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ANNUAL REPORT

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KERALA AGRICULTURAL UNIVERSITY
KAU (PO) - 680 656, Thrissur

ANNUAL REPORT 2008 - 2009

July 2009

Copies : 300

Printed and Published by :

Registrar
Kerala Agricultural University,
KAU (P.O.) 680 656, Thrissur

Printed at :

Kerala Agricultural University Press,
Mannuthy-680 651, Thrissur

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GENERAL REPORT

The Executive Committee of the Kerala Agricultural University presents to the General Council its annual administration report for the year 2008-2009 (1st April 2008 to 31st March 2009).

The report pertains to the general administration, education, research, extension, library and information service, students welfare, engineering works, estate and campus development and finance and accounts. The lists of members of the statutory authorities, staff at various campuses, projects operated under Directorate of Research are also appended.

Designation	Name	Period (from 1.4.07 to 31.3.2008)
Chancellor	His Excellency R.L. Bhatia Governor of Kerala	
Pro- Chancellor	Mullakkara Ratnakaran Hon'ble Minister for Agriculture	From 1-4-2008 to 31-3-2009
Vice Chancellor	K.R.Viswambaran	2008-'09
Registrar	Dr.Jobi V.Paul	2008-'09
Comptroller	Dr.E.Nanu Dr.U.Ramachandran Dr.E.Nanu Shri. P.M. Devadas	1-4-08 to 7-4-08 8-4-08 to 30-4-08 1-5-08 to 17-7-08 FN 17-7-08 to 31-3-09
Director of Research	Dr.D.Alexander	2008-'09
Director of Extension	Dr.M.K.Sheela Dr. C.B.Mano mohan Dr.M.K.Sheela	1-4-08 to 14-7-08 15-7-08 to 30-8-08 1-9-08 to 31-3-09
Director of Physical Plant	Suresh Babu i/c	2008-'09
Director of Students Welfare	Dr.Jose John Chungath Shri. E.U. Rajan	1-4-08 to 16-6-08 17-6-08 to 31-3-09
Director (Acad & PG Studies)	Dr.P.K.Asokan	2008-'09
Deputy Director of Students Welfare	E.U.Rajan	2008-'09
University Librarian	K.P.Sathian	2008-'09
Dean (Agriculture)	Dr.K.Harikrishnan Nair Dr.Sasikumaran Nair Dr.K.Harikrishnan Nair	1-4-08 to 15-1-09 16-1-09 to 16-2-09 16-2-09 to 31-3-09
Dean (Veterinary)	Dr.E.Nanu Dr.P.C. Saseendran Dr.E.Nanu	1-4-08 to 5-10-08 6-10-08 to 7-11-08 8-11-08 to 31-3-09
Dean (Fisheries)	Dr.D.Damodaran Nambudiri Dr.C. Mohanakumaran Nair	1-4-08 to 12-12-2008 13-12-08 to 31-3-09
Dean (Agrl.Engg.)	Dr.S.Ganesan i/c	2008-'09

Other Officers

Assoc. Dean (Horti.)	Dr.P.K.Rajeevan	2008-'09
Assoc. Dean (Forestry)	Dr.P.K.Asokan Dr.B. Mohan Kumar Dr. K. Gopikumar Dr.B. Mohan Kumar Dr. K. Gopikumar	1-4-08 to 19-8-08 20-8-08 to 30-10-08 1-11-08 to 31-1-09 1-2-09 to 27-2-09 28-2-09 to 31-3-09
Assoc. Dean (CCB & M)	Dr.U.Ramachandran	2008-'09
Assoc. Dean (COA Padannakkad)	Dr.I.John Kutty	2008-'09
Assoc. Dean (CV&AS) Pookot	Dr.P.B.Balakrishnan	2008-'09
Assoc. Dean (CDS&T), Mannuthy	Dr.R.Rajendra Kumar Dr.P.I. Geevarghese Dr.R.Rajendra Kumar	1-4-08 to 18-8-08 18-8-08 to 15-9-08 FN 15-9-08 to 31-1-09

EDUCATION

The following ten educational institutions functioned under the university during the period. Various courses offered in these institutions are given below:

Name of College	Course offered
College of Agriculture, Vellayni	B.Sc.(Ag), M.Sc (Ag.), M.Sc. (Hort) & Ph.D M.Sc (Home Sc.)
College of Horticulture, Vellanikkara	B.Sc.(Ag), M.Sc (Ag.), M.Sc. (Hort) & Ph.D M.Sc (Home Sc.) M.Sc.(Ag. Stat)
College of Agriculture, Padannakkad	B.Sc. (Ag)
College of Veterinary & Animal Sciences, Mannuthy	B.VSc & A.H., M.Vsc and Ph.D
College of Fisheries, Panangad	B.F.Sc and M.F.Sc
Kelappaji College of Agri. Engineering & Technology, Tavanur	B.Tech (Agri. Engineering) and M.Tech (Agri. Engineering)
College of Coconut Seed Farm-operation, Banking and Management, Vellanikkara	B.Sc. (C & B) and M.Sc. (C & B)
College of Forestry, Vellanikkara	B.Sc. (Forestry) and M.Sc.(Forestry)
College of Dairy Science and Technology, Idukki	B.Tech (D.Sc. & Tech)
College of Veterinary. & Animal Science, Pookode, Waynad	B.V.Sc & A.H.

Admission

Students are admitted to the U.G. courses of the University except B.Sc (C & B) on the basis of the rank obtained in the common entrance examination conducted by the Government of Kerala. In the absence of common entrance test for B.Sc (C & B), University conducted, the admission based on the ranks obtained by students at Plus 2 level. For PG Courses, selections are made based on entrance examination conducted by the Kerala Agricultural University. Semester system of instruction continued in all the colleges.

The number of students admitted:

A(i) UG Programme	
B.Sc (Ag)	147
B.VSc & AH	106
B.Sc. (Forestry)	20
B.F.Sc	37
B.Sc (C & B)	40
B.Tech (Agri. Engineering)	39
B.Tech (DS)	21
Total	410

<i>A (ii) PG Programmes</i>	
Agronomy	3
Plant Pathology	3
Plant Breeding & Genetics	2
Ag. Entomology	2
Soil Science & Agrl. Chemistry	1
Horticulture	6
Ag. Economics	1
Forestry	3
Co-operation & Banking	5
Plant Biotechnology	6
Fisheries	6
Veterinary Sciences	39
Home Science	8
MBA Agrl. Business Management	30
Total	115
<i>A (iii) Ph.D Programmes</i>	
Agriculture	7
Veterinary	6
Fisheries	1
Total	14

Number of students passed out from 1.4.2008 to 31.3.2009

1	B.Sc (Ag)	116
2.	B.VSc & AH	104
3.	BFSc	41
4.	B.Sc (C & B)	48
5.	B.Tech (Ag.) Engineering	16
6.	B.Sc. (Forestry)	21
7.	B.Tech (D.Sc & Tech)	19

Masters Degree Programme

1.	Agronomy	4
2.	Plant Pathology	9
3.	Plant Breeding & Genetics	4
4.	Agrl. Extension	7
5	Agrl. Entomology	4
6	Soil Science & Agrl. Chemistry	1
7	Agrl. Economics	2
8	Plant Physiology	2
9	Forestry	4
10.	Plant Biotechnology	8
11.	Co-operation & Banking	4
12.	Fisheries	7
13.	Veterinary Science	33
14.	Agrl. Statistics	1
15.	Home Science	7
16.	Horticulture	13
17.	Agrl. Engineering	6
	Total	116

Doctoral Programme

1	Agriculture	13
2	Veterinary	6
	Total	19

Extra-curricular activities of the students and co-curricular activities were co-ordinated by the Director of Students Welfare through physical education teachers and other teachers of the various colleges.

The Kerala Agricultural University continued to be a member of the Associate of Indian Universities and the Indian Agricultural Universities Association, New Delhi.

Research

Human resources, skills and technologies required for the sustainable development of agriculture in Kerala are provided by Kerala Agricultural University, which is the exclusive organization for the state. Research activities of the University are undertaken to increase the productivity of crops, livestock and fisheries through manipulation of the genetic base, improvement in the management practices, control and management of pests, diseases and parasites, increasing the efficiency of biophysical and human resources, designing policies and programmes and fabrication and refinement of machineries suitable for Kerala agriculture.

The research programmes of the university are mainly operated through the following six Regional Agricultural Research Stations located in different agro-ecological zones.

Agro-ecological zone	Regional Agricultural Research Stations
High range Zone	RARS, Ambalavayal
Northern Zone	RARS, Pilicode
Central Zone	RARS, Pattambi
Special Zone of Problem Areas	RARS, Kumarakom
Onattukara region	RARS, Kayamkulam
Southern Zone	RARS, Vellayani

Dr. D.Alexander acted as the Director of Research and was also holding charge of ADR (General Administration). The Associate Directors of Head Quarters were Dr. P.C. Alex (V&AS), Dr.A.Augustin (AR&T), Dr.V.K.Raju (Farms), Dr.Sajan Kurien (Planning, M&E) and Dr.T.R.Gopalakrishnan [Officer on Special Duty (Seeds)]

Associate Directors of Research in charge of various zones:

High range Zone, Ambalavayal	Dr.V.S.Devadas
Northern Zone, Pilicode	Dr.B.Jayaprakash Naik
Central Zone, Pattambi	Dr.S. Pathummal Beevi
Special Zone of Problem Areas, Kumarakom	Dr.K.G.Padmakumar
Onattukara region, Kayamkulam	Dr.Sverup John
Southern Zone, Vellayani	Dr.P.Sivaprasad

In addition to the above, five Associate Directors were taken charge for the effective mission work related to food security of the state. They are as follows:

Dr.P.V.Balachandran (Paddy Mission)

Dr.P.C.Balakrishnan (Coconut Mission)

Dr.L.Rajamony (Vegetable Mission)

Dr.M.Subramonia Iyer (Soils)

Dr.M.S.Sheela (Plant Protection&Biocontrol Agents Production)

Dr.G.S.L.H.V.Prasada Rao (Meteorology & Disaster Management)

Research support for sustainable development of agriculture sector in the state is rendered in close association with other research institutions of Indian Council of Agricultural Research, Commodity Boards and Development departments of the State and Central Governments.

Over 500 research projects are in operation in KAU, including 47 All India Co-ordinated Projects/Network Projects, 14 Ad-hoc Projects, 2 NAIPs, 51 KSCSTE projects, 51 SHM projects, 48 RKVY projects, 139 other externally aided projects funded by Western Ghat Cell and Govt. of India. Faculty Research Committee (FRC) constituted in all the four faculties vets the KAU research projects. The 66th and 67th FRC meeting of the Faculty of Agriculture were held on 03-05-08 and 06-03-09 respectively. The 49th FRC meeting of the Veterinary & Animal Sciences Faculty was held on 31-03-09. Fisheries Faculty had its 24th FRC meeting on 03-11-08. The 18th FRC meeting of the Engineering Faculty was held on 28-05-08.

During the period under report the Director of Research and ADRs of Head Quarters visited various research stations of KAU. They attended high-level meetings of the University including FRC meeting. In addition, they attended Coconut Mission meeting, review meetings of RKVY projects, seeds and planting material production at different centres, paddy mission activities, ZREAC meeting of different zones. Directorate of Research conducted mini package of practices workshop and prepared the adhoc package of practices recommendations for organic farming.

ADR (Farms) visited the farms attached to various Research Stations and proposed activities for their development.

ADR (Paddy Mission) actively involved in activities for increasing the production of paddy in the state especially for bringing fallow lands and uplands under paddy cultivation. Paddy mission activities achieved to bring about 14560 ha of fallow land under cultivation and increase in production to the tune of 50000 to 60000 tons.

ADR (Coconut Mission) and the mission members put concerted effort for the control of the seriously occurred bud rot disease of coconut in Maruthankara panchayat of Kozhikode District and Balal, West Eleri&East Eleri panchayats of Kasaragode District. Management of root (wilt) affected palms is being carried out in Thazhakkara and Pathiyoor panchayats of Alleppey Dist.

ADR (Vegetable Mission) prepared the action plan of Vegetable Mission Programme for 2009-10 for boosting vegetable production in Kerala and attended the review meeting of 1000 organic vegetable village scheme of the Govt. of Kerala.

ADR (Plant Protection & Biocontrol Agents Production) prepared the action plan for the establishment of Plant Protection and Biological Control Agent Production Centre.

ADR (Soils) took initiative for the establishment of Stationary Soil Testing Labs and Mobile Soil Testing Labs one each at Vellayani, Vellanikkara and Padannakkad campuses.

ADR (Meteorology & Disaster Management) took lead for the implementation of Integrated Agromet Advisory Service – A multi – institutional programme in collaboration with IMD, ISRO, CUSAT, Planning Board and Department of Agriculture and it was initiated in all 14 districts with KAU expertise and weekly agromet advisory services are being prepared and disseminated to the farming community. A centre for climate change reseach was established.

Research Highlights

Rice and Rice based Cropping System

- Medicinal rice Njavara and scented rice IET 13553, IET 13552 and Pusa Basmati-1 can be successfully cultivated in Onattukara.
- Rice variety Bhagya recorded the highest grain yield of 3.96 t ha⁻¹ in uplands of Onattukara followed by Jyothi (3.60 t ha⁻¹).
- Varietal combination Swarnaprabha + Makaram followed by C3-2KM + Makaram were consistent in their performance in Kootumundakan for over five years.

- Superior rice cultures 9401-2, 9409-12 with medium stature, good, compact, sturdy plant habit and having pest and disease tolerance were identified.
- Three extra short duration rice cultures developed through re-selection in Hraswa were found promising in station trials and were recommended for farm trials in kole lands.
- Rice culture C26T (b) developed by hybridization and selection between Mahsuri x Vytilla 3, was recommended for farm trial in kole lands for salinity tolerance.
- Among the seven high yielding, non lodging, awnless rice cultures identified for the salinity prone Kaipad paddy tracts of Northern Kerala, JK 70 and JO 345 were recommended for release.
- MK 157, a high yielding, medium duration, non -lodging, wetland rice culture with good cooking quality developed at PRS, Panniyur was found promising and accepted by farmers.
- Photothermic indexing done with 20 entries planted at 28 days interval showed that by delaying sowings, the number of days taken to attain panicle initiation stage was reduced by 2 to 6 days while the flowering and grain filling (ripening) period were reduced by 2-14 days and 2-13 days respectively except in IET 20312 (2 days less required for panicle initiation stage and 2 days more required for flowering and maturity period).
- Radiation use efficiency done in 81 entries showed that IET 20998, IET 20981, IET 21032 and IET 21005 recorded grain yield of 3270 kg, 3140 kg, 3080 kg and 3010 kg respectively whereas Aiswarya recorded 2690 kg per hectare as local check.
- Among the seven aerobic rice entries tested with alternate weekly wetting and drying cycles, starting from 15 days after planting through maturity, PHB 71 recorded fifteen per cent more grain yield followed by Swarna Prabha Sel-3-1 and Naveen compared to normal irrigation.
- Application of 40:20:20 kg N, P₂O₅ and K₂O ha⁻¹ recorded the highest grain yield in Njavara (917 kg ha⁻¹) in Onattukara.
- The positive influence of rice yield in pokkali fields due to tidal action can be attributed to the washing away and reduction of toxic products and increase in the nutrient content in the soil especially exchangeable K and increase in the dissolved oxygen content of flood water.
- Slow release nitrogen fertilisers had little effect on rice yield in pokkali fields.
- Under conditions of high floodwater coupled with low tide affect, the germination and survival of direct sown seeds of pokkali suffers the most and cannot be practiced as an alternate method unless adequate water regulation is ensured.
- The seedling establishment was found more influenced by the soil acidity than salinity in acid saline soils of pokkali.
- GI registration for pokkali was obtained under the initiative of KAU with support from Pokkali Land Development Agency.
- Pre-emergence spray of pretilachlor @ 0.45 kg ai/ha 3-4 DAS and one light hand weeding 28 DAS contributed to the highest net income in the wet sown rice fields of kole land.
- Application of P fertilizers is a must in wetland rice since skipping of phosphorus fertilizers delays flowering, reduce crop growth and yield and delays maturity of rice.
- In sequential cropping of rice, application of 50% of the nutrient requirement (on equivalent nitrogen basis) as organics (FYM, rice straw, green manure) and 50% as fertilizers during kharif season and the entire dose of nutrients as fertilizers in rabi

season enhances the grain and straw yield at Karamana. The organics may be incorporated 3 weeks before transplanting.

- Application of 25% of the nutrient requirement as organics and 75% as fertilizers during kharif season and reducing the fertilizer dose of rabi by 25% gives comparable yield with full PoP recommendation during both seasons at Karamana. Thus a savings of 50% fertilizers is possible in double-cropped rice cultivation.
- Under organic farming practices in rice based cropping systems, a very high rice equivalent yield of 18t/ha per annum is possible.
- SRI management gave higher yield and profit compared to Farmers practice. However in places where farmers follow KAU Package of Practices recommendations, SRI management techniques were not promising.
- The performance of the rice variety Annapoorna under SRI with spacing 20 cm x 15 cm of 20 days old seedlings was superior in grain yield.
- Balanced nutrition with major nutrients is highly required for maintaining the productivity of rice and soil health. The indiscriminate use of pesticides can be reduced through balanced nutrition and maintaining the soil health.
- The most important constraint in the productivity of rice was found to be the optimum plant density and it was followed by application of organic manure.
- The rice fallows in summer season can be diversified and intensified with vegetables where there is assured irrigation. Among the vegetables evaluated, Rice-Rice-Yard long bean recorded maximum gross income and net returns to the tune of five to six times than Rice-Rice-Fallow double cropping system.
- Conceptualization of "Food Security Army" was initiated through Agro Machinery Operations Service Executives (AMOSE), Agro Machinery Operations Service Centre (AMOSC), Mobile Agro Machinery Training Unit (MAMTU), Mobile Agro Machinery Repair and Service Unit (MAMRSU), Farm Machinery Facilitation Centre (FMFC) at ARS, Mannuthy.
- Application of organic manures either as FYM or green manure is good for higher rice yield and restoring soil fertility in acidic sandy loam soils.
- Permanent Manurial Trial (Tall indica) has completed 48 years and Permanent Manurial Trial (Dwarf indica) has completed 36 years of experimentation at RARS, Pattambi. During the period under report, irrespective of the season, maximum grain and straw yield were obtained for the integrated use of fertilizers and cattle manure. Continuous application of nitrogenous fertilizer alone or inorganic fertilizers alone was found to have detrimental effect on the growth and yield of rice.
- The long term fertilizer evaluation completed 12 years at RARS, Pattambi. In both the seasons, highest grain and straw yield were recorded by the treatment, which received 100%NPK (as per POP of KAU) along with FYM @5t/ha. However, this was on par with the treatment receiving 100% NPK + *in situ* growing of *Sesbania aculeata*, green manure crop.

Coconut and Other Palms

- The coconut genotypes Kudat, Philippines Lono and St. Vincent superior to other genotypes in terms of nut and copra yield/palm were proposed for release.
- The coconut genotype Malayan Green Dwarf was proposed for release as a variety suitable for tender nut purpose.

- In general the coconut hybrids were superior to WCT and other varieties in nut yield. The copra yield/palm/year was higher in the hybrids indicating the superiority of hybrids over other varieties.
- The severity of arecanut yellowing in Kannur district was found low in well managed plots.
- Continuous absence of phosphorus in the presence of N and K drastically reduced the growth of coconut leading to yield reduction and death of the palm necessitating the balanced application of NPK on a long term. The increased dose of N and K continuously for the past 45 years could sustain the yield of coconut in deep red loam soil of southern Kerala.
- Closer planting (5m x 5m) without fertilizer application drastically affected the growth and yield of coconut palms. Closer spacing induced the tendency of leaning of palms in search of light with higher vegetative growth at the expense of nut production.
- Fertilizer management could increase the general yield of intercropped clove in coconut garden.
- Under the comprehensive coconut care programme for root (wilt) affected area in Onattukara, 1000 palms each from Thazhakkara and Pathiyoor gramma Panchayaths were selected. Initial survey conducted indicated that Rhinoceros beetle, coconut coreid bug are predominant pests infesting coconut palms of the project area. Among the diseases, root (wilt) was observed in 97.8% palms in Thazhakkara compared to 76.4% in Pathiyoor. Leaf rot infestation was found to be severe in both the locations (99%) and was of medium severity.

Vegetables

- A high yielding amaranth 'Kannara Local' was proposed for farm trial.
- Identified the resistant source of leaf blight caused by *Rhizoctonia solani* in *Amaranthus dubius*. Hybridisation to incorporate the resistance to *A. tricolor* is in progress. A high yielding amaranth line (*A. dubius*) genotype Am 88 was given for farm trial.
- Mosaic resistant F₂ and BC₁F₄ segregants of bitter gourd developed at the Collge of Horticulture were evaluated.
- Farm trials are going on with snake gourd accession, TA-19-1 at Thrissur, Ernakulam, Palakkad and Malappuram districts.
- High yielding and yellow vein mosaic resistant F₆ generation okra segregants were developed out of the cross *Abelmoschus caillei* x *A. esculentus*.
- Among the 20 accessions of ash gourd, highest yield was recorded by AP 7 followed by AP 3, AP 10, AP 4 and AP 5. These accessions were tolerant to mosaic.
- Five accessions of chilli were found to be resistant to both bacterial wilt and mosaic during field evaluation involving fifty-three chilli accessions.
- In bird pepper (*C. frutescens*), genotype CF 51 was identified as high yielding both in shade and open condition and proposed for release.
- In hot chilli / mali mulaku (*C. chinense*), genotype CC 30 was the top yielder followed by CC 13 among thirty two genotypes in southern districts of Kerala.
- Among the fifteen paprika accessions collected from different parts of the country, the accession Paprika - 2 recorded highest yield.
- The yields of chilli and amaranth were improved under rain shelter whereas the yield of determinate variety of tomato Mukthi was better under open situations.

- Wedge grafting on three week old tomato and four week old brinjal root stocks were successful for grafting tomato to reduce bacterial wilt disease. Three hybrids from IAHS, Bangalore- Ruchi, Indam 519 and Naveen 2000 were grafted using the standardized method. The highest yielder was Indam 519. The survival percentage was 100 for grafted plants whereas for non grafted ones, it ranged from 63.5 to 75. The spotted wilt incidence was less in grafted plants.
- When tomato was grown under organic farming soil organic carbon content increased except in plots that were supplied with crop residues alone.
- Yield of oriental pickling melon varieties Mudicode and Soubhagya was significantly higher when planted in trenches as compared to pit system of planting during both rabi and summer seasons
- In snake gourd variety Kaumudi, a spacing of 2m x 2 m and a fertilizer dose of 150 % of the recommended dose of NPK were found optimum and economic.
- Selected 10 pole types and 12 bush types of hyacinth bean and maintained for further comprehensive evaluation.
- Tetraploid and triploid Ivy gourd were developed which were found to be high yielding and having less astringency.
- Superior drumstick genotypes Viz. MO-144, MO-95, MO-70 and AD-4 were recommended for release.
- Limb cuttings of drumstick (*Moringa oleifera*) clones collected from different parts were established. Higher yield was recorded by the clones MO 27, MO 13 and MO 8.
- Technology for cultivation of cool season vegetables like cauliflower and cabbage in the plains of Kerala was standardized.
- Promising varieties of cool season vegetables for Wayanad conditions were identified.
- Model vegetable gardens were raised in the homesteads of 128 farmers in Thrissur, Palakkad and Ernakulam districts.

Sugar and Tuber Crops

- In sugarcane, Madhuri, Madhumathi and Co Tl 93116 were selected for standardization of agrotechniques for maximising jaggery yield and recovery percentage.
- Agrotechniques were standardized for the advanced zonal cultures of sugarcane viz., Co 2000-10 and CoTl 1153.
- Spraying ethrel at 500 ppm four months after planting was found to be effective for controlling flowering, improving the quality of the product and staggered harvesting in sugarcane variety Madhuri.
- Application of 75 % of the recommended dose of NPK as inorganic and 25 % as organic (FYM) in plant and ratoon crop of sugarcane is found to be superior with respect to cane and sugar yield.
- Planting sugarcane in double row at spacing of 30cmx60cm recorded higher cane yield.
- NPK recommendation for cassava can be reduced up to 50% if khondolite @ 1 t ha⁻¹ and FYM @ 12.5 t ha⁻¹ are applied along with chemical fertilizer. Full substitution of chemical fertilizers with khondolite is possible if khondolite is applied at a higher rate of 2 tons ha⁻¹.
- Yield reduction was noticed in coleus when inter nodal cuttings were used as planting material.
- Lesser yam followed by elephant foot yam was found to be the best intercrop in banana variety Njalipoovan. The fertilizer recommendation for the system was 50 % of the

recommended NPK for the intercrops (NPK 40: 30:50 kg ha⁻¹ for elephant foot yam and 40:30:40 for greater yam and lesser yam) and full PoP for the main crop of banana.

Fruits

- Among the banana varieties screened for fibre recovery percentage, Nendran gave the maximum fibre recovery.
- Planting three suckers per pit at a spacing of 2m x 3 m and giving 100% recommended dose of fertilizers resulted in higher per hectare yield in banana var. Nendran.
- Irrigating at 80 percent ER (Evaporation Replenishment) or 0.8 IW/CPE at all growth stages was ideal for Nendran for maintaining proper growth and yield.
- Turmeric proved to be the most profitable intercrop with rainfed nendran.
- In banana, application of coir pith compost registered the highest yield of 7.46 kg/plant, application of nutrients in three splits registered the highest bunch weight of 7.50 kg /plant and application of chemical fertilizers recorded the highest net return of Rs.1, 90,000/annum. Among the different organic sources tested, poultry manure registered the highest net income (Rs.1, 78,00/-).
- The protocol for production of tissue culture plants of the pineapple hybrid variety Amritha was standardized.
- One pineapple hybrid, one clonal variant of pineapple and one yellow variety of passionfruit developed at PRS, Vazhakkulam are under farm trial.
- Presence of pineapple mealy bug and wilt associated virus were detected in Vazhakulam area.
- Paclobutrazol application in mango indicated the positive response of trees, recording increased flowering. In unproductive old trees, even cauliflorous flowering could be induced by severe pruning and cultar application.
- Eight diverse mango types suitable for dessert purpose have been identified from Nileshwar block of Kasaragod and Taliparamba of Kannur districts and character described using NBPGR Descriptors. Kunhimangalam, Nambiar Mango, Gomanga, Kilichundan, Kappakka manga, Kurukkan, Kunteni, Cherymanga are the types collected.
- The most effective propagation method in jack was inarching where the graft take was 90% with a final success percentage of fifty.
- A novel technique was developed for rapid production of jack grafts. The whole process of production of a finished graft (seed to field) will take only 60 days.

Floriculture

- Hybrids of more than 60 cross combinations and mother plants belonging to 40 varieties of Anthurium (*Anthurium andreaenum* Linden)are being maintained and promising hybrids have been selected.
- Based on the evaluation conducted under two climatic conditions viz., Vellanikkara, (Trichur) and Nelliampathy (Palakkad), cut flower varieties of anthurium- Aymara, Titicaca, Benicito and Chichas are found ideal for the plains (Vellanikkara) and Salasaga, Caesar, Esmeralda, Titicaca and Benicito for higher altitudes (Nelliampathy) of Kerala. Among the pot plant varieties, Trampolino, Mia, Condor, Coralis and Pumasillo are recommended for the plains (Vellanikkara) and Mia, Condor, Excellent and Bonina for higher altitudes (Nelliampathy) of Kerala.
- Five novel varieties in monopodial orchids were identified. They are Vanda Vellayani TMA Diane, Aranthera Vellayani Maggie Beatrice, Ananthera Vellayani James Maggie, Dendrobium Vellayani Chiangmai Royale and Dendrobium Vellayani Chao Red..

- Aquatic plants can be classified into deep-water aquatics (*Nymphaea alba*, *Nymphoides indica*), shallow water plants (*Nelumbo nucifera*), submerged ones (*Utricularia australis*, *Najas minor*), marginal plants (*Ipomoea aquatica*, *Hygrophysa aristata*) and bog plants (*Angelonia salicariae folia*, *Crinum viviparum*). Among the different media combinations, sand and clay (1:2) and sand + soil + clay (1:1:1) were found to be best for vegetative growth and flowering respectively.
- Application of inorganic fertilizers improved vegetative as well as floral characters in *Dendrobium*. Plants receiving NPK 30:10:10 @ 0.1% with vermiwash (3%) and panchagavya (3%) produced maximum number of large sized flowers.
- Poultry manure either alone @ 29.23 t ha⁻¹ or in combination with chemical fertilizers 100:50:50 kg NPK ha⁻¹ + poultry manure @ 22.22 t ha⁻¹ are beneficial for growth and yield in tuberose.
- Irradiation was carried out in fifteen flowering plants, twenty five foliage plants, fourteen cut flowers and 100 *in vitro* cultures. Mutants were evaluated and promising variants in tuberose, coleus, aralia, philodendron and monstera were multiplied for further field trials.

Spices and Plantation Crops

- Among the intervarietal hybrids of black pepper planted during 2000, P6 x P 5 is found to be promising which recorded the maximum green berry yield of 2.5 kg/vine and it is recommended for release.
- Among the black pepper cultures evaluated, Cul 5489(PRS) recorded the maximum green berry yield of 3.8 kg/vine followed by IISR cultures - Cul 1041 and HP 105 with 2.5 kg/vine in 2008-09.
- Karimunda, a shade tolerant pepper variety exhibited higher Net Assimilation Rate and lower carbon isotope discrimination than shade sensitive variety Panniyur-1 under very low light intensity.
- Integrated nutrient management is superior to organic and inorganic farming in black pepper.
- Pepper is incompatible with sapota, *Casuarina*, coffee, rubber, *Glyricidia*, subabul and guava. Just as *Erythrina*, trees like jack, wild jack, mango, cashew, *Bombax*, portia, neem and teak are good standards for trailing pepper.
- Among the twenty seven ginger varieties maintained, Maran, V2E5-2 and Rio- De-Janeiro are the best.
- In ginger, fertilizer application as per the recommendation of KAU gave the highest yield (6.88Kg/plot) followed by application of FYM+ *Azospirillum* (6.64Kg/plot).
- A new variety of cashew (Selection 990) evolved at CRS, Anakkayam has been approved for release.
- Of the 87 diverse cashew types identified, PLD -4 was found to be superior to all the other accessions collected.
- The cashew hybrid MDK -1 x PLD-57 was found to be close to the dwarf male parent in growth characteristics recorded.
- The cashew nut yield per ha was significantly higher under the planting density of 600 plants / ha. Higher nut yield per ha was recorded with the fertilizer dose of 75: 25: 25 kg NPK /ha.
- DOCGERM , a user friendly portable software package which gives information about the cashew accessions in the germplasm for the 68 descriptor data fields at the fingertip was installed at CRS, Madakkathara.

- 134 cocoa hybrid seedlings resistant to *Phyophthora* pod rot were field planted during the year.
- Soil moisture stress for one to one and a half months during November-December is sufficient to induce flowering in vanilla. Soil moisture stress altered the physiological and biochemical parameters in vanilla, which could be used to visually assess the extent of moisture stress in the garden.
- For inducing flowering in vanilla, spraying of growth regulators like NAA and Ethrel each at 100 ppm and GA 50ppm during November was found effective. Spraying NAA 50 or 100ppm at monthly or trimonthly interval and spraying BA 50ppm at monthly interval on fruit bunches improved the size and weight of vanilla beans and vanillin content.
- Performanace of spiny coriander (*Eryngium foetidum* L) was found best under 75 percent shad level and at a closer spacing of 10 cm X 15 cm. In general, as the intensity of shade increased, performance of the crop was better.

Pulses and Oil seeds

- Among the seven entries of cowpea tested for the yield and disease reaction, CP-11 recorded significantly higher yield (742.31 kg/ha) with moderate reaction to anthracnose followed by CP-12 (622.50kg/ha).
- Among the seven entries of horse gram tested for the yield and disease reaction, HG-41 recorded significantly higher yield (842.99 kg/ha) followed by HG-40 (741.04kg/ha) with no disease incidence.
- Foliar application of micronutrients, Fe and Zn increased the yield of cowpea.
- Combined application of *Rhizobium* and Phosphorus solubilizing bacteria without chemical fertilizers produced higher yield of cowpea and this was on par with the yield obtained at 100% recommended dose of chemical fertilizers.
- Effectiveness of PSB on the productivity of cowpea was higher when it was integrated with higher quantities of organic manure under lower levels of chemical N and this was significantly superior to the treatment with 100% recommended dose of fertilizers.

Forage and Green manure Crops

- Identified two high yielding guinea grass clones with better adaptability.
- Two promising rice bean and fodder cowpea cultures were developed for release.
- Developed two promising bajra-napier hybrids.
- Among the different grass- legume mixtures tried, guinea grass + cowpea was found to be the best grass legume combination for the humid tropical situation for the highest fodder production and effective soil moisture conservation.

Aromatic and Medicinal Plants

- Accession -2 of long pepper is superior (665 kg/ha) to the existing high yielding variety 'Viswam' (508 kg/ha).
- Among the 25 accessions of Plumbago, Accession-10 a local collection from Trichur District and Accession-9 from Thuruthissery recorded significantly higher number of roots. Accession-24 from Pulppara recorded maximum fresh root weight. Accession -1 from Vellanikkara recorded maximum Plumbagin content.
- Out of the 42 accessions of Asoka, accessions collected from Thrissur and Trivandrum showed vigorous growth represented by its increased height, number of leaves and higher girth of the stem.

- A large variation was observed in the phenotypic characters of the ecotypes of brahmi collected from different places of the state.
- Brahmi plants having shorter inter node with fleshy bigger size leaves and non flowering and late flowering accessions contain more therapeutically important constituent Bacoside A. Accession -29 was identified as better plant for higher biomass yield and Bacoside A content followed by Accession-14. Accessions received from coastal region have higher biomass and higher Bacoside content.
- Agrotechniques were developed for *Ficus* species of the 'naalpamara' medicinal group.
- Plants of *Ficus* group can be propagated vegetatively. Stem cuttings of 15-25 mm diameter are ideal for rooting. Success ranged between 10 and 20%. Air layering on the twigs of old trees during May-June is the most suitable vegetative propagation method, the success rate ranges from 40 to 80%.
- Palakappayyani (*Oroxylum indicum*) requires good sunlight for its best performance.
- Seedling of *Oroxylum indicum* is to be manured with FYM @ 20 kg/ plant/year or poultry manure @10kg/ plant/year in two doses for optimum growth.
- *Caesalpinia sappan* (Chappangam) should be left unpruned and supported with poles during the initial years for good crop architecture with larger stem diameter.
- Domestication package for the medicinal plant jeevakom was formulated.
- The maximum growth and quality (bacoside content 5.88%) of brahmi was observed at 5 months after planting and hence the best time for harvest of brahmi is 5 months after planting.
- The combined application of organic manures with biofertilizers gave the highest biomass and dry matter yield of brahmi than application of organic manures alone. The fresh and dry yield and bacoside content were the highest when coirpith compost was applied in combination with Azospirillum and Phosphorus solubilizing bacteria.
- The best time for the harvest of *Sida cordifolia* is 8 MAP with respect to fresh and dry yield of the crop.
- *Sida cordifolia* cannot tolerate shade and maximum growth and yield was obtained under open condition.
- *Aegle marmelos* (koovalam), *Bacopa monnieri* (brahmi), *Psidium guajava* (guava) and ayurvedic medicines Triphalachoornam, Draksharishtam and Chyavanaprasam were found to possess high *in vitro* antioxidant capacity.
- Methods of extraction, HPLC analysis of polyphenolic components and assay of antioxidant capacity of medicinal plants by five different methods were developed and validated.
- *Argyreia speciosa*, *Ipomoea mauritiana* and *Artanema sesamoides* showed high anti-inflammatory activity in animals. Activity was significantly high in the ethanol extract of the roots of *Artanema sesamoides* followed by *Argyreia speciosa*.
- Roots of *Artanema sesamoides* were high in the content of phenolic compounds.
- The barks of the *Saraca asoca* and its major adulterant in market *Polyalthia longifolia* can be differentiated physically by observing lenticels on outer bark and smoothness of inner bark and chemically by haemagglutination assay.

Post Harvest Technology

- Standardized technology for the preparation of four forms of jaggery viz., liquid, semisolid, solid (ball form) and powder with improved quality.

- Standardised the mechanized extraction of banana fibre. Prototypes of different products were prepared.
- The protocol for minimal processing of the fruits and vegetables like jackfruit, breadfruit, pineapple, cowpea, coleus and elephant foot yam was developed.
- Modified atmosphere packaging coupled with refrigerated storage prolonged the shelf life, reduced physiological loss in weight and microbial population in fresh cut products.
- Vacuum concentration of snapmelon pulp and placenta was found advantageous as it reduces the bulk of raw material and provide easiness for storage with shelf life of approximately one year. The concentrate can be reconstituted to different value added products.
- Different value added products viz., jam, sweetened juice, squash, wine, sauce, blended beverages and rind based products viz., jelly, wine, pickle, pulp and rind mixed products viz., jam, jelly, sauce, wine, blended beverages etc were developed using watermelon.
- The watermelon pulp was identified as good source of lycopene and the content ranged between 4.10-5.55%. The netted type of Goa was found to possess maximum lycopene content. Protocol for extraction of lycopene colour from watermelon flesh was developed.
- An “instant mix” with watermelon colour concentrate and condensed milk was developed using vacuum concentration and spray drying technology. The product can be used as a basic material for preparation of naturally flavoured and coloured milk, ice-cream, shakes, halwa etc.
- Standardized the recipe for the preparation of sweetened concentrated coconut milk and coconut toffee.
- Standardized production of Kasthuri turmeric powder, a value added product.

Soils and Agronomy

- The lean flow in river Achenkovil is decided by the volume of ground water exploited in the midland and highland portion of the catchments. Effective measures need to be adopted to maintain the lean flow in Achencovil River by adopting water harvesting methods and constructing storage structures.
- Vermicomposting with leaf loppings of *Bombax*, guava, *Macaranga* and *Casuarina* as substrate, resulted in significantly higher compost output compared to banana pseudostem.
- A database on homestead farming system of Kerala was created. The average size of homestead was less than 0.4 ha in as much as 70 per cent of the homesteads surveyed.
- The homesteads were found to be repositories of biodiversity. One hundred and thirty different species of plants were identified in a 0.4 ha homestead. The soils were generally low in available N and medium in available P and K and were acidic in nature.
- High density multi species cropping system in coconut garden has great impact on productivity and economic viability. The treatment coconut+ banana+ amorphophallus+vegetable cowpea/amaranthus was found best for higher productivity and profitability.
- Sub surface zone with high concentration of exchangeable Al exists in laterite soil of the pepper garden of College of Horticulture and the by-product phospho gypsum was found to be a good ameliorating agent for the sub soil acidity.
- Application of the different amendments namely leaves of *Pongamia pinnata*, *Cleistanthus collinus* and lime significantly improved the available P and soluble P in

laterite soil. The radio active Phosphorus activity measurements indicated that the applied P is routed through the inorganic fraction Ca-P and not coming to the labile pool.

- A target yield equation was developed for pumpkin in second crop of rice and test verified in two locations one each at Palakkad and Thrissur district. In both the locations the targeted yield was achieved and hence the STCR technology was found to be superior.
- Development of protocol for quality control of commercial organic manures and their evaluation showed that none of the 44 commercial organic manures collected from manufactures all over Kerala confirmed completely to the quality standards specified by FCO Amendment Order, 2006 of Government of India.
- Analysis of raw material revealed that leather meal was the best source for N, bone meal and pressmud for P and pressmud for K. Mathematical models were also developed for predicting the N, P, K contents of any mixture of bone meal, leather meal and neem cake.
- Dairy industry waste was found to have ameliorative effect on soil acidity. It improves the soil quality indicators by reducing bulk density and increasing water holding capacity, organic matter status and microbial count.
- A multiple linear regression equation has been developed to estimate total coconut production of Kerala seven months ahead. Such models are also developed in the case of cashew for estimating the cashew production of the State before the crop harvest commences.
- A sound database has been developed on onset of monsoon and rainfall for the State of Kerala since 1871 onwards.
- If the onset of monsoon is early (before 25th May), the monsoon rainfall over Kerala is likely to be below normal.
- The quality of monsooned Malabar coffee appears to be better if the monsoon activity is good. Monsoon breaks like in 2002 adversely affected the quality of coffee to a greater extent.
- The economic impact of Agromet Advisory Service (AAS) showed that there was a benefit in the case of AAS farmers when compared to non-AAS farmers.
- An eight node cluster super computer was installed at CUSAT, DAS for running the WRF model. It is made operational for the weather forecasting three days ahead.
- The time series analysis of the weather data (temperature, relative humidity, rainfall, evaporation) collected for the past 25 years from Vellayani, Balaramapuram, Vellanad and Kottarakkara revealed that with respect to the total annual rainfall, there is a decrease towards the southern parts of the State as indicated by data from Vellayani and Balaramapuram. While the monsoon rainfall exhibits a low degree of variability, the summer rains (December – April) poses problems to the farmers with a very high degree of variability. Portable data acquisition systems have been installed in the representative sites located in the 5 districts of the southern zone. Pests and disease score cards have been prepared.
- Rendered agro-advisory services to the farmers based on medium range forecast issued by NCMRWF (National Centre for Medium Range Weather Forecasting, New Delhi), DST, Govt. of India.
- Received the ICAR best centre award for the AICRP (Ag.met.) centre functioning at the College of Horticulture, Vellanikkara.

Seed Technology

- Standardised the procedures for chemical test like Peroxidase reaction, NaOH test, Phenol colour reaction, lugol reaction and Potassium dichromate test to analyse the seed purity in 10 rice varieties based on the biochemical component of seed.
- Confirmed the utility of ODV(Other Distinguishable Variety) identification as a pointer towards genetic purity in seed quality testing.
- Paddy seeds stored in poly –lined jute bags under air-conditioned store retain their viability for longer period (four months) compared to that stored in ordinary jute bags (two months), after they were removed from the air-conditioned environment and then stored under ambient conditions. Seeds stored in jute bags exhibited poor viability compared to that in HDPE bags and poly-lined jute bags both under conditioned and ambient environment.
- Okra fruits can be harvested for seed purpose at 18 days and 24 days after anthesis in Aruna and Salkeerthi respectively for getting maximum germination percentage and vigour index.
- Maximum germination and vigour in tomato (Mukthi) was observed when the seeds were extracted manually by fermenting the pulp and then drying in shade.
- Fresh seeds of *Ficus racemosa*, *F. microcarpa*, and *F. religiosa* have poor germination capacity, which can be tremendously increased by soaking the seeds in hot water (65°C) for 10 minutes before sowing.
- In *F. religiosa*, germination started on 8th day of incubation and prolonged upto 35 days.
- In *F. racemosa* and *F. microcarpa*, there was drastic decrease in germination percentage after six months of extraction. In *F. religiosa* viability started declining after 12 months whereas *F. benghalensis* seeds retained satisfactory viability even after 18 months.
- Storing seeds in refrigerator retained the viability of the seeds of *F. racemosa*, *F. religiosa* and *F. benghalensis* upto two years.

Plant Protection

- The major species, yellow stem borer, *Scirphophaga incertulas* was dominating during the early tillering and maximum tillering phase of rice while pink stem borer, *Sesamia inferens* was dominating in reproductive phase of the crop. The white stem borer, *Scirphophaga innotata* was maintaining a low status during all the stages of crop growth.
- The common species of leaf folder, *Cnaphalocrocis medinalis* was dominating the early tillering and maximum tillering phase of rice while another species *Marasmia patnalis* was dominating during the reproductive stage of the crop.
- The major species of rice bug dominating in rice fields of Pattambi is *Leptocorisa oratorius* and other species found were *L. acuta* and a small sized bug (Identity yet to be established).
- Leaf roller incidence was significantly low in IPM plots when compared with farmers practice.
- Among the new insecticides tested, Flubendiamide 39.35% SC @ 25g a.i./ha was effective and superior to monocrotophos @ 500 g a.i./ha against dead heart caused by stemborer.
- The pink stem borer incidence was significantly higher in SRI plots (9.12 and 8.52 % in Jyothi and hybrid) compared to normal system of cultivation (NSC) (3.80 and 4.84 % in Jyothi and hybrid). Leaf folder incidence was also high in SRI than in NSC.

- The IPM modules(spraying with eco-neem 1% at 15, 30, 45, 60 & 75 DAT with six release of *Tricogramma japonicum* against stem borer and *T. chilonis* against leaf folder and spraying with Eco-neem 1% at 15, 45 & 75 DAT and chemical insecticides viz., Cartaphydrochloride @ 500 g a.i./ha at 25 DAT & Spinosad at 60 DAT with three releases of *T. chilonis* against leaf folder) resulted in a higher grain yield of 2500 and 2567 kg/ha compared to farmers practice (1933 kg/ha) with superior cost benefit ratios.
- Earhead blackening incidence in rice was minimum (5%) in plots which received bavistin 50% WP@ 500 g/ha.
- Farm trials conducted in Malappuram and Palakkad districts showed that Fuji-one 40E @ 1.5ml / l was effective for controlling the blast disease of rice and can be recommended.
- The plant oils- lemon grass oil and cinnamon oil and the biocontrol agents- *Trichoderma viride* and *Pseudomonas fluorescens* were found effective in reducing the sheath blight severity in rice.
- Rodent attack in coconuts was effectively managed by integrated tactics at Mathilakam block panchayat.
- In sugarcane ratoon crop, pre emergence application of the herbicide Metribuzine 1 kg ai/ha along with hoeing 45 days after ratoon initiation was found to be effective in controlling weeds.
- The pest surveillance on banana in Thrissur Dist. recorded pseudostem borer, rhizome weevil, banana aphid, leaf caterpillars and root mealybug as major pests.
- Survey conducted revealed that, the major diseases of banana in Thrissur Dist. are leaf spot diseases; viral diseases like bunchy top, banana bract mosaic, infectious chlorosis, and rhizome rot. Panama wilt was observed on varieties like Rasthali, Kadali and Njalipoovan.
- Taxonomic study of root mealy bugs showed that there are two species infesting banana, namely, *Geococcus citrinus* Kuwana and *G. coffeae* Green.
- The nematode genera commonly encountered in Thrissur, Palakkad and Ernakulam were *Rotylenchulus* and *Tylenchorynchus*.
- Rotting on the pseudostem of banana var. Kadali observed in Thrissur district was due to the fungus *Sclerotium sp.*
- Sigatoka leaf spot disease in banana could be effectively managed by spraying Propiconazole (Tilt 25 EC) 1 ml/l (0.1%) + spraying of *Pseudomonas fluorescens* @ 5 g/ litre three times.
- In the management of *Phytophthora* foot rot disease of black pepper, defoliation and death of vines were significantly low in plants treated with Potassium Phosphonate+ *Trichoderma*.
- Developed and evaluated management methods including MAT & BAT for the effective management of mango fruit fly.
- The pathogens causing die back disease of mango graft in nursery were identified as *Colletotrichum gloeosporioides* (Penz) Sacc and *Otryodiplodia theobromae* Pat. The fungicides viz 1% Bordeaux mixture, 0.15 % Copper hydroxide, 0.3% Captan, 0.1% hexaconazole and carbendazim and the bioagents *Trichoderma viride* and *Pseudomonas fluorescens* (2% each) were equally effective in the management of the disease. Two varieties, Alphonso and Malgoa were found highly resistant to die back disease. The highest Phenol content was recorded in Alphonso followed by Malgoa.

- The pathogens causing the leaf blight disease of mango graft in nursery were identified as *C. gloeosporioides*, *Pestalotiopsis mangiferae*, *Cylindrocladium mangiferae*, *Drechslera australensis* and *Alternaria alternata*.
- Survey on pests of jack showed the occurrence of 12 species of insects and mites.
- Diseases of jack recorded were leaf spot disease & fruit rot caused by *Colletotrichum gloeosporioides*, Rhizopus fruit rot and pink disease caused by *Corticium salmonicolor*.
- Assessed the bioefficiency of biorational insecticides for managing the key pests of jasmine.
- Hot spot areas of infestations of nematodes were identified in paddy, banana, pepper, ginger, turmeric, kacholam, thippali and koduveli and depicted in the map for the use of farmers and extension personnel.
- Management of root- knot nematode infesting bitter gourd using organic amendments showed that the yield was highest with neem cake (11.5 tons per ha) followed by Jatropa cake (10.0 tons per ha) with an ICBR of 1:3.12 and 1:3.0 respectively. These treatments were better than the chemical carbofuran with an yield of 8.2 tons per ha.
- Management of root- knot nematode in okra with biopesticides revealed that *Trichoderma harzianum* is the best in increasing the yield (8.3 tons per ha) followed by *Pochonia chlamydosporia* (7.8 tons per ha).
- Management of nematode complex in banana in two locations showed that the highest yield (12.25 kg) was obtained in sucker treatment (paring+ hot water treatment) + carbofuran (0.05 g/a.i per plant) + neem cake (1kg/plant)).
- The pest risk analysis in paddy due to *Meloidogyne graminicola* in nursery and main field revealed that in the nursery 90 per cent damage was due to this nematode alone while in main field, damage was assessed in terms of yield (grain and straw). The yield reduction being 50 to 60 per cent in field with an initial nematode population of 217 to 300 larvae per 200 g soil.
- The pest risk analysis in banana, an initial population of 266 *Radopholus similis* per 200 g soil resulted in 50 per cent reduction in yield (bunch weight) of banana (9.5 kg per plant as against 18.0 kg in Nendran variety and 3 kg per plant as against 5- 6 kg in healthy plants of Robusta and Poovan variety.)
- The pest risk analysis in vegetables (bitter gourd and cucumber) revealed that a population of 247 *M. incognita* per 200 g soil at one month after sowing recorded 33 per cent loss in yield (10 to 15 t/ha as against 40-45 t/ha).
- Management of root – knot nematode in vegetable by adopting various cropping systems prevalent in the area showed that there was 20 to 22 percent reduction in nematode population in the soil due to the non preferred host sweet potato variety Sree Bhadra when compared to preferred host okra, followed by brinjal and chilli.
- Management of nematodes on banana using bioinoculants like *Bacillus macerans*, *Trichoderma viride*, *Pseudomonas fluorescens*, *Pochonia chlamydosporia* reduced the nematode population, improved the vigour of the plants and induced earliness in flowering by three weeks.
- Survey for the incidence of diseases in cowpea in Palakkad district showed the incidence of collar rot caused by *Rhizactonia solani*, mosaic caused by cowpea mosaic virus and rust caused by *Uromyces vignae*.

Biotechnology

- Isolated and carried out molecular characterization of native isolates of *Bacillus thuringiensis* against *Spodoptera mauritia*.

- Molecular markers detected for bacterial wilt and ToLCV resistance in tomato.
- Developed F₂ population in tomato for mapping disease resistance gene.
- Developed Stress related Expressed Sequence Tags in Black pepper.
- Developing RILs in tomato through Single Seed Descent method.
- *In vitro* pollination in turmeric was attempted and seed set and development was obtained in the media. : Half MS + 2x vitamins + BA 1 mg l⁻¹ + Kintin 1 mg l⁻¹ + Picloram 0.2 mg l⁻¹ + Sucrose 3% + Phytigel 0.18% Half MS + 2x vitamins + BAP 0.5 mg l⁻¹ + Kinetin 1 mg l⁻¹ + NAA 0.5 mg l⁻¹ + Sucrose 3%.
- Seed set was obtained in Kacholam, through *in vitro* placental pollination with pollen grains suspended in ME₃ medium. Culturing medium identified for ovule development is ½ MS + 2, 4-D 0.2 mg l⁻¹.
- Genetic diversity of *Pseudomonas fluorescens* of western ghats was assessed by RAPD and Rep PCR. Molecular diversity was noticed and both the techniques were equally effective
- Nitrogen fixers, 81 P solubilizers, 25 *Pseudomonas fluorescens*, 22 *Trichoderma* and 16 lignin degraders were isolated
- The P-solubilizing bacterium PB1 solubilized 34.5µg/ml within 7 days.
- Two pigment producing bacteria were identified by 16S rRNA sequencing as *Serratia marcescens* and *Chromobacterium violaceum*.
- The native isolate Pf-10 of *Pseudomonas fluorescens* produced maximum antagonism index of 199.2 on the bacterial wilt pathogen *Ralstonia solanacearum*.
- A repository of 500 native *Bacillus thuringiensis* isolates was prepared.
- Full length *Cry1Ac* gene from the isolate KAU 474 was cloned.
- 10 isolates recorded 100% mortality in bioassay experiments with the test insect *Diaphania indica*.
- The parasporal crystal protein *cry46* from the native isolate KAU 41 produced cytoplasmic blebbing, cytoskeletal alterations and nucleus condensation in Dalton's Lymphoma Ascites tumour cells under *in vitro* conditions.
- Standardised cheap protocol for large scale production of tissue culture in banana.
- Standardised the protocol for tissue culture production of true to type plantlets of orchids.
- Identified the enzyme markers like peroxidase, superoxide dismutase, proline etc. for salinity tolerance screening.
- Cataloguing of cashew germplasm with molecular markers and digitizing the morphological data was done with hundred cashew accessions, 50 from Cashew Research Station, Madakathara, 25 from Anakayam and 25 from Pilicode which were unique to the stations.
- Sixty cashew accessions which were more unique based on the RAPD and morphological markers were chosen for the AFLP analysis and standardized the technique of AFLP in cashew based on 6 primer combinations.
- Standardized the tissue culture techniques for mass multiplication of *Plumbago*.
- Developing and updating a Database on Indian Spices, Rice, Spices and Herbs, Improved Crop varieties at KAU, Farmers Portal.

- Based on *in silico* work by screening various phytochemicals, promising leads were identified to treat different genetic disorders as follows which have to be confirmed by further wet lab experiments:
 - Convolvine and Curcumin in Parkinson's disease
 - Curcumin and baccoside in Alzheimer's disease
 - Piperine against lung cancer

Economics, Extension and Statistics

- Three Kazhchakula demonstration plots have been laid out and supported by providing critical inputs in Tholur Panchayath of Thrissur District.
- Two Kadali banana sucker production plots have been laid out at KAU and Ayanikkad, Tholur Panchayath. Nine Kadali demonstration plots were continued as ratoon crops.
- Software was developed for monitoring the production and sale of farm produce in connection with the establishment of a network for computerization of sales and farm stock maintenance.
- Majority of the farmers in Kerala, Karnataka, Tamilnadu and Andra Pradesh preferred urea for its high crop response, reasonable price and reputed practice.
- Impact assessment of cluster approach showed a considerable change which indicates that the financial assistance in the form of subsidies together with the farmer participatory approach proved successful in implementation of the cluster programme.
- Many of the Pesticides used in pine apple include chemicals which are banned for sale in Kerala (Endosulfan), and those permitted for restricted use only (2 Methoxy ethyl mercury chloride). The pesticides which are suggested on a need based manner is applied on a prophylactic approach. The application level is higher than the recommended level of the chemical by 0-550 % in pine apple and 0 to 900 % in bitter gourd. Despite relatively higher literacy and formal education, the knowledge and awareness level with respect to pesticides were found to be far less than satisfactory.
- The SWOT analysis and participatory evaluation of the selected agro ecological units of Palakkad district highlighted the importance of farming and agri-related sectors for providing livelihood security of the district and outlined the strategies to be devised. A spatial integration of crop, livestock and other agro-related enterprises under the aegis of Krishibhavans by integrating other line departments and major programmes like NREGS in a participative manner with the support of local bodies should be the strategy for the development of agriculture in Palakkad.
- Regarding perception of farmers on governmental interventions for resolving the agrarian crisis, interest free loan, "Padashekara Samithi" based rice group farming loan availing scheme and subsidies for inputs are found to be more useful.

Beneficial Organisms

- In rice, significantly high incidence of dead heart, white earhead and leaf folder were recorded in conventional farming compared to BIPM cultivation. The grain yield and the population of spiders and coccinellids were significantly high in BIPM.
- The coccinellid and spider counts were significantly high in organic farming.
- In coconut, the pest population came down significantly after the release of natural enemies compared to control. Lowest pest count was recorded in *Goniozus nephantidis* released palms.
- A highly virulent strain of the entomopathogenic fungus *Metarrhizium anisopliae* on coconut root grub *Leucopholis coneophora* was isolated at CoA, Padannakkad and

named as Padanekkad strain. Another new entomopathogenic fungus *Fusarium cocophilum* is found infecting on coconut root grub.

- All the grubs and pupae of *Oryctes rhinoceros* were found diseased 15 days after treatment of *Metarrhizium anisopliae* var. *major* and the fresh incidence of attack was very low in palms.
- Entomofungal pathogens viz., *Verticillium lecanii*, *Fusarium pallidroseum*, *Beauveria bassiana*, *Metarrhizium anisopliae* were found effective for the control of *Aphis craccivora* in cowpea.
- Significant reduction in spider mite population was observed in bhindi after the release of anthocorid predator *Blaptostethus pallescens*.
- The ants collected as predators of cashew tea mosquito bug in Madakkathara area are *Oecophylla smaragdina* Fabr., *Camponotus compressus*, *Crematogaster* sp. and *Tetraponera* sp., belonging to the family Formicidae. The common spiders preying on cashew mirid bug collected are *Hyllus diacanthus* (Salticidae), *Telamonia elagans* (Salticidae), *Oxyopes sunandae* (Oxyopidae) and *Oxyopes swetha* (Oxyopidae).
- Developed four consortial formulations of bioagents with shelf life of 6-12 months viz., *Trichoderma harzianum* + *Bacillus megaterium*, *T. harzianum* + *T. viride*, *T. harzianum*+*Pseudomonas fluorescens* and *B. megaterium* +*P. fluorescens* for the management of *Phytophthora* rot of black pepper, vanilla and bacterial wilt of chilli.
- Potential antagonistic endophytic fungi, *Trichoderma viride* and *T. pseudokoningii* from black pepper were isolated for the first time.
- Potential antagonistic endophytic bacteria, *Bacillus megaterium* which is reported to be phosphorus solubilizing bacteria was isolated from black pepper for the first time.
- Combined application of *Trichoderma harzianum*+*Pseudomonas fluorescens* is the best combination for the management of rhizome rot and bacterial wilt of ginger and bacterial wilt of chilli.
- 50% coconut water, a cheap liquid medium has been developed for the mass multiplication of *Trichoderma*, *Pseudomonas* spp. and *Bacillus* spp. The concentration of coconut water can be further reduced to 25% by the addition of nutritional supplements like $MgSO_4$ (2g/l) or dextrose (15g/l) for the mass multiplication of both *Trichoderma* and bacterial bioagents. In addition, tapioca powder @ 5g/l can be used in case of *Trichoderma*. Dried coconut leaf bits + neem cake at the ratio of 9:1 is a good economic solid substrate for the large scale multiplication of *Trichoderma* spp.
- Developed a consortium of Biofertilizers with the native organisms isolated from different tracts of Kerala for Nitrogen and Phosphorus nutrition of black pepper, vanilla and other crop plants of Kerala.
- Developed a compatible consortium of PGPR isolates from Kerala soils for growth promotion and suppression of phytopathogens in black pepper, vanilla and other crops of Kerala.
- Catering the need of pure cultures, technology consultancy etc. for 27 microbial production units in Kerala including State Biocontrol lab, State Biofertilizer production centres, 14 private firms and NGOs.
- Developed highly potential *Beauveria* and *Verticillium* for effective management of Pseudostem weevil of Banana and aphids of vegetables.
- Application of Biofertilizers- Arbuscular Mycorrhiza, P solubilizers and *Azospirillum* is useful to produce healthy and vigorous cashew seedlings in the nursery.

- A biofertilizer production unit has been established at AHADS, Attappady to cater the requirement of tribal farmers of Attappady.
- Efficient antagonistic fungi and native PGPR capable of suppressing dreadful pathogens such as *Phytophthora* and *Xanthomonas* infecting betel vine were isolated from rhizosphere and phyllosphere of healthy betel vine plants.
- Paddy straw was selected as best substrate for oyster mushroom (*Pleurotus* sp.) cultivation giving early spawn run, mushroom production & maximum yield for all species.
- Mushrooms packed in pin pricked PP bags and in PP bags without ventilation under refrigerated condition recorded maximum shelf life.
- *Auricularia* spp., Jew's ear Mushroom could be successfully cultivated on paddy straw supplemented with wheat bran. Several recipes were standardized using *Auricularia* spp. This Mushroom can be recommended for cultivation through out the year.
- Organic recycling by use of compost/green manures and mulching with coconut leaves/coconut husk increased the population of beneficial microorganisms-bacteria, fungi, actinomycetes- thereby achieving better rhizosphere in the coconut basin. Broad bed furrow was the most effective for increased infiltration and ground water recharge.

Agroforestry and Silviculture

- Among *Acacia mangium* provenances, Papua New Guinean performed better in the humid high rain fall conditions of Kerala. Provenances of Upper aramia, Oriomo and Arufi Village were the better performers in overall growth.
- Nilambur Teak provenances such as Cherupuzha, Nedumkayam-1 and Karuali showed better growth.
- Heavy annual pruning to the extent of up to 50% tree height is not advisable for a fast growing tree species like *Acacia mangium*.
- Highest tuber yield of the medicinal shrub *Plumbago rosea* intercropped with *Acacia mangium* was observed in the moderately dense *A. mangium* stands (2.33 kg; 1250 trees ha⁻¹) while the lowest crop yield was observed from heavily stocked stands (0.90 kg; 5000 trees ha⁻¹).
- In 7-year-old *Acacia mangium* stands, soil nitrogen, phosphorus and potassium showed only modest response to planting density and pruning while highest organic carbon content was observed in the moderately dense stands (2.63%; 2x2 m).
- Growing of black pepper (*Piper nigrum*) in a 12-year-old *Acacia mangium* stand managed at various thinning regimes revealed better pepper vine growth under heavily thinned stands (533 trees ha⁻¹). Results suggest the possibility of intercropping with *A. mangium* through judicious regulation of stand stocking.
- Early observations in the silvo-pastoral system involving four fast growing fodder tree species and fodder grass species suggest that *Gmelina arborea* showed better growth among the fodder tree species. Among the fodder grass species, hybrid napier showed better growth irrespective of tree species. Maximum herbage production was in combination with *Pterocarpus marsupium* (1.51 Mg ha⁻¹).

Food Science and Nutrition

- About 53.68 per cent male and 49.8 percent female agricultural labourers had stage I hypertension which is related to their food and living habits.
- Among women coir workers, the intake of most of the food groups and nutrients were found to be lower than RDA. About 70 per cent of women working in organised sector

and 85 per cent in unorganised sector had anaemia. All the women coir workers had negative energy balance.

- Evaluation of marine and fresh water fish products showed that constituents like moisture, fat, calcium, phosphorus and iron and peroxide values were comparatively high in marine fish products viz., cutlet and sticks whereas, fresh water fish varieties had highest protein and vitamin A content. All the organoleptic qualities were superior for fresh water fish products. Shelf life of the product irrespective of fresh water or marine varieties with acceptable maximum total plate count was found to be 30 days.
- Nutritional profile studies of women participatory in kudumbasree programmes revealed the emerging trend that rural women at the subsistence level have high potentials as economic providers for their households and could act as promoters of health and nutrition of families.
- Meat analogues were prepared using green gram as the base, blended with soyabean and wheat in different proportions among which, 60% green gram, 10% soya and 10% wheat can be recommended as meat analogue with acceptable qualities. This product can also be used in therapeutic diets as a source of good quality protein of acceptable sensory qualities comparable to meat but without the adverse effects of meat.
- Developed 6 good banana based probiotic fermented food mixtures.

NAIP

- The project to resolve the Agrarian Crisis in Wayanad was initiated.

Veterinary & Animal Sciences

- The progeny cows born through artificial insemination on dam cows reared by farmers in the field using highly pedigreed bulls are capable of producing 500 kg more milk than their previous generation and 300 kg more milk than their contemporaries.
- Conserved the only native cattle of Kerala (Vechur cattle) which happened to be the smallest breed of cattle in the world studied so far. This precious germplasm is maintained as mother stock and all scientific analysis was carried out to expose the profile of this breed to scientific community.
- The alpha-LA gene of vechur cattle has been cloned and completely sequenced.
A centre was established to multiply and propagate vechur cattle breed to interested farmers. The farmers interested in Vechur farming were given special training on various aspects of farm techniques and the importance of native germplasm.
- Prediction equations were developed for estimation of body weight of Malabari goats using chest girth, paunch girth, body length and height at withers for below one, three and six months of age.
- An index was constructed with the objective of increasing milk production together with the body weight at different ages of Malabari goats by incorporating dam's peak yield as one of the traits. This index had the r_{IH} value of 0.5703.
- The Pig Breeding Center has evolved and implemented on a trial basis the terminal sire system of breeding for production of three breed combinations with Duroc as terminal sire (i.e. Duroc as terminal sire and crosses of Desi, Large White Yorkshire and Land race).
- Under the field condition swill feed was found to be equally effective compared to concentrate feed in producing growth of the fattener pigs.
- Phytase supplementation increased body weight gain, dry matter intake and mineral availability (Calcium, Phosphorous and Manganese) in pigs. Phytase supplementation of ration decreased feed cost per kg body weight gain.

- The supplementation of chromium propionate can be beneficially used to improve the lipid profile of the cross bred pigs.
- Angamali Pigs were found to be different from other indigenous pigs of Kerala on Phylogeny analysis.
- The local pigs were genotyped using 25 microsatellite markers.
- A DNA bank consisting of 337 genomic DNA samples of Indian Elephants was established
- A panel of microsatellite markers was set up in Indian Elephants which could be useful in individual identification, verification of percentage, testing of inbreeding among wild populations and other purposes such as wild life census and forensics.
- The rabbit farm is functioning as a source of seed materials on various breeds of broiler rabbits. 557 Rabbits were supplied to various farmers and a regular contact programme is arranged to clear their problems whenever required.
- Diallel crossing using three breeds of rabbits to find out the best suited rabbit meat breed for Kerala showed that White Giant male X Grey Giant female cross was found to be the best meat producer.
- Four breeds of rabbit viz., Soviet Chinchilla, New Zealand White, White Giant and Grey Giant are maintained as mother stock.
- Developing a new grass variety “Thumburmuzhi- I” suitable for agro climatic zone of Kerala with a crude protein content of 17.5%, 120 tillers and biomass 500 t/ha /year.
- Developed agricultural practices for new fodder grass varieties.
- “Thumburmuzhi model compost unit” for farmers waste management and rural income generation is ready for demonstration and implementation.

NAIP

- The project to develop Herbal Acaricides Against Ticks in Animals was initiated.

Agricultural Engineering

- Different versions of tractor operated rotovators, post-hole diggers, paddy seeder and multipurpose minitiller were evaluated.
- Ten different paddy combines were field evaluated for their efficiency.
- Zero till drill for pulses & daincha and Raised bed planter for upland paddy & pulses were successfully evaluated in rice fallow for the first time in Kerala to utilize the residual soil moisture.
- Three micro sprinkler methods were studied. The ALBL micro sprinkler and KAU micro sprinkler had the maximum B-C ratio but the initial investment of the KAU micro sprinkler is the lowest. Hence the irrigation method with KAU micro sprinkler is recommended.
- One KAU micro sprinkler in the centre of the pit, in the three banana suckers per pit is the best irrigation method.

Fisheries

- *Chela frasciata* Silas, an indigenous ornamental cyprinid of the Western Ghats was found to be a multiple spawner with protracted spawning season with the individual spawning intermittently.
- *Puntius pookodensis* is a multiple spawner with a protracted spawning season with the individual spawning intermittently.

- Growth of *Penaeus monodon* in monosex and mixed sex culture under laboratory conditions over a 50 days period showed that growth was significantly more in all female culture than in all male or mixed sex culture and there was no significant difference in survival.
- *Penaeus monodon* showed highest growth rate and survival when the blue green alga *spirulina fusiformis* was used as a supplementary protein source in the diet along with clam meat compared to clam meat alone.
- The extracts of mangrove leaves *Avicennia officinalis* and the seaweed *Gracilaria costicata* showed strong antimicrobial activity and have the potential to be used as alternatives to antibiotics in aquaculture. The active principle was indicated as a polysterolic lipid quinone with isoprenoid side chains.
- Threadfin bream (*Nemipterus japonicus*) and bulls-eye (*Priacanthus hamrur*) surimi and sausage were effectively identified by comparing their SDS-PAGE pattern with species specific SDS-PAGE pattern in their extracts of water soluble proteins and salt soluble proteins. Adulteration/substitution with their species could be identified by the same technique.
- The accessory nidamental gland (ANG) in the Indian squid, *Loligo duvanceli* could be classified into four stages namely immature, ripening, ripe and spent. High antibacterial activity against gram negative bacterial strains, *Escherichia coli* and *Pseudomonas aeruginosa* and gram positive *Staphylococcus aureus* was detected in the ANG-butanol extracts of ripe glands. Further investigations pointed at unsaturated fatty acid components in the extract as the possible active principles.
- In composite culture of carps substrate based biofilm led to significant enhancement in growth and survival.
- Stock identification and genetic characterisation of prawns from different states done with DNA markers like RAPD.
- The detection kit for white tail disease (WTD) of *Macrobrachium rosenbergii* is in the final stages of development.
- Polyculture of mud crabs, *Scylla serrata* and *S. tranquebarica* along with brackish water fish species enabled to achieve better production from wet land farming system.
- A combination diet of trash fish along with pelleted feed was found to be an efficient diet for achieving better growth and production of mud crab under culture condition.

Seeds and Planting Material Production

Under KAU Seed Authority, production and distribution of quality seeds and planting materials of different crops and fish seeds worth Rs.3.25 crores was achieved.

Finance

The university formulated the budget estimate for 2007-2008 showing Rs.11932 Lakhs as receipt and Rs.15539 Lakhs as expenditure in anticipation of Grant in aid for Rs.6771 Lakhs under Non Plan and Rs.2100 Lakhs under plan from the State Government. ICAR assistance of Rs.1375 Lakhs, Rs.257 Lakhs from other Externally Aided Projects, Rs.1019 Lakhs from Internal resources and Rs.410 from Institutional Finance were also anticipated.

CHAPTER I

GENERAL ADMINISTRATION

The Kerala Agricultural University came into existence on 1st February 1972 under the KAU Act 1971 (Act 33 of 1971).

The Main Campus of the University at Vellanikkara is 13 km east of Thrissur-Palakkad Highway (NH-47). The College of Horticulture, College of Forestry and the College of Co-operation, Banking and Management are located at the Main Campus. The University has seven other teaching campuses, viz. College of Veterinary & Animal Sciences, Mannuthy, College of Fisheries, Panangad, College of Agriculture, Padannakkad, College of Agriculture, Vellayani, Kelappaji College of Agricultural Engineering and Technology, Tavanur, College of Dairy Science and Technology, Idukki (presently functioning at Mannuthy), College of Veterinary and Animal Sciences, Pookode. Development works related to the two Campuses, College of Veterinary and Animal Sciences, Pookode, Waynad and College of Dairy Science and Technology, Idukki are under progress. In addition to this the University has 30 major research stations distributed throughout the State. Some of the Stations are also recognised as centres for PG research of the University. When the NARP was implemented in the University, five of these stations were recognised as Regional Agricultural Research Stations. They are located at Pilicode, Ambalavayal, Patambi, Kumarakom and Vellayani. ORARS, Kayamkulam was started on 12.4.2000 so as to continue the works in root wilt disease of coconut and to implement a comprehensive coconut care programme.

The University received financial assistance mainly from the State Government and ICAR. Financial assistance was also received from outside agencies like NATP, Department of Science & Technology, DBT, Department of Atomic Energy, Spices Board, Coconut Development Board etc.

OFFICERS OF THE UNIVERSITY AND ADMINISTRATIVE SET UP

The Officers of the University are the Chancellor (Governor of Kerala), the Pro-Chancellor (Minister of Agriculture), the Vice-Chancellor who is the Chief Executive and Academic Officer of the University.

The Vice-Chancellor is also the ex-officio Chairman of the General Council, Executive Committee and Academic Council. The Vice-Chancellor is the principal executive and academic officer of the University who is assisted by the Registrar, the Comptroller, Deans of Faculties, the Directors of Research, Extension, Physical Plant, Students Welfare and the Librarian holding tenurial positions and recognised as the Officers of the University. In addition, the Director of Academic and Post Graduate Studies assists the Vice-Chancellor in Academic affairs.

The General administrative control is vested with the Registrar while the Comptroller is responsible for budgeting finance, statements of accounts and audit. The co-ordination, direction and administration of research activities in the University are vested with the Director of Research. The Director of Extension is responsible for the extension education and public relations. The Deans and Associate Deans of the various colleges are in charge of resident teaching and instruction of the respective colleges. The Director of Physical Plant is the custodian of the University properties and in charge of the construction and maintenance of buildings, roads, vehicles and machinery.

AUTHORITIES OF THE UNIVERSITY

The statutory authorities of the University are the General Council, the Executive Committee, the Academic Council, the Faculties and the Board of Studies of each faculty. The lists of members of these bodies are appended.

General Council

The supreme authority of the University is the General Council. The Council is reconstituted every three years. The XIV General Council was constituted on 18.6.2008 for a period of 3 years. Ordinarily the Council meets once in four months. During the period under report 3 meetings were held.

The Executive Committee

The Executive Committee is the chief executive authority of the University. The Executive Committee is reconstituted in full on 29.4.09. During the period under report, 6 meetings were held.

Academic Council

The Academic Council is responsible for maintenance of standards in educational programmes and examinations in the University. The Academic council shall exercise such other powers functions conferred upon it by statutes. During the year 2007-08, 2 meetings were conducted. The tenure of the existing AC was over on 27-12-09.

The Academic Council was reconstituted wef. 29.12.2008, for a period of three years.

Major decisions taken by the Academic council were the following

- Regulations governing the project guidelines of MBA programme in Agricultural business management approved.
- Decided to offer Phd. Programme in Biotechnology.
- Syllabus for B.Tech. Agricultural Engineering, B.Tech. Dairy Science & MFSc. (Fisheries) revised.
- Decided to have research collaborations with IIHR Bangalore & University of Maryland, USA under an MOU.
- Decided to implement Raghavan Committee report on suggested by Supreme court of India, to prevent ragging in the campuses.
- Decided to implement Lyndong Committee report in students Union elections of University.
- Decided to strengthen examination using.
- Decided to have reservation of seats for administration to B.Sc. C. & B., for physically challenged candidates.
- Recommended to change the nominative of the degree B.Tech. Dairy Science & Technology to B.Tech. Dairy Technology to match the national pattern.

During the period students of Kerala Agricultural University has excelled in the All India Competitive Examinations conducted by ICAR for the award of Junior Research Fellowship. Kerala Agricultural University was judged as the best University with respect to number of JRG was during the year. The 2nd function on the presentation of Sardar Patel Gold Medal Award for academic excellence was held on 14.11.2007. Dr. Thomas Issac, Hon'ble Finance Minister delivered Dr. K.N. Shyamasundaran Nair Endowment Lecture on "Agriculture – Challenges and Threats" on 20.08.2007.

Sub Committees of GC and Executive Committee

The details of Sub Committees of General Council and Executive Committee are included in the Appendix.

Faculty Research Committee

The main duties of the Faculty Research Committee are to scrutinize the research proposals received from different co-ordinators and to review the progress of research periodically. The four Faculty Research Committees viz., Agriculture, Veterinary, Fisheries & Agrl. Eng. meet once during the report period.

Co - ordination Groups

The various project co-ordination groups organised are authorities to critically examine the research proposals received from Project Leaders, Principal Investigators and to review the progress in the concerned group. The number of such groups under each faculty are Agri-30, Vet-10, Fisheries-5 and Agri Engineering sub divisions-4.

Faculty Improvement

The members of the academic staff were provided with opportunities to acquire higher qualifications by granting deputation, study leave or leave for study purposes. They were also sent for short-term training courses, summer institutes etc. in different specialised centres and for participating in seminars, symposia, workshops etc., organised by different scientific agencies/ICAR institutes/SAUs.

Labour

Farm labourers constitute a major category of personnel in the University. Two categories of workers-casual and permanent exist in farms and research stations under the Kerala Agricultural University. In respect of service conditions and wages, generally the University follows Government orders applicable to the labourers of the Department of Agriculture and Animal Husbandry. Total labour strength in the report year is 1566 Permanent labourer -- 971 and Casual labourer – 595.

**Tour programme of Shri. K.R. Viswambharan, Vice Chancellor
during the period from 01-04-2008 to 31-03-2009**

Visited the paddy field at Kuttanad with District Collector, Alleppey and other officials to help the farmers for harvesting the paddy. And also accompanied with the high level team visited from New Delhi to assess the damages/loss to the farming community due to the heavy rainfall - on 01-04-2008.

Attended the subject committee meeting in the Chamber of Minister for Agriculture, Trivandrum on 02-04-2008.

Inaugurated the function conducted by the Agri-Horti Society, Palakkad on 07-04-2008.

Attended the programme on paddy harvesting from the Nedupuzha Chamakole Padasekharam with the help of KAU students on 9th and 10th April 2008.

Attended the function "**Clean Kerala Mission**" conducted at College of Fisheries, Panangad on 11-04-2008.

Attended the one day workshop on "**Setting up of University of Fisheries and Ocean Sciences in Kerala (UFOS)**" arranged at Govt. Guest House, Ernakulam on 15-04-2008.

Visited the College of Agriculture, Vellayani to chair the Scientists meet and to attend the "**XXVII Zonal Research Extension Advisory Council (ZREAC)**" meeting on 23rd and 24th April 2008.

Attended the Board meeting of the "**State Medicinal Plants Board**" in the chamber of Hon'ble Minister for Health & Social Welfare, Thiruvananthapuram on 29-04-2008

Attended the "**One day State Level Interface Programme**" chaired by Agri. Production Commissioner at Trivandrum. & Laid foundation stone for the "**Vegetable Seed Complex**" at College of Agriculture, Vellayani on 07-05-2008.

Attended the "**National Honey-Mango Fest-2008** organized in collaboration with State Horticulture Mission, Kerala Agricultural Department, Kerala Agricultural University and HortiCorp at Chandrasekharan Nair Stadium, Trivandrum on 08-05-2008.

Attended the "**Pre-Workshop on 30th Zonal Research Extension Advisory Committee (Central Zone) meeting**" at Regl. Agri. Research Station, Pattambi on 20-05-2008.

Attended the "Kerala Legislative Assembly – Subject Committee-I" meeting arranged at 'VD' Conference Hall, Trivandrum on 23-05-2008.

Attended the **State Level Inauguration of the Water Management Training Scheme** at Agronomic Research Station, Chalakudy and visited Cattle Research Station, Thumburmuzhi and Aromatic and Medicinal Plant Research Station, Odakkali on 24-05-2008.

Attended the *Inter-Ministerial meeting to discuss the implementation and funding of the M.S. Swaminathan Research Foundations Recommendations on Idukki-Meeting* at Krishi Bhavan, New Delhi on 28-05-2008.

Attended the programme on "**Celebration of Second anniversary of GoK and sugarcane farmer's meet**" held at Kuttoor Grama Panchayat organized by Government of Kerala on 02-06-2008.

Visited KAU Regional Cattle Infertility Research Centre and Internal Audit Circle, Vellimadukunnu, Kozhikode and discussion with officials and staff on 07-06-2008.

Attended the '**One Day Scientific Seminar on Sustainable Management of Water Hyacinth in Kerala**' organized by Allahabad Agri. Institute University in association with Kerala Higher Education Trust held at International Hotel, Kochi on 12-06-2008.

Inaugurated the "**HARIYALI project**" organized by Madappally Block Panchayat, Changanassery on 15-06-2008.

Attended the one day seminar/meeting to discuss about the **District Level Agromet Advisory Service (DAAS)** organized by Indian Meteorological Department, GoI (Meteorological Centre Observatory, Tvm) held at Govt. Guest House, Thycaud, Thiruvananthapuram and discussion with Agriculture Minister at Secretariat and also attended Press Conference at Trivandrum on 20-06-2008.

Inaugurated the **Fish-cum-Pokkali rice cultivation** programme in the field of College of Fisheries, Panangad and attended the collaborative project of **"Integrated Agro Advisory Service based on Mesoscale modeling using space tools"** organized by KAU, CUSAT and ISRO at College of Fisheries, Panangad on 23-06-2008.

Attended the programme **"Tholur Panchayath to become the Model Panchayath of Kerala State"** organized by the Tholur Panchayat and Co-operative Bank Authorities on 27-06-2008.

Discussion with Prof. P.P. Pillai, Dean MBA, FISAT in connection with preparation of comprehensive projects for improving food production with funding from State Government at Govt. Guest House, Ernakulam on 04-07-2008.

Attended the XIVth Executive Committee of the State Horticulture Mission at Secretariat, Trivandrum on 08-07-2008.

Attended the programme on **"Signing the Memorandum of Understanding"** by KAU with Rubber Mark, at Ernakulam on 09-07-2008.

Attended the book release of **"Pokkali Karshaka Sangamavum Nirdeshangalum"** at Rice Research Station, Vyttila on 15-07-2008.

Attended the first meeting of the officials' committee constituted for coordinating the implementation of the **"Food Security Mission in Kerala"** held at Secretariat, Thiruvananthapuram on 17-07-2008.

Attended the meeting on **"A special project for cultivation in the fallow lands"** conducted at Collectorate, Pathanamthitta on 19-07-2008.

Inaugurated the **"Karshaka Seminar"** organized by Mulamthuruthy Block Panchayat and attended a **"Farmers Meet"** at Tholur Panchayat, Parappur on 23-07-2008.

Attended the meeting **"Coconut Mission"** at Ernakulam Collectorate on 14-08-2008.

Attended the Seminar on **"Disaster Management"** conducted by Institute of Land and disaster Management (ILDm), GoK at Ernakulam on 21-08-2009.

Discussion with the Chancellor, KAU, HE Governor of Kerala on 25-08-2008.

Visited Cattle Breeding Farm, Thumburmuzhi on 27-08-2008.

Discussion with Agriculture Minister and Agricultural Production Commissioner at Secretariat, Trivandrum 02-09-2008.

Attended the **Farmers meet** conducted by Tholur Panchayat and visited various agricultural fields of farmers at Tholur 05-09-2008.

Attended the function **Gender concern – "Women Entrepreneurs Meet and inauguration of Tissue Culture Lab"** programme conducted by the Centre for Gender studies in Agriculture & Farm Entrepreneurship Development, KAU. held on 09-09-2008.

Inaugurated the Scientific Advisory Committee (SAC) meeting conducted by KVK Malappuram on 18-09-2008.

Inaugurated the Scientific Advisory Committee (SAC) meeting conducted by KVK Kannur on 19-09-2008.

Discussion with Tribal Union Leaders at Govt. Guest House, Kalpatta in the presence of Wynad District Collector and Tribal Development Officer – issues related to the appointment of SC/ST families – who were the inhabitants of the Pookkode CoVAS premises on 20-09-2008

Attended the 295th Standing Committee Meeting of Association of Indian Universities (AIU) held at New Delhi 24-09-2008.

Attended the 5th IAUA National Symposium on “Environment Pollution and its effect on Agricultural Production and human health” held at Allahabad Agricultural Institute (Deemed University), Allahabad on 25-09-2008.

Attended the State Level Inauguration of “Harithavidyalayam” organized by Sarva Shiksha Abhiyan (SSA) Kerala at Govt. Fort UP School, Fort, Thiruvananthapuram on 06-10-2008.

Inaugurated the programme on “Gramashree - Backyard birds” organized by Vattakkulam Grama Panchayat (Edappal), Animal Husbandry Dept, Kerala Agrl. University and Kudumbashree Mission on 11-10-2008.

Inaugurated the programme of “Staff Training 2008-09” of Soil Science Unit of Department of Agriculture (Soil Conservation) at Kakkanad on 14-10-2008.

Attended the National Conference on Organic Farming in Horticultural Crops with special reference to Plantation Crops organized by Central Plantation Crops Research Institute (CPCRI), Kasaragod on 15-10-2008.

Inaugurated the programme on Public Information Campaign (PIC), Govt of India, organized by Press Information Bureau at Panchayat Hall, Armbur on 20-10-2008.

Attended the Kuttanad Prosperity Council Meeting arranged at Chief Minister's Conference Hall, Govt. Secretariat, Trivandrum 22-10-2008.

Inaugurated the Facilitation Centre on Medicinal Plants at Aromatic Medicinal Plants Research Station (AMPRS), Odakkali on 06-11-2008.

Attended the “Review meeting of the External Aided Projects”, at Chief Minister's Conference Hall, Thiruvananthapuram on 11-11-2008.

Attended the Rashtriya Krishi Vikas Yojana (RKVY) State Level Sanctioning Committee at Chief Secretary's Committee Room, Government Secretariat, Thiruvananthapuram on 13-11-2008.

Attended the 296th Standing Committee Meeting of Association of Indian Universities (AIU) held at North Eastern Hill University, Shillong 16-11-2008.

Attended the 296th Standing Committee Meeting and 83rd Annual Meeting of the Association of Indian Universities (AIU) and National Seminar on “Quality and Relevance of Higher Education” held at North Eastern Hill University, Shillong on 16 to 19 Nov. 2008.

Attended the Annual Workshop on “Pesticide Residue” conducted by College of Agriculture, Vellayani at Kovalam on 28-11-2008.

Attended the function of Pokkali Rice – Bhoopradasha index registration – organized by KAU and Dept. of Agriculture held at Paravoor Municipal Town Hall on 9-12-08.

Attended one day Workshop on Medicinal Plants held at Parakkadavu Grama Panchayat, Ernakulam and also attended a National Seminar on “Global recession and Indian Fishing Industries” held at College of Fisheries, Panangad on 12-12-08.

Visited KAU Research Station at Konni and discussion with officials on 13-12-08.

Inaugurated the NAIP programme and Scientist meet held on 19-12-08 at RARS, Ambalavayal on 18-12-08.

Meeting with Agri. Production Commission on 01-01-09.

Meeting with M/s. Cadbury India Ltd. Officials at College of Fisheries, Panangad on 02-01-2009.

Meeting "Pokkali" conducted at RARS, Kumarakom on 09-01-2009.

Attended the meeting conducted by Chelakkara Grama Panchayat – Agri-Vety Developmental programmes – chaired by Agricultural Minister on 30-01-2009.

Attended meeting with Finance Minister at Secretariat, Trivandrum on 07-02-09.

Attended the programme on *Research Strategies for Rice Development* – organized at Kanakakunnu Palace, Trivandrum on 11-02-09.

Attended the *one day seminar of the Rubber Growers Association* at Rubbermark, kottayam on 14-02-09.

Attended the *Advisory Committee meeting of Gender Concern* at College of Fisheries, Panangad on 20-02-09

Attended attend the meeting of **Food Park** at Thiruvananthapuram on 02-03-2009.

Attended the **KSHM Governing Body** meeting held at Mascot Hotel, Thiruvananthapuram on 18-03-2009.

Attended the meeting **Farmers' Club State Level Review and Development Meet 2007-08** organized by NABARD at Ernakulam on 20-03-2009.

Attended the *One day seminar on medicinal plants* held at Thopramkudi (Idukki) organized by AMPRS, Odakkali on 23.03.2009.

CHAPTER II
EDUCATION
FACULTY OF AGRICULTURE
COLLEGE OF AGRICULTURE, VELLAYANI

Faculty : Agriculture
Name of Head of the station : Dr.K. Harikrishnan Nair

Awards/Scholarships to staff

Name and Designation	Other details
Dr. S. Shilaja, Professor	Best paper presentation award – National Seminar on Self help groups for Rural upliftment Emergency Extension issues & Strategies 12 & 13 July 2008 organised at Anbil Dharmalingam Agricultural College & Research Institute, Thiruchirapally
Dr. C. Lekha Rani, Associate Professor	Best Poster award for poster entitled “Intra and intergeneric compatibility analysis in monopodial orchids” in the National Conference on Orchids held at Bangalore during April 10-12, 2008
Dr.LuluDas, Professor	3 rd prize in the receipe cpmpetition organized by Kuthuvilakku Products.

Academic programs

Under graduate programme

Intake capacity & No. of students enrolled during 2008-09				Out turn of students during 2008-09			
	No. of students enrolled	Male	Female		Male	Female	Total
2008 U.G	58	15	43	2004 Admission U.G.	9	31	40
2007 U.G	57	11	46	2003 Admission U.G	1	5	6
2006 U.G	37	11	26	2000 admission U.G	1		1
2005 U.G	60	17	44				
2004 U.G	42	11	31				
2003 U.G	3	1	2				
2002 U.G	1	1					
2000 U.G	1	1					
Study tour- I (2006 UG admn.) South India	61	17	44				
Study tour –II (2005 UG admn.) All India	42	11	31				
2005 UG	RAWE registered						

PG&Ph.D

	Male	Female		Male	Female
PG	15	1	PG	7	1
Ph.D.	1	-	Ph.D.		1

Study tour

The South Indian study tour for B.Sc. (Ag.) 2006 admission students was conducted from 18.7.08 to 3.8.08. Dr. B.R. Reghunath, Dr. Sumam Susan Varghese and Dr. Krishnakumar Professors accompanied them.

All India Study Tour of 2005 Admission B.Sc(Ag) students was also conducted. Dr. Vasanthakumar, Professor, Dr. Anith and R.V. Manju, Assistant Professors accompanied the students. Dr. Jiji, T. accompanied the final year B.Sc.(Ag) students on their five day study tour to High ranges during July 2008

Other activities (brief outline only)

a. Students Union activities : Dr. C. Gokulapalan - took part in the students union activities as Associate patron for students union 2008-09

Dr B.R. Reghunath, acting as Advisor, Camara Club.

Dr. Beela.G.K functioning as Staff Editor- College Magazine -2008- 2009 and also for 2009- 2010
The following activities were undertaken by the College Union during the period under 2008-09.

1. An open forum was organized under the College Union on 26.3.2009 to discuss about the system of education and syllabus of Agricultural education in Kerala.
2. Inter class Arts Festival "Spandhanam- 09" was organized in the college campus from April 21st to 24 2009.
3. A trekking programme was organized by the forestry club on 7.5.2009.
4. Kerala Agricultural University Union was inaugurated by Hon'ble Minister for Agriculture Shri. Mullakkara Ratnakaran at College of Agriculture Vellayani on 26th May 2009.

b. Extra-curricular activities :

c. NSS activities: Dr. Roy Stephen is serving as the NSS Programme Officer

Dr. Syamakumari is functioning as Programme officer in organizing various camps throughout the academic year

Details of camps organised

Theme	Date	Highlights
1. Campus Cleaning Programme	15.8.08	Cleaning of Campus
2. Career guidance camp	25.11.08	at COA Vellayani by Prof. Chandrasekharan
3. Diabetic Retinopathic camp	23.1.09	Health check up with Diabetic & Cataract tests were done for staff and labourers
4. World Science day	28.2.09	Science quiz and debate
5. Nature study Camp	12.3.08 to 13.3.09	at Munnar
6. N.S.S. Orientation Training Camp	17.3.09 to 23.3.09	at Wynad

The programme Officer attended the annual meeting on 13.8.08 at Directorate of Extension, Mannuthy. She also attended the review meeting there on 3.2.09. She had attended the seminar on Community Sanitation organized by State Pollution Control Board, Alleppy on 25.7.08 & 26.7.08. Various cultural competitions were organized in January 09 for both students and families.
Dr. Roy Stephen, Assistant Professor is serving as the Officer i/c of Career Guidance Cell

Sports and games

1. Conducted Inter collegiate Athletic Meet (Men & Women) from 27th to 28th May 2008
2. Conducted Inter Collegiate Volleyball (Men & Women) Tournament from 20th and 21st January 2009 and Men own the Championship.
3. Participated in the Inter Collegiate Basket ball tournament held at College of Veterinary & Animal Sciences, Mannuthy.
4. Participated in the Inter Colelgiate Badminton and Table Tennis (Women & Women) Tournament conducted on 17th and 18th October 2008 at Faculty Club, Mannuthy
5. Manu Scarya (2007-01-107), Binumon. K.K. (2005-01-154), Tony Michael, Vaijyanthi.P.V. (2007-01-123), Archana. P.H. (2007-01-144), Aswathy SAsidharan (07-01-128) represented the KAU in All India Inter Agricultural Universities Sports & Games Meet, JNKVV, Jabalpur from 3rd to 6th March 2009.
6. Donald James (05-01-103), Joseph Poovathingal (05-01-156), Mohammed Anseem (07-01-157), represented KAU in Soutn Zone Inter University Tournament held at Dharward.

Research programmes

a. Major research achievements (highlights)

(Attached photographs of salient findings) :

The Ph.D. research project on “Intra & intergeneric hybridization and molecular characterization in monopodial orchids” revealed successful capsule formation. These were inoculated in vitro and successful seedlings were deflasked at appropriate stages and seedlings from 36 hybrid combinations were successfully hardened. The genetic diversity of 20 monopodial orchid hybrids were studied using RAPD technique which generated 57 scorable bands.

In the Ph.D. project on “Genetic analysis of resistance to pod borers and yield in yard long bean (*Vigna unguiculata* subsp. *sesquipedalis* (L.) Verdecourt), 50 genotypes were collected from different parts of Kerala and were analysed for important qualitative and quantitative characters for the resistant to pod borers and yield. The results of the study suggests ample scope of improvement of yield through selection based on the characters pod weight and pod length. To superior genotypes for high yield potential and tolerance to pod borers were identified. The inheritance pattern showed additive, dominance and epistatic interactions for all the characters studied and indicated that recurrent selection or recombination breeding can be followed for future breeding programme.

In the M.sc project entitled “Genetic variability in kacholam (*Kaempferia galanga* L.) under open and partially shaded conditions ,twenty accessions of kacholam along with the two released varities viz.,Kasthuri and Rajani were collected from different locations of Kerala and southern most part of Tamil Nadu and were evaluated for variability in yield and yield attributing characteristics under full sunlight and partially shaded conditions in coconut gardens. Among the accessions collected, ten were found to be superior in rhizhome yield and oil yield.Comparing the two conditions in which the crop was raised, rhizhome yield was more when grown under open whereas oil yield was more under partially shaded conditions.the study revealed that the crop is suited as a pure crop as well as an intercrop in coconut gardens. The ten superior accessions identified are being forwarded to stability analysis in farmers fields.

The project on “Development and evaluation of hybrids in ivy gourd (*Coccinia grandis* L.Viogt) hybridization was carried out between four selected gynoeocious and three androeocious lines. The family I(Royappanpattyl x Royappanpatty local) revealed superiority over other families in many characters including number of fruits and fruit yield per plant. The superior progenies were identified and these can be utilized for further crop improvement.

The M.Sc. research study on “Induction of variability through mutagenesis in Neelayamari (*Indigofera tinctoria* L.)” attempted to induce variability through mutation breeding using gamma rays.

The mean performance of the characters was reduced as the doses of mutation increased M_1 generation. Indigotin content has negative correlation with yield where as it has direct effect on yield through other correlated characters indicating that selection for this character should be carried out along with others characters. Raising M_3 progeny lines each of these [plants and evaluation of the lines is suggested as future line of work.

In the project on "Evaluation of seedling variability in selected varieties of *Anthurium andreanum* hybrids of more than 60 cross combinations and mother plants belonging to 20 varieties of anthurium are being maintained. About 7 varieties were recommended for release in the NARP Zonal workshop. Those varieties were under multiplication by top cuttings and sucker splitting. Genetic improvement of some of the promising hybrids were carried out by the way of back crossing to their parent varieties. Secondary crossing of several selected F_1 hybrids is in progress. Some of them have flowered and their characters were stabilized. Detailed character evaluation of these hybrids is in progress. About 95 anthurium plants were purchased from Istruotional farm, Vellayani and added in the germplasm collection. Crossing programme is in progress and many hybrids are under evaluation and multiplication.

In the project, "Breeding for Novel Varieties in Monopodial Orchids" five combinations have been submitted for registration. These are Vanda Vellayani TMA Diane, Aranthera Vellayani Maggie Beatrice, Ananthera Vellayani James Maggie, Dendrobium Vellayani Chiangmai Royale and Dendrobium Vellayani Chao Red.

In the M.Sc. Project on "Morphological and Molecular analyses in Coconut (*Cocos nucifera*) genotypes" conducted in six popular coconut cultivars, WCT, Komadan, Laccadive Ordinary, Natural Cross Dwarf, Chowghat Green Dwarf and Chowghat Orange Dwarf. Correlation studies revealed that nine the characters except plant height had significant positive correlation with yield. Path coefficient analysis revealed that all characters showed positive direct effect on yield. Divergent analysis with biometrical traits and RAPD markers slightly differed Morphological markers clustered Komadan and Laccadive Ordinary together and West Coast Tall along with NCD. But in the RAPD analysis, West Coast Tall and Laccadive ordinary clustered together and Komadan clustered with dwarfs and NCD at 80 per cent similarity. Even though, Komadan is accepted as a superior palm its pedigree is controversial. A detailed molecular study can give a clear picture. The least similarity was noted between Laccadive Ordinary and Chowghat Orange Dwarf. These divergent accessions can be used as parents for exploiting maximum heterosis.

Result of the project on "Cataloguing of Cashew germplasm of Kerala with molecular markers and digitizing the morphological data" revealed a novel and efficient protocol for isolation of good quality DNA . Using the protocol DNA was isolated from the selected 100 accessions (Fifty accessions from Madakathara and twenty-five each from Anakayam and Pilicode). The selected 100 accessions were subjected to RAPD analysis using 20 primers. The RAPD analysis of the 100 accessions of cashew with 20 primers yielded a total of 199 amplicons of which 171 were polymorphic giving an overall percentage of 85.92% polymorphism. Most of the amplicons produced were between molecular weight 0.1 and 1 Kb. Few were above 1Kb. Genome analysis of cashew accessions using AFLP markers with 6 primer combinations also done. Morphological characterization of the accessions at the three stations based on the vegetative characters completed. A software tool DOCGERM was developed for storing the data. DOCGERM is a graphical user interface tool encapsulated with a Cashew data repository, which organizes the data of cashew plants according to the physical properties. Tool provides a convenient graphical user interface for the manipulation of the data of cashew, from three different stations. Accession number is used as the unique number to identify each item individually. Genome analysis of cashew accessions using AFLP markers with 6 primer combinations also done.

The KAU project on "Development of high yielding leaf curl virus resistant varieties in chilli from segregating generations of interspecific crosses", selfed seeds (F_4 seeds) from 58 promising plants (in yield and leaf curl virus resistance) collected, from the previous KSCSTE project (Breeding leaf curl virus

resistant chilli through interspecific hybridization), were raised in the field for evaluation for high yield and curl virus resistance. The field experiment is in progress.

Research results identified promising fungal pathogens for the biological control of chromolaena and lantana weeds.

Considerable mushroom yield was obtained in Oyster mushroom trials both *Pleurotus sajor caju* and *P. florida*. A very good collection of novel mushrooms were obtained during the surveys conducted in May, June and November.

The results of the project entitled "Natural resource management for sustainable development of watershed in Western ghats of Kerala" revealed that micro catchments (rectangular basis of size 2 m x 2 m) with slope inwards and towards the plant and mulching with coconut husk recorded highest bunch weight in banana and relative leaf water content. This treatment also improved the physical properties of the soil like bulk density, porosity and water holding capacity.

Among the different grass- legume mixtures tried, guinea grass + cowpea can be recommended as the best grass legume combination for the humid tropical situation for the highest fodder production and effective soil moisture conservation.

High density multi species cropping system in coconut garden has great impact on productivity and economic viability. The treatment coconut+ banana+ amorphophallus+vegetable cowpea/amaranthus was found best for higher productivity and profitability.

Organic recycling by use of compost/green manures and mulching with coconut leaves/coconut husk increased the population of beneficial microorganisms-bacteria, fungi, actinomycetes- thereby achieving better rhizosphere in the coconut basin. Broad bed furrow was the most effective for increased infiltration and ground water recharge.

The results of the study on the development of protocol for quality control of commercial organic manures and their evaluation showed that none of the 44 commercial organic manures collected from manufactures all over Kerala conformed completely to the quality standards specified by FCO Amendment Order, 2006 of Government of India. Analysis of raw material revealed that leather meal was the best source for N, bone meal and pressmud for P and pressmud for K. Mathematical models were also developed for predicting the N, P, K contents of any mixture of bone meal, leather meal and neem cake.

In the project on "Re-domestication and popularization of true kashthuri turmeric (*Curcuma aromatica* Salisb) an endangered cosmetic cum medicinal plant" the production of Kashthuri turmeric powder was standardized. Two multi-coloured folders on Kashthuri turmeric one in Malayalam and one in English, published aiming at popularization of kashthuri turmeric. A video film CD Kashthuri turmeric cultivation is prepared. The CD will be helpful for popularizing the crop.

The studies on the "Performance of spiny coriander (*Eryngium foetidum* L) under different shade regimes" were carried out at the Department of Plantation Crops and Spices, College of Agriculture, Vellayani during 2004-2006. The performance of *Eryngium foetidum* was studied at three levels of shade (25, 50 and 75%) and four spacings (10 cm X 15 cm, 15 cm X 15 cm, 20 cm X 15 cm and 30 cm X 15 cm). From the experiment, it was found that the crop performed best under 75 per cent shade level and at a closer spacing of 10 cm X 15 cm. In general as the intensity of shade increased, performance of the crop was better.

The major findings of the study on "Survival stress for livelihood security of farmers in Palakkad district, the case of Nellopilly Panchayath" revealed that regarding the extent of survival stress of respondents more than half (55 percent) of them were under very high survival stress level and no farmer was found belonging to very low stress level. Most of them had negative affective reaction symptoms as the prime effect due to their survival stress.

Regarding perception of farmers on governmental interventions for resolving the agrarian crisis, interest free loan, "Padashekara Samithi" based rice group farming loan availing scheme and subsidies for inputs are found to be more useful.

Establishing farmers counselling centres for face to face interaction and counselling of farmers or tele-psychological treatment using video conferencing to dissuade the farmers from committing suicide, research and development schemes should be intensified and scheduled programme should be organised for developing their leadership quality, management ability, marketing organisation etc, among the farmers and to organise themselves for their rights for protection for their development, enhancing post harvest technology for widening the scope for value addition and product diversification, revising the credit gap and strict supervision for credit utilisation by farmers, maximum support price for all agricultural commodities, money lending act and minimum wage act should be announced, non farm employment opportunities should be provided by the government to raise the income of the farmers family, a risk mitigation fund can be generated to finance the three different insurance schemes – crop, credit and income. This fund should have contribution from the government and can also be drawn from the Rural Infrastructure Development Fund (RIDF) were the major suggestions for resolving the survival stress and indebtedness.

The profile characteristics of respondents showed that in both the categories of users and non user farmers majority of farmers fell under the middle age group. The maximum response on the efficiency of the ICT was on saving time and money in interacting in both user and non users.

They needed information on agriculture such as market rates, bio pesticides and bio fertilizers. These areas ranked top in their information needs. This was followed by organic farming, plant protection and cropping practices. In the case of user farmers saving the required information for future use ranked first. This was followed by how to use mouse and switch on/off the computers. The socio economic status had positive and high significance with socio technical perception and communication behaviour.

The suggestions as given by the farmers were that, care should be taken so that the contents are in local languages and that it is useful even to illiterate farmers, scheduled video conferencing can be arranged by the concerned institutions to provide expert advices to the farmers, more member of trainings on skills can be conducted to widen the user base. The centres should provide multiple services to farmers so that it can be made more functional on participatory basis. Suitable mechanism need to be developed for the creation of location specific knowledge capsules.

The factors leading to indebtedness were delineated and arranged in descending order of severity. They are low market price of produce, disease/pest of support, decline in agricultural income, disease of crop, absence of other sources of income, decrease in produce demand, crop failure due to climatic variations, high rate of interest, absence of value addition, misutilization of loans, pest attack of crop, deficiency of irrigation water, decrease in soil fertility, inefficient marketing, low export price.

A similar analysis was done on consequences of indebtedness. The descending order of consequences in changes in lifestyle, hunt for alternate jobs, deforestation in holdings, reduction in money on social purposes, selling land, and reduction in money spent on recreation, depression, decrease in health consciousness, arranged in decreasing order of importance. They are compensation cash for pepper, interest waiver, Debt Relief Commission, saplings and fertilizers for pepper farmers and NREGS. It was also found that majority of farmers had high levels of stress.

Twenty genotypes of bird pepper (*C. frutescens*) collected from different parts of Kerala were evaluated both under shade and open conditions. The genotype CF 51 was identified as high yielding both in shade and open. Comparative yield trials were conducted in 2002, 2003 and 2004. The genotype CF 51 recorded highest yield in all the trials. Farm trials were conducted in Thiruvananthapuram, Kollam and Pathanamthitta districts. The proposal for variety release was submitted to the Director of Research, KAU.

Thirty two genotypes of hot chilli / mali mulaku (*C. chinense*) collected from different parts of Kerala were evaluated. Comparative yield trials were conducted in 2003, 2004 and 2005. The genotype CC 30 was the top yielder followed by CC 13. Farm trials were conducted in Thiruvananthapuram , Kollam and Pathanamthitta districts with CC 30 and CC13. CC 30 was the highest yielder in all location

Limb cuttings of clones of drumstick collected from different parts were established in the orchard. They showed considerable variability in yield and fruit characters. Highest yield was recorded from MO 27, MO 13 and MO 8.

Identification of vegetable amaranthus (*Amaranthus dubius*) with high yield and leaf blight resistance. (P.I. Dr. V.A. Celine)

In vegetable amaranthus, identified the resistant source to leaf blight caused by *Rhizoctonia solani* in amaranthus (*Amaranthus dubius*). Hybridisation to incorporate the resistance to *A. tricolor* is in progress. The high yielding *A. dubius* genotype Am 88 was given for farm trials.

Standardisation of protocol for grafting of tomato using bacterial wilt resistant root stocks is in progress. Results have shown that wedge grafting on three week old tomato and four week old brinjal root stocks were successful for grafting tomato. Three hybrids from IAHS, Bangalore Ruchi, Indam 519 and Naveen 2000+) were grafted using the standardized method. The highest yielder was Indam 519. The survival percentage was 100 for grafted plants whereas for non grafted ones it ranged from 63.5 to 75. The spotted wilt incidence was less in grafted plants.

Initial evaluation of the different accessions of paprika was done. The accession Paprika - 2 recorded highest yield.

Talc based formulation of the fungal pathogens *Beauveria bassiana* and *Fusarium pallidoroseum* were prepared and shelf life of the formulation was assessed . Good colony forming units were observed upto ten weeks after storage in the case of *F. pallidoroseum* .The shelf life of the talc based formulation of *B. bassiana* was shorter and good number of colony forming units were observed for six weeks only. The pattern of sporulation of *F. pallidoroseum* and *B. bassiana* was standardized in broth culture before formulation of the fungus. Field experiment was conducted to determine the effective dose of the formulated products of the entomopathogens

Extracts of seeds of *Annona squamosa* and plant extracts of *Andrographis paniculata* and *Clerodendron infortunatum* alone and as mixtures with chilli, garlic, ginger and neem seeds were prepared and tested for bioactivities at different concentrations against various pests of vegetables in the laboratory. Around 20 different extracts of the plants were evaluated. Three extracts/ mixtures proved effective against pests in the preliminary evaluation.

The pathogenicity of the new isolates of the fungi *B. bassiana*(ITCC 6063) and *Paecilomyces lilacinus*(ITCC 6064) and *Aspergillus candidus* was tested against major pests of vegetables like *Anadevidia peponis*, *Epilachna sp.* , *Diaphania indica*, *Bactrocera cucurbitae*, *Sylepta derogate*, *Anomis flava*, *Antoba olivaceae* and *Ferrisia virgata*. *B. bassiana* and *P. lilacinus* recorded 30 - 90% and 50-70% mortality of the pests, respectively. The methodology for preparation of granular formulation of the fungi was standardized for soil application for the management of fruit fly pupae

Pathogenicity studies were conducted for two fungi viz *Metarhizium anisopliae* and *Beauveria bassiana* against banana pseudostem weevil . Two talc based formulations viz wettable powder and granule were prepared. These formulations were tested under laboratory conditions. Works related to the standardization of the dose of the formulated product is in progress.

Pest and disease museum was established in the department displaying different stages of pest, symptoms of pest damage and major diseases of crops to provide necessary training to farmers as well as to the field consultants.

AICRP on Nematode Pests

Hot spot areas of infestations of nematodes were identified in paddy, banana, pepper, ginger, turmeric, kacholam, thippali and koduveli and depicted in the map for the use of farmers and extension personnel.

Management of root-knot nematode infesting bitter gourd using organic amendments showed that the yield of fruits ranged from 8.2 to 11.5 tons per ha. Maximum yield was obtained in neem cake (11.5 tons per ha) followed by *Jatropha* cake (10.0 tons per ha) with an ICBR of 1:3.12 and 1:30 respectively. These treatments were better than the chemical carbofuran with an yield of 8.2 tons per ha.

Evaluation of biopesticides for the management of root-knot nematode in okra revealed that *Trichoderma harzianum* is the best in increasing the yield (8.3 tons per ha) followed by *Pochonia chlamydosporia* (7.8 tons per ha).

The revalidation (demonstration) of management of nematode complex in banana in two locations showed that the highest yield (12.25 kg) was obtained in sucker treatment (paring+ hot water treatment) + carbofuran (0.05 g/a.i per plant) + neem cake (1kg/plant)). The increase in yield ranged from 2.2 kg to 3.75 kg per plant over the other treatment combination without neem cake application. The ICBR is high in treatment having of sucker treatment + carbofuran and ranged from 1:5.1 to 1:6.1 while in the treatment combination having neem cake the ICBR ratio ranged from 1:3.2 to 1:4.2.

The pest risk analysis in paddy due to *Meloidogyne graminicola* in nursery and main field revealed that in the nursery 90 per cent damage was due to this nematode alone while in main field, the yield reduction was 50 to 60 per cent in field with an initial nematode population of 217 to 300 larvae per 200 g soil. (Average yield in this field is 1.2 t/ha as against 3 t/ha in healthy area).

The pest risk analysis in banana, an initial population of 266 *Radopholus similis* per 200 g soil resulted in 50 per cent reduction in yield (bunch weight) of banana (9.5 kg per plant as against 18.0 kg in Nendran variety and 3 kg per plant as against 5- 6 kg in healthy plants of Robusta and Poovan variety.)

The pest risk analysis in vegetables (bitter gourd and cucumber) 247 *M. incognita* per 200 g soil at one month after sowing recorded 33 per cent loss in yield (10 to 15 t/ha as against 40-45 t/ha).

Management of root – knot nematode in vegetables by adopting various cropping systems prevalent in the area showed that there was 20 to 22 per cent reduction in nematode population in the soil due to the non preferred host sweet potato variety Sree Bhadra when compared to preferred host okra, followed by brinjal and chilli. There were no statistically significant variation in the yield of okra, brinjal and chilli in various rotation sequence.

Experiments on the management of nematodes on banana using bioinoculants like *Bacillus macerans*, *Trichoderma viride*, *Pseudomonas fluorescens*, *Pochonia chlamydosporia* showed that the vigour of the plants was improved by various treatments when compared to untreated. The date of flowering was delayed for three weeks in untreated plants. The reduction in nematode population at periodic interval was also noticed in bioinoculants treatments.

PG projects

1. Population dynamics and management of erythrina gall wasp, *Quadrastichus erythrina* Kim.
2. Population dynamics and management of aphids in vegetable ecosystem.
3. Impact of pesticides on abiotic and biotic components in rice ecosystem of Kuttanadu.
4. Bio-efficacy and safety evaluation of biorational insecticides for the management of sucking pest complex of chilli (*Capsicum annum* L.)
5. Evaluation of entomopathogenic fungi for the management of major coleopteran pests and characterization of pesticide tolerant strains.

6. Management of major sucking pests in cowpea *Vigna unguiculata* (L.) Walp with entomopathogen and plant defense inducing rhizobacteria.
7. Management of melon fly *Bactrocera cucurbitae* Coquillett using local isolates
Beauvaria bassiana(Bals.)Vuill, *Paecilomyces lilacinus*(Thom) Samson and *Aspergillus candidus*
Link:Fries

Extension programmes:-

a. Highlights of extension activities :

(Attach photographs of important activities)

Agri. Extension

- i) The members of the Department acted as resource person for various training programmes organized by outside agencies and Development Departments such as – TC, IMG, RATTTC. etc,
- ii) The scientists took a lead role in project formulation under ATMA programme in various districts such as Trivandrum, Wyanad, Kottayam and Pathanamthitta
- iii) The teachers participated in various radio programmes and Television programme on vegetable cultivation and Employment generation
- iv) Actively participated in the National Mangofest organized at Chandrasekharan Nair Stadium and a KAU pavilion was set up.
- v) Ten research papers were presented in the national seminar organized at Trichinapally by society of Extension Education
- vi) Six research papers and many popular articles were published during the report period.
- vii) As part of the UG RAWE programme many training programmes and Agri-clinics and Exhibitions were organized in Pazhayakunnilmel Panchayath of Trivandrum District. Also Agro clinics were conducted in Sreekariyam and Athiyanoor Grama panchayaths.

Agri – Diagnostic and Information Centre

An information centre is developed displaying latest agricultural technologies of Kerala Agricultural University. Besides an air conditioned diagnostic lab is furnished with equipments like micro-scopes to analyze the diseases and pests of crop plants.

Department of pomology

Dr C. S. Jayachandran Nair functioned as Resource person for Department of Agriculture, Kerala Horticultural Development programme, Vegetable and fruit promotion Council, Vocational Higher secondary Education Department and for SHM.

Dr. Sabina G.T. and Dr. V.L.Sheela handled classes in training programmes arranged by KAU, Department of Agriculture, Agri Horti Societies, CWRDM, NGOS, KVK , and VHSE, Govt. of Kerala

I. Training Programmes organized

Plantation Crops

Training Programmes were conducted in two districts viz., Trivandrum and Kollam for populatization of Kasthuri turmeric as part of the project “ Re-domestication and popularization of true kasthuri turmeric (*curcuma aromatica* Salisb) – an endangered cosmetic cum medicinal plant”

Dept. of Pomology

Dr C. S. Jayachandran Nair conducted a Training on gardening & beautification for Police Officers , 23rd to 28th of June 2008

Extension classes handled

- Dr. M. Abdul Vahab participated in the meeting regarding the implementation of 1000 vegetable village programme at Kanakakunnu on 21-5-08 and 5-7-08.
- Dr. M. Abdul Vahab participated in the meeting conducted by Sarva Shisha Abhian at Sreekariyam and took class on vegetable cultivation on 25-7-08
- Dr. M. Abdul Vahab participated in the judging committee for selecting best farmer in VFPCCK on 4-8-08.
- Dr. M. Abdul Vahab took class on seed production to farmers in the seminar organized by Gandhi Smaraka Trust on 23-10-08 and 16-12-08.
- Dr. M. Abdul Vahab took class on vegetable cultivation to farmers organised by KARMA on 24-10-08.
- Dr. M. Abdul Vahab took class on kitchen gardening in Tholicode settlement area on 9-11-08
- Dr. M. Abdul Vahab took class on vegetable cultivation to farmers in the seminar organised by KARMA and SHM on 24-11-08
- Dr. M. Abdul Vahab attended the meeting conducted at the Sugarcane research centre, Thiruvalla on 15-12-08
- Dr. M. Abdul Vahab visited the Travancore sugarcane Tiruvalla and gave proposals for the improvement on 20-12-08
- Dr. M. Abdul Vahab took class on vegetables to farmers in a seminar organised by Malayalamanorama at Kattakkada on 17-1-09

Plantation crops

Dr. B.R. Reghunath, Professor handled the following classes during the period

1. Class on 'Herbals integral part of kitchen garden' at vyakthi Vikas Kendra, Sasthamanglam, TVPM as part of their all Kerala project on "Project Green Kerala" on 7.4.2008.
2. Class on 'Plant propagation methods at dept. of Polology & Floriculture, COA, Vellayani to police officials as part of Gardeners' training programme on 25.6.2008.
3. Class on Marketing of medicinal plants at Seminar Hall, COA, Vellayani as part of State Hort. Mission sponsored training programme on 'Precision farming in commercial mediculture, organized by Instructional farm, Vellayani on 24.9.2008.
4. Class on 'Commercial cultivation medicinal plants as part of on job training for VHSE students, organized by TSS, COA, Vellayani on 25.9.2008, 4.11.2008, 17.11.2008 & 9.12.2008.
5. Class on Domestication and Utilization of medicinal plants to farmers organized by RATT Centre, Kazhakotam on 4.12.2008.
6. Class on 'Domestication and Utilization of medicinal plants' to farmers organized by RATT Centre, Kazhakootam on 4.12.2008.
7. Class on 'Semi-processing and value addition in medicinal Plants' to farmers of southern districts of Kerala organized by ETC, Kazhakootam on 16.2.2009.

Class on 'Semi-processing and value addition in medicinal Plants' to farmers organized by RATTC Centre, Kazhakootam on 5.3.2009

Farm Advisory service

The scientists of the college attend to the regular queries on pest and disease problems, crop management aspects including conduct of field visits when necessary. Scientists of this College attended to all the queries raised by the farmers in the field as well as when they brought their specimens.

The scientists of the college served as members of the expert team and visited Kallambalam and Chenkal area in connection with the early flowering of paddy.

As part of EAP “Re-domestication and popularization of true kashuri turmeric (*curcuma aromatica* Salisb) an endangered cosmetic cum medicinal plant “ field visits in farmers field in Thiruvananthapuram and Kollam Districts are undertaken as part of the front line demonstrations

Scientists were actively involved in the RAWE programme of final year B.Sc. (Ag) students.

In person	Over telephone	Through letters
235	127	104

iii) Field visits

No. of visits	Problem identified	Recommendations
78	Management and plant protection problems of banana, rice, vegetables, coconut, boron deficiency in coconut, improper nutrient management problems, drainage problems, yellowing in coconut, early flowering in rice, problems due to poor seed quality, nematode problems of vegetable and banana, scientific management of bee keeping against TSBV, judicious use of pesticides etc.	As per package of practice recommendations
42	Fruit fly infestation in cucurbits and mango	Pheromone traps distributed to farmers for fruit fly management

Radio talks / Tv programmes/ Audio-video cassettes

Department of Plantation Crops produced a video-documentary on “ Cultivation and utilization of Kasthuri manjal as part of NHB aided project titled “Re-domestication and popularization of true kashuri turmeric an endangered cosmetic cum medicinal plant”

Dr.N.Saifudeen and Dr.K.Ushakumari of the department of Soil Science presented programme on All India Radio and Trivandrum Doordarshan related to various aspects of crop production, especially land use planning and organic farming.

Topic	Date	Scientist
Cultivation of vegetables on commercial scale	6-8-08	Dr. V A.Celine
Organic vegetable cultivation	4-9-08	Dr. Abdul Vahab
“Nagaraththile Krishi” Discussion	06.09.2008, 6.50 pm	Dr. V.B. Padmanabhan
Training for Teachers on Vegetable cultivation – Radio report	29.09.2008, 6.50 pm	Dr. V.B. Padmanabhan
Training for Teachers on Vegetable cultivation – Radio report	06.10.2008, 6.40 pm	Dr. V.B. Padmanabhan
Village Stay Programme – RAWE students at Adayamon -- Inauguration Radio Report	27.10.2008, 8.30 pm	Dr. V.B. Padmanabhan
Village Stay Programme – RAWE students at Adayamon - Valedictory	29.10.2008, 8.30 pm	Dr. V.B. Padmanabhan
Agricultural Quiz for farmers	Feb. 2008, 6.50 pm	Dr. V.B. Padmanabhan
Agricultural Quiz for farmers	10.12.2008, 6.50 pm	Dr. V.B. Padmanabhan
“Nagaraththile Krishi” Discussion	06.09.2008, 6.50 pm	Dr. V.B. Padmanabhan
Kissan Varthakal – Training for teachers on Vegetable cultivation	24.10.2008 5.30 pm	Dr. V.B. Padmanabhan
1 Management of monsoon disease of plantation crops	30.05.2008 & 15.07.08	Dr. P. Santha Kumari

Home science

Dr.M.Rajani.M delivered talk on "Bhakshya Prathi sandhi pariharikkan kuvaraku" broadcast on 21.1.09

T.V.Programme

Dr.Beela.G.K participated in the Kairali T.V programme and presented the topic on Handling children with Attention Deficiency Syndrome" telecast on 26.08.08

Dr. C.Nandakumar handled a programme on Rodent control on Kairali TV on 30.01.2009

Press Coverage

1. Dr.Beela G.K. gave an interview session with reporters of Malayala Manorama and Hindu.
2. A coverage on the Horticulture therapy programme was published in the respective dailies during the month of March 09 -
"Horticulture therapy for disabled children"

List of publications

Scientific papers

Anu Mary C. Philip and Sunny K. Oommen (2008) Genetics analysis of yield related characters in cowpea (*Vigna unguiculata* (L.) Walp) *Geobios* 35 : 137-140

Anu Mary C. Philip and Sunny K. Oommen (2009) Correlation studies of klegume pod borer (*Maruca vitrata* (Fab)) damage parameters and morphological characters in cowpea *Geobios* 36 : 41-44.

Nair, C. S. J; Sereena, J; Khader, K. M. A and Sheela, V. L. (2008) Genetic analysis in papaya (*Carica papaya* L.). S-Ii Genetic resources and crop improvement in *II international Symposium on Papaya, 9-10 Dec. 2008. Madurai, India*

Jayalekshmy.V.G.,Priya Lawrence and Dhanya Jayaseelan 2008. DOCGERM- Database of cashewgermplasm-information at the fingertip.Indian Journal of Plantation Crops 2008

Beena Thomas,Arya K,Divya Krishnan and S.G.Sreekumar Heterosis for Biological nitrogen fixation traits and yield components in black gram(*Vigna mungo*(L.)Hepper)*Legume Res.*, 2008. 31(4): 260-264,

Dijee Bastian, Arya.K., Gayathri. G. and Vidhu Francis. P. 2008. Correlation and path analysis in Rice. *Current Biotica* 2 (3) : 354-358.

Gayathri. G., Dijee Bastian, Arya.K. and Vidhu Francis. P. 2009. Rapid multiplication of fire flame bush (*Woodfordia fruticosa* (L.)Kurz.) through in vitro techniques. *Current Biotica* 2 (4) : 453- 460.

Lekha Rani, C and S.T. Mercy, 2008. Studies on anthesis and pollen parameters in *Dendrobium* genotypes. Proceedings of National Conference on Orchids, APRIL 10 -12, 2008, Bangalore.

Lekha Rani, C and Udaya, V.P. 2008. Intra and intergeneric compatibility analysis in monopodial orchids. Proceedings of National Conference on Orchids, April 10-12, 2008, Bangalore.

- D. Wilson, Jiju J.K.K, and Prabu, R. 2009. Molecular characterization of androecious gynoecious and hybrids of ivy gourd (*Coccinia grandis* L. Voigt.) 21st Kerala Science Congress, Extended Abstracts, 72-74 Prabu, R. and D. Wilson, 2009 Correlation and path analysis in the hybrid progenies of ivy gourd (*Coccinia grandis* L. Voigt.) Proceedings of 21st Kerala Science Congress, Kollam, 28th – 31st January. pp.148-151.0
- Arya, K., Dijee Bastian, Vidhu Fancis, P and. Gayathri, G 2008., Bush pepper – a viable option for organic pepper is homesteads. National Conference on Organic farming in Horticultural Crops 2008.
- Arya, K., Dijee Bastian, Vidhu Fancis, P and. Gayathri, G. 2008. , Studies on Genetic parameters of bush pepper plants of South Kerala. National Seminar on Piperaceae.
- Gayathri, G., Arya, K*, Dijee Bastian and Vidhu Francis P. 2009. Induction of rooting in Micropropagated shoots of thatthiri (*Woodfordia fruticosa* (L) Kurz.) 21st Kerala Science congress 28-31, pp. 144. 2009.
- Divya Krishnan and Arya K. Genetic variability in kacholam genotypes under open conditions. 2009. 21st Kerala Science congress 28-31, 2009.
- D.S.Radha Devi and Nayar, N.K. (2008) Induced-vitro tagenesis in banana variety Nendran. IAEA International symposium on Induced Mutations in lants - Vienna - 12-15 August, 2008
- Jayalekshmy, V.G. and P.S. John. 2008. Genetic diversity in cashew germplasm assessed by RAPD markers. International Genetics ongress, Berlin, Germany, 2008
- Mareen Abraham & Radhakrishnan, V.V. 2008. Induced mutations in *Coleus Solenostemon rotundifolius* (Poir.) J.K. Morton)- An underutilized medicinal tuber. IAEA International Symposium on Induced Mutations in lants - Vienna - 12-15 August, 2008
- Jyolsana V.K. and Mathew, U. 2008. Boron nutrition of tomato grown in laterite soils of southern soils of Kerala. *J. tropic. Agrl.* 46 : 61-63

Plantation Crops

1. Sarada S. and B.R. Reghunath 2008. Performance of *Indigofera tinctoria* L. accessions under open and shaded conditions.. *J. Med. Aromatic Plant Sci.* 30:105-108.
2. Sarada S. and B.R. Reghunath 2008: Evaluation of Indian Indigo (*Indigofera Tinctoria* L) grown as intercrop in coconut garden for growth and indigo dye yield. Proc. Natl. Conf. Organic farming in horticultural cops. 16-18 Oct. 08, ISPC, CPCRI, Kasargod P.69
3. Deepa S. Nair and B.R. Reghunath 2009. Cryoconservation and regeneration of axillary shoot meristems of *Indigofera tinctoria* (L) by encapsulation-dehydration technique. *In vitro Cellular dev. Biology* (Accepted for publication).
4. Jacob, L. Manju R.V., Stephen R. Bijila P.V. and Reghunath B.R. 2008. Influence of hmgr (3-hydroxy-3 methyl glutaryl Co A reductase) expression levels on withanolide content in *Withania somnifera* (L). Dunal under light stress. Natl. Sem. Medicinal Plants 2008. 24-25 July 2008. RGC for Biotech. Tvpm p.48.
5. Thangaselvabai., T. Jayachandran, B.K. & Rajmohan, K 2008. Micropropagation of screw pine (*Pandanus fascicularis* L) – the under exploited medicinal plant . *Adv. Pl. Sci.* 21 (accepted for publication)
6. Thangaselvabai, T. & T. Jayachandran B.K. 2008 *Pandanus* – a significant plant resource of coastal India – an overview. *J. Med. Arom. Pl. Sci.* (accepted for publication)
7. Thangaselvabai T., Jayachandran B.K. & Rajmohan K 2008 Molecular characterization and cataloguing of *Pandanus* spp. *Adv.Pl. Sci.*, 24 9 (accepted for publication)

8. Palanikumar.M, P.C. Jessykutty, K. Sundhariya P. Arularasu and G. Sathish 2008. Influence of different shade levels on photosynthetically active radiation, stomatal conductance and chlorophyll content in mint (*Mentha spp.*) types J. Sci. Trans. environ Technov. 2(1): 49-52.
9. Jessykutty P.C. and Jayachandran B.K. 2008 Conservation and sustainable production of medicinal plants through oil palm based cropping system. Proc. Intl. Seminar Sustainable utilization of tropical plant biomass. December 15-16 2008, Kerala University campus, Kariavattom, Thiruvananthapuram. Pp 143-146.
10. Jessykutty P.C., B.K. Jayachandran Assan. 2008. Influence of oil palm shade on biochemical characters of galangal (*kaempferia galangal L*) Proceedings of the twentieth Kerala Science Congress, (Ed) Yesodharan E.P. Kerala State Council for Science, Technology & Environment, Thiruvananthapuram. Pp 264-266.
11. Hazeena M.S. and G.R. Sulekha 2008. In Vitro propagation of *Aegle marmelos (L.)* Corr. J. Trop. Agri. 46(1-2): 79-84.
12. Jayachandran.B.K(2008) Intensive cropping in coconut for soil moisture conservation, nutrient recycling and high profitability proceedings of the 20th Sci. Congress, January 2008, Trivandrum pp-230-233

Agri.Extension

1. A. Sakeer Husain, K.S. Sali and P.J. Boniface, Socio-economic empowerment through fisheries co-operatives. Journal of Extension and Research; Vol. X, Nos.1&2, January 2008, pp 61-63.
2. A.K. Sherief, A.S. Anilkumar, A.Sakeer Husain and J.K.J.P. Jayawardhana Socio-psychological characteristics of farmers in the adoption of organic farming practices in coconut based homesteads of humid tropics Proceedings of the Second scientific conference of International Society of Organic Agricultural Research (ISO FAR) 18-20 June 2008 Modena, Italy
3. B. Seema, G. Sobhana, S. Shilaja, N.P.K.Sushama Correlates of Entrepreneurial behaviour of Agricultural Students. International Symposium on Sustaining Global Pressures: Women in Science and Engineering held at Kalpakkam during 3-5 January 2008. PP: 41
4. Gopika Somanath and N.P.Kumari Sushama Entrepreneurship: A Means of women employment International Symposium on Sustaining Global Pressures: Women in Science and Engineering held at Kalpakkam during 3-5 January 2008. PP: 42
5. N.P.Kumari Sushama, S. Nazreen Hassan Development issues of women in Science and Technology – An analysis International Symposium on Sustaining Global Pressures: Women in Science and Engineering held at Kalpakkam during 3-5 January 2008. PP: 47
6. Sobhana, G. Shilaja, S and Sukumari, P (2008) Women in agricultural education and research in Kerala. International seminar organized by International symposium on sustaining global pressures: Women in Science and Engineering. Jan 3-5 2008.
7. Seema, B. Fayas, A.M and Shilaja, S (2008) Micro credit utilization and repayment in self help groups proceedings of National seminar on Self Help Groups for Rural enlistment re-emerging extension issues and strategies.
8. Bhavya, B. Kumari Sushama, N.P. (2008) A comparative analysis of Self Help Groups in mushroom cultivation
9. Seema, B. Fayas, A.M and Shilaja, S. (2008). Micro credit utilization and repayment in Self Help Group - National Seminar on Self Help Groups for Rural Upliftment – emerging extension issues and strategies held at Thiruchirappally

10. Bhavya, B, Kumari Sushama N.P, (2008). A comparative analysis of Self Help Groups in mushroom cultivation - National Seminar on Self Help Groups for Rural Upliftment – emerging extension issues and strategies held at Thiruchirappally
11. Gopika Somanath and Seema, B (2008). From Penury to Prosperity – The Greening of SHG's National Seminar on Self Help Groups for Rural Upliftment – emerging extension issues and strategies held at Thiruchirappally
12. Sakeer Hussain, A. and Ranjit Kumar, E. G. (2008). – Empowerment study of Self Help Groups : A model -National Seminar on Self Help Groups for Rural Upliftment – emerging extension issues and strategies held at Thiruchirappally
13. Nazreen Hassan, S. Kumari Sushama, N.P and Kishorekumar, N. (2008).– Social economic impact of SHGs : A case with Kerala Swarna Jayanthi Gram Swarozgar Yogana (SGSY) National Seminar on Self Help Groups for Rural Upliftment – emerging extension issues and strategies held at Thiruchirappally
14. Shilaja, S. and Sobhana, G (2008).– Rural Business Hub – An innovative approach for rural upliftment - National Seminar on Self Help Groups for Rural Upliftment – emerging extension issues and strategies held at Thiruchirappally
15. Kishorekumar, N. and Reddy, M.N. ATMA (2008). – A convergence platform for holistic development - National Seminar on Self Help Groups for Rural Upliftment – emerging extension issues and strategies held at Thiruchirappally
16. Nazreen Hussan, S. Kumari Sushama, N.P and Kishore kumar, N. (2008).– Extension Strategy through SHGs in Kerala Agriculture - National Seminar on Self Help Groups for Rural Upliftment – emerging extension issues and strategies held at Thiruchirappally

Department of Agronomy

M. Abdul Salam P. acob John. Meagle Joseph. Mini Poduwal., Shanthanu J., Ambedkar., Bindumol A., Yadukumar and M.G. Bhatt Quantitative Estimation of soil Fertility and Fertilizer recommendations (QUEFC) for Cashew (*Anacardium occidentale* L) J PlantationCrops 2008.

R. Pushpakumari, . R. Sheela, . Nandakumar and AnnammaGeorgeStandardization of Organic Farming Practices for Banana var. Nendran, Proceedings on National Conference on Organic Farming in Horticultural Crops with Special reference to Plantation Crops 15-18 October 2008

Geethakumari V.L., Usha C. Thomas and Annamma George, 2008 Ecofriendly Techniques for enhancing productivity if amaranthus Proceedings on National Conference on Organic Farming in Horticultural Crops with Special reference to Plantation Crops 15-18 October 2008

Jessy.M.D.,Meerabai,M, Rajendran,P., Geethakumari.V.L.Nair,A.N.S. and Philip,S. 2008.Adaptability of rubber tree to low soil phosphorus-some mechanisms involved. J. Plantn.Crops 36(1),

Shalini pillai P. V.M Nair, Geethakumari V.L.,2008. Balance sheet of soil Nitrogen in Rice based cropping system under integrated nutrient management. Indian J. Agron. 52(1) 2008.

Vandana Venugopal and Sheela.K.R. 2009. Integrated nutrient management for safe food production in banana, Green farming 2(4): 253-256

Vandana Venugopal and Sheela.K.R. 2008. Effect opf planting patterns and intercrops on growth of banana variety Nendran. Geobios 35:245-248

Processing

1. Mini.C & Jose Mathew. 2008. Effect of priming on seed viability and vigour in cashew (*Anacardium occidentale* L) *Seed Res* 36 (1) 37-41

2. K. Krishnakumary, A. Venkata Subramanian & C. Mini. 2008. Optimization of hydro priming techniques for cowpea seed invigoration. *Seed Res.* 36 (1) 33-36.

3. Jose Mathew, Gregory Zachariah and C.Mini. 2008. Economic potentials of tuber crops for intercropping in young cashew plantations. *J.Pln crops*.36 (3): 366-367
4. Mini C, Jose Mathew and Indira V. 2008. Changes in chemical and microbial quality of mixed cashew apple jams during storage. *J.Pln crops*.36 (3): 496-499

Animal Husbandry

Sl. No.	Title	Journal	Name of the author
1	Therapeutic efficiency of an ethno veterinary formulation in the treatment of clinical cases of bovine dermatophytosis.	Animal Science Reporter (2009). 3(1):33-36.	Vijayan,R.,Saritha, A.L.,Anoop,S.,Ammu,R and Nisha,M.
2	Perception of empowerment by the members of women self help groups in goat farming.	Journal of Dairying, Foods and Home Sciences(2008), pp181, Vol.27, No.3/4.	V.Kavitha and R.S.Jiji
3	Training needs of dairy farm instructors in Kerala.	Journal of Dairying, Foods and Home Sciences(2008), pp 94, Vol.27, No.2.	N.Vimal Rajkumar and R.S.Jiji
4	Role expectations of the field veterinarians as revealed by the critical incidents technique.	Indian Journal of Animal Research(2008), pp 253, Vol.42, No.4.	R.S.Jiji and P.N.Kaul
5	Serum biochemical changes in chicks exposed to sub lethal doses of Aflatoxin	Compendium of National seminar on recent advances in the diagnosis prevention and surveillance of animal diseases at Govt: guest house, Thiruvananthapuram	Dr.Ajith Jacob George

Dept of Entomology

1. T. Bharathi meena and K. Sudharma (2008) Biological studies on the southern green stink bug , *Nezara viridula* (L) and the smaller stink bug *Piezodorus rubrofasciatus* (F) (Pentotomidae :Hemiptera) infesting vegetable cowpea Pest management in Horticultural ecosystems Vol. 14 (!) pp 30- 36
2. T. Bharathi meena ,K. Sudharma and M. h. Faizal (2008) Seasonal incidence of pod bugs and their natural enemies in vegetable cowpea ecosystems of Kerala Pest management in Horticultural ecosystems Vol. 14 (!) pp 37- 43
3. Jiji,T., Praveena, R. Naseema, A. and Suja,G. 2008. Entomopathogenic fungi for the biological control of important pests of vegetable crops. Proc. Natl. Conf. on organic farming with special reference to plantation crops. p.132
4. Jiji,T., Praveena, R. Naseema, A. and Suja,G. 2009. Pheromone traps for the management of fruit fly *Bactrocera dorsalis* (Hendel) in mango-a case study. Pro. Kerala Sci. Congress. p.75-77
5. Ambily Paul, Nandakumar, C. and Hebsy Bai. 2008. The vigour of coconut seedlings influenced by the coreid bug *Paradasynus rostratus* Dist. Pest Mgmt. Hortl. Ecosystems 13(2); 102-107

6. Sheela, M.S. 2008. Management of Nematodes in Plantation Crops. Paper presented in Fifth International Congress on Nematology from 13 – 18th July 2008, Brisbane, Australia. Proc. p. 316-317.
7. Sheela, M.S. and Nisha, M.S. 2008. Bio-intensive management of root-knot nematode in coleus (Chinese potato). Paper presented in Fifth International Congress on Nematology from 13 – 18th July 2008, Brisbane, Australia. Proc. p.46.
8. Sheela, M.S., K. Ajith and M.S. Nisha (2008). Impact of green leaf application on the management of plant parasitic nematodes and its effect on the population of predatory and saprophytic nematodes and microflora in soil. Paper presented in Fifth International Congress on Nematology from 13-18th July 2008, Brisbane, Australia. Proc. p.37-38.
9. Siji, J.V., Jayaprakas, C.A., Sheela, M.S. and Mohandas, C. 2007. Efficiency of *Chromolaena odorata* against *Meloidogyne incognita* infestation of Okra. National Symposium on Nematology in 21st century: Emerging paradigms on 22-23 Nov.2007 organized by Nematological Society of India and Assam Agricultural University, Jorhat. Abstract p. 75-76.
10. Nisha, M.S. and Sheela, M.S. Integrated management of Root-knot nematode in coleus, *Solenostemon rotundifolius*. National Symposium on Nematology in 21st century: Emerging paradigms on 22-23 Nov.2007 organized by Nematological Society of India and Assam Agricultural University, Jorhat. Abstract p. 86-87.
11. Remya, K.R. and Sheela, M.S. Potential of Entomopathogenic nematodes for the management of pseudostem weevil in banana. National Symposium on Nematology in 21st century: Emerging paradigms on 22-23 Nov.2007 organized by Nematological Society of India and Assam Agricultural University, Jorhat. Abstract p. 85-86.

Dept of Plantation Crops

Dept. of Processing

1. Jose Mathew and Mini C .2008. Opportunities for income enhancement from cashew through nut and apple processing. *Natl Seminar on Food security through innovations in Food processing and entrepreneurship development*. 29th ept- 30th Sept,2008.p.36-41
2. Mini C , Jose Mathew and Simi Davis. 2008. Replacement of sugar with jaggery fro the preparation of cashew apple syrup. *Natl Seminar on Food security through innovations in Food processing and entrepreneurship development*. 29th ept- 30th Sept,2008.p.145
3. Mini C , Jose Mathew and Sheeba, M.S. 2008. Utilizind cashew apple foor home scale wine production. *Natl Seminar on Food security through innovations in Food processing and entrepreneurship development*. 29th ept- 30th Sept,2008.p.149-150
4. Mini C, Jose Mathew and S.Krishnan.2008. Refinement and commercialization od technology for the rpeparation of pickle from cashew apple. *Abstracts 3rd Ind. Hort congress*. Nov 6-9th , Bhubaneswar, Orissa.p.54.
5. Jose Mathew and Mini C.2008. Manipulation of tree densities for yield and income maximization in cashew. *Abstracts 3rd Ind. Hort congress*. Nov 6-9th , Bhubaneswar, Orissa.p.203.
6. Jose Mathew, C.Mini and Gregory Zachariah.2008. Organic nutrition in cashew nursery and plantation. *Abst. Natl. Conference on Organic Farming in Horticultural Crops with special reference to plantation crops*. 15-18 Oct,2008.pp.49.
7. Jose Mathew, C.Mini and Sobhana, A.2008. Cashew apple: Economic utilization through value addition . Proc. *3rd Ind. Hort congress. Recent Initiatives in Horticulture*. Nov 6-9th , Bhubaneswar, Orissa.p.612-623

Technical bulletins Leaflets/Booklet/Brochures

Name	Title
Jessykutty P.C. Reghunath B.R. Sulekha G.R & B.K. Jayachandran	Practical Manual of Hort 1202 Plantation Crops(1+1)
Pushpakumari R. Meerabai M John P.S.	Practical Manual on Agro 1102 Principles of Agronomy (1+1)

Plantation Crops

1. Kasthuri turmeric – Multi coloured folder (Malayalam)

2. Kasthuri turmeric- Multi coloured folder(English)

Books

Mini.C, Krishnakumary K and K.V. Peter 2008. "Leaf vegetables" in Malayalam. State Institute of Languages, Kerala .56p

Technical bulletins :2 Nos

Agri.Extension

Name	Title	Edited by
Dr. C. Bhaskaran	Book entitled Extension Strategies for Knowledge Centre Agri. Growth	J. Vasanthakumar, C. Bhaskaran and N. Philip
Dr. A.K. Sherief	Biodynamic Agricultural Calendar	

Chapters in Books

Name	Title
Reghunath B.R.	Advances in Medi culture – Piper Longum L.(Eds. Oushakhasasyakrishikku Oru Vazhikatty. Directorate of Extension KAU pp-77-85.
Reghunath B.R.	Advances in Medi culture – Solanum Spp. (L.(Eds. Oushakhasasyakrishikku Oru Vazhikatty. Directorate of Extension KAU pp- 114-119.
Reghunath B.R	Thippali (Piper Longum L) (Ed. Miniraj N. et. Al) Proc. Oushadheeyam 2008, Directorate of Extension , KAU, pp 151-165.

Total Number of popular Articles : 29 Nos

Olericulture

Sl. No.	Title	Magazine/ News Paper	Author	Other details
1.	Our vegetable varieties	<i>Keralakarshan</i>	Sreelathakumary.I and V.A.Celine.2008	54 (4) : 19 -21
2.	Cultivation of cucumber and pumpkin	<i>Keralakarshan</i>	Abdul Vahab.M. and I. Sreelathakumary.2008	54 (4) : 25 - 27

Important visitors

Dr. S.A.Faruqui, Project Co-ordinator, AICRP on Forage Crops visited the Vellayani Centre on 2009

Dr. R. K. Jain, Project Co-ordinator, AICRP on Nematodes and Dr. R. V. Singh, Principal scientist, IARI, New Delhi, visited the experimental fields and demonstration trial plots at Nemom, Ookkode and Chaikkottukonam

Dr. R.Ushakumari, Professor, Department of Plant Breeding and Genetics, TNAU, Madurai

Saff strength as on 31.3.2009

1.	Scientific	96
2.	Administrative	71
3.	Supporting	47
4.	Others	0

Details of sale of seeds/planting materials/biocontrol agents etc.

Olriculture

Item	Quantity (kg)	Revenue (Rs)
Truthfully Labelled Vegetable Seeds	240.3	3,09,981/-

Plant Breeding

Item	Quantity	Revenue
1. Breeder seeds of bhindi	1.275 kg	Rs.1149/-
2. Vegetable Cowpea Seeds	0.075 kg.	Rs. 90/-

Animal Husbandry

Earn While You Learn Programme on broiler production

Project No. and Duration	No. of students	Amount spent (Rs)	Total Income (Rs)	Profit divided among students (Rs)
22/5/08 to 6/6/08 I	7	15500	26042	10,542
19/11/08 to 30/12/08 II	5	15000	31860	16860
1/1/09 to 4/3/09 III	5	15750	31035	15285

Clinical laboratory

Samples examined

2) Milk	-	70
3) Urine	-	72
4) Blood	-	7
5) Faecal sample	-	16
a) Veterinary Hospital		
Cases attended	-	330
PD	-	70
b) Cattle farm		
6. Milk produced	-	32,677.4 litres
7. Income from sale of milk	-	Rs.6,53,548/-
8. Dung produced	-	240 tonnes
9. Income from sale of dung	-	Rs.44000/-
10. Income from sale of gunny bags	-	Rs.2840/-
11. Income from sale of culled animals	-	Rs.40,250/-

c) Poultry farm

Layer unit restarted with 300 white leghorn chicks on 9/1/09.

d) Pig farm

a) Culled animals	-	3 (adult)
b) Income from sale of culled animals	-	Rs.10745/-
c) Piglets sold	-	28
d) Income from sale of piglets	-	Rs.25,500/-

e) Goat farm

Comprises of one buck, two does and two kids.

Other details if any:-

As project leaders/members, the teachers were actively involved in the conduct of the following projects, attending the periodical meetings and monitoring the progress of research.

Name of Scientist	Project/Committee
Dr.N.Saifudeen	1. Hariyali Project
	2. GIS Project of Dept. of land use planning
	3. GIS project soil survey Department
Dr.M.S.Iyer	1. TAG meeting of TVM corporation
	2. Kudumbasree Samagra Project
	3. Project on Wet Land Conservation of Govt. of India
Dr.Sam.T.Kurumthottical	1. Macromanagement Scheme in Agriculture of Dept. of Agriculture

Remote Sensing and GIS laboratory

A Remote Sensing and GIS laboratory was initiated under the department of Soil Science and Agricultural Chemistry to train the students on remote sensing techniques and to assess the existing land use patterns and to suggest suitable land use models for each agro ecological zones .

Strengthening of departmental Analytical Laboratory

The existing Analytical Laboratory of the department was strengthened by replacing the old and damaged instruments. The newly installed instruments include Flame photometer, colorimeter, hot air oven, horizontal shaker, pH meter, water still, water bath, hot plate etc.

Strengthening of Computer Centre

The existing computer centre of the department was strengthened by replacing the old and damaged computers with new generation computers.

Dr. M. Abdul Vahab participated in the meeting regarding the implementation of 1000 vegetable village programme at Kanakakunnu on 21-5-08 and 5-7-08.

Dr. M. Abdul Vahab participated in the meeting conducted by Sarva Shisha Abhian at Sreekariyam and took class on vegetable cultivation on 25-7-08.

Dr. Elsamma Job, Associate Professor(Economics) served as member of the Committee for implementation of micro irrigation in Kerala stata and as a member of State Agricultural&Prices Board

In the department of Home Science a Study Centre for IGNOU is functioning

Programme Co-Ordinator: Dr.Mary Ukkuru.P

Professor (Home Science)

The department is offering MSc. Programme in Dietetics & Food Service Management (DFSM)(Through Distance Learning)

Students enrolled during 2008-09 : 10

Revolving fund programme on "Processing of fruits and vegetables " is in progress

Leaf/tissue lab: The leaf / Tissue analytical Lab funded by SHM was inaugurated on 20.3.2009 at the Department of Agronomy. The Laboratory will cater to the analytical requirements of farmers, research scholars and scientist by charging modest fees.

Crop Museum: The department of Agronomy is maintaining a crop museum for the benefit of students and public.

Finance 2008-09

Head	Expenditure	Receipts
Non-Plan	7,72,58,398.00	
Plan	1,18,85,709.00	
ICAR	34,10,000.00	25,89,468.00
Other EAPs	7,27,234.00	
Revolving fund	0.00	

COLLEGE OF HORTICULTURE, VELLANIKKARA

Name of the Head of the Station : Dr.P.K.Rajeevan

Study tours

2005 Batch completed All India Study Tour. Four students could not attend the tour and they were sent for training in farm for the equivalent number of days.

2006 Batch went on South India Tour. The team consisted of 42 students and 3 teachers under the leadership of Dr. E.Sreenivasan. The period of the tour was from 19-8-2008 to 8-9-2008.

Other activities :

Students Union activities

The Student's union 2008-09 was formed in January 2008. Following were its office bearers:

President	:	hamed Shahab S
Vice President	:	Delna Jose
General Secretary	:	Yunus C
Joint Secretary	:	Aswathy Krishna
Arts Club Secretary	:	Rithula R
Student Editor	:	Athul B.M
Sports Club Secretary	:	Abdul Rahiman
S Service League Secretary	:	Rijith P
Planning Forum Secretary	:	Aswathy Pramod
Quiz Club Secretary	:	Gous Ali
Unty Union Councillors	:	Jijio Joseph T.J., Najeeb Nandutodi, Renjini V.R.
Class representatives	:	Gintu George (2005), Renjith P.S. (2006), Jaleel (2007), Anil Sebastian (2008) &Randeep K.R. (PG)

The Union took shape with Dr. P. K. Rajeevan as the Patron and Dr. P. Ahamed as the Associate Patron.

The following teachers were appointed as staff advisors:

Dr.Suresh Kumar– Arts Club

Dr. K.Nandhini– Staff Editor

Sri E. U. Rajan – Sports Club

Dr. R. Ushakumari- Social Service League

Dr. Jim Thomas- Planning Forum

Dr.Asha Shankar-- Quiz Club

Inauguration

he formal inauguration of the Students' Union 2008-'09 was held on 27th January 2009. The function was presided over by Ahamed Shahab S., President of the Students' Union. The Union was declared inaugurated by the celebrated Lyricist Sri Rafeeq Ahamed. The Famous theatr performer and caricaturist Sri. Nandakishore inaugurated the Literary Club& Idea Star singer fame Sri Sannidanandan

inaugurated the Arts Club. The Secretary of the Students' Union extended the vote of thanks. The formal function was followed by an orchestral performance by Cochin Heroes.

+were the runners up.

Kalathilakam - Vysaghan V (Avalon 2008)

Kalathilakam - Anuja A.R. (Sopanam 2005)

Chithraprabha - Najeeb N. (Orion 2006)

Sargaprabha - Anuja A.R.

Extra curricular activities & d) Sports and games

The course Phed 1101 (0+1) was offered to B.Sc. (Ag.) 2008 admission for the period from 17/9/2008 to 10/3/2009.

Participation in Intercollegiate tournaments

<u>Event</u>	<u>Venue</u>	<u>Date</u>	<u>Position</u>
i) Shuttle & TT (M) & (W)	Faculty Club, Mannuthy	7 th & 18 th October 2008	Runner up Shuttle (W)
ii) Volley ball (M) & (W)	College of Agriculture, Vellayani.	0 th & 21 st January 2009	Participant
iii) Basket ball (M) & (W)	Veterinary College, Mannuthy	29 th & 30 th January 2009	Winner (Womens team)
iv) Football (M)	eterinary College, Mannuthy	24 th & 25 th February	Participant

* Conducted coaching camp for Basket ball, Volley ball and Football for the year 2009.

* Priya Vallat was selected to represent KAU Shuttle team for the participation of 10th All India Inter Agri Sports Meet.

* Inauguration of College Health Club was made on 6-8-2008.

* Annual Sports & Games Meet was conducted from 16th to 28th January 2009 at COH Grounds.

NSS activities

1. No. of Units : Two
2. Chairman, Advisory Committee : Dr. P.K. Rajeevan, Associate Dean
3. Programme Officers : 1. Dr.P.R. Suresh
2. Dr. Prema (Upto 21-08-2008)
3. Dr. D. Girija (from 22-08-2008 till date)

4. Activities taken up:

Independence Day Celebrations

NSS volunteers of College of Horticulture celebrated Independence day. The volunteers assembled at the college building at 9.00 a.m after flag hoisting at the University head quarters. The Associate Dean, Dr P K Rajeevan addressed the students, teachers and labourers and said that cleaning our surroundings was indicative of cleansing our thoughts.

Volunteers, assisted by teachers and labourers, cleared all the thorny weeds and shrubs that were found in and around the college campus. Bleaching powder was sprinkled around the college building to disinfect the surroundings of the college and to destroy the algal growth. *Eco-neem*, a neem-based formulation to control insects was sprayed in all the sewage lines and crevices around the college building

to ward off insects breeding in stagnant water. The volunteers then had refreshments and the Hon'ble Vice Chancellor, Registrar, Director (Academic) and other KAU officials also took part in the activities.

Gandhi Jayanthi Celebration

In connection with the Gandhi Jayanthi celebration on October 2nd, an essay competition in English and Malayalam was conducted on the topic 'Relevance of Gandhian thoughts' and first and second prizes distributed by Sri. Haridas, Retd. Professor and NSS Programme Officer, St. Aloysius College, Thrissur on 16-10-2008.

Orientation Programme

An orientation programme was arranged on 16-10-2008 for the first and second year students on the objectives and mission of National Service Scheme. Sri. Haridas, Retd. Professor and NSS Programme Officer, St. Aloysius College, Elthuruthu was the speaker. The Associate Dean introduced the speaker. Sri. Haridas elaborated on the activities of the NSS and how these activities will help the students to improve their personality. He stressed on the fact that NSS will provide a link between the students and the community. Vinod Krishnan, the student captain proposed vote of thanks.

Mission Green Earth Campaign

The NSS unit of the College of Horticulture became a part of the Mission Green Earth programme which was launched jointly by the Art of Living Foundation, Thrissur Chapter, United Nations and the Ministry of Environment and Forests, Govt. of India. This programme is organized for fighting global warming which is brought about by human activities. On 18-10-2008, the volunteers assembled at the College, wearing the T-shirts with the logo of Mission Green Earth, took an oath to protect the earth from global warming and then proceeded to the avenue between the Central Auditorium and the main gate of the university. *Lagerstromia* seedlings were planted in the gaps, basins of the existing plants were cleared of weeds, vermicompost was applied and plants were irrigated.

Village Adoption Programme

The NSS volunteers took part in the Village Adoption Programme of Kerala Agricultural University at Tholur Panchayat. They collected soil samples from the Kole lands. These samples were analysed and suitable fertilizer recommendation given. They also took active part in follow up field visits during crop growth and the harvest festival.

Special Camp

A Special camp "JAIVAM" was organized in Kuttanad, in collaboration with the Dept. of Agricultural Entomology, College of Horticulture and the faculty members of Regional Agricultural Research Station, Kumarakom. 50 volunteers participated and took lead role in Arthropod Bio Diversity in Kuttanad from 20th to 26th January 2009. Pre-camp Orientation was given on 20th. Inauguration of the camp was arranged on 21st at Kumarakom. District Collector of Kottayam, Sri. Venugopal IAS addressed the volunteers and The Hon'ble Minister for Agriculture, Sri. Mullakkara Ratnakaran was also present on the occasion. Volunteers took active part in Nutrition garden preparation in Kudumbasri units. On 22nd, the camp area was cleaned and the volunteers were given an Orientation on bio diversity survey. 23rd Conduct of survey in 11 locations in Alapuzha, Kottayam and Pathanamthitta districts with the help of farmers and students of MSM college Kayamkulam and MG university. The premises of Primary Health Centre Vechoor were cleaned on 24th & 25th Visit to various ecosystems of Kuttanad. Insects were sorted out and report prepared. Various ecosystems of Kuttanad were visited on 25th. Post camp evaluation was held on 26th January.

Training of Programme Officers

The programme officers attended two day training programme on 'Empowerment and personal excellence' at the Central Training Institute, Mannuthy

Formation of the Advisory Committee

The Advisory Committee was formed for the year 2009-10 and the first meeting was held on 4th February 2009 in the board room of the College, with Dr. P.K. Rajeevan in the chair. The Committee consisted of the following members:

1. Chairperson : Dr.P.K. Rajeevan, Associate Dean
2. Member Secretaries : i) Dr. P.R. Suresh, Programme Officer
ii) Dr. D. Girija, Programme Officer
3. Student Volunteers : i) Jijo Joseph, 2nd Year student
ii) Jilu V. Sajan, 3rd year student
4. Two Faculty Members : i) Dr. P. Ahamed, Associate Patron
ii) Dr.P.S. John, PTA Secretary
5. One Representative : Mrs. Nimba, Agricultural Officer
From Dept. of Agri
6. Elected representatives : Smt. Jayasudhakaran, Ward Member, 9th ward
of Panchayat Sri. Shyjan, Ward Member, 10th Ward,
Madakkathara Panchayat

Research Programmes

Major research achievements (highlights)

Agricultural Engineering

For meeting the objective namely “Conservation and Management of Soil and Water Resources to mitigate drought and other natural calamities” of the NAIP project “Multi-enterprise farming models to address the agrarian crisis of Wayanad”, three training programmes were conducted to farmers during the period.

Agricultural Economics

The study on fertilizer use pattern of major crops in South Zone showed that majority of the farmers in Kerala, Karnataka and Tamilnadu and Andhra Pradesh preferred urea for its high crop response, reasonable price and reputed practice. Price reduction as a solution to improve IFFCO fertilizer was provided by 36% farmers in Kerala, 29% in Tamil Nadu, 57% in Karnataka and 29% in Andhra Pradesh

The indicators used in Impact assessment of cluster approach showed a considerable change which indicates that the financial assistance in the form of subsidies together with the farmer participatory approach proved successful in implementation of the cluster programme. Cluster approach should be extended for the marketing of produce, thereby ensuring higher profits. Despite relatively higher literacy and formal education, the knowledge and awareness level with respect to pesticides were found to be far less than satisfactory.

The study on Pesticide Use and Crop Productivity in Food Crops of Kerala (bittergourd and pine apple) came out with the following observations. Many of the Pesticides used in pine apple include chemicals which are banned for sale in Kerala (Endosulfan), and those permitted for restricted use only. (2 Methoxy ethyl mercury chloride). The pesticides which are suggested on a need based manner is applied on a prophylactic approach. The application level is higher than the recommended level of the chemical by 0-550 % in pine apple and 0 to 900 % in bitter gourd. Despite relatively higher literacy and formal education, the knowledge and awareness level with respect to pesticides were found to be far less than satisfactory.

The SWOT analysis and participatory evaluation of the selected agro ecological units of Palakkad district highlighted the importance of farming and agri-related sectors for providing livelihood security of the district and outlined the strategies to be devised. A spatial integration of crop, livestock and other agro-related enterprises under the aegis of Krishibhavans by integrating other line departments and major programmes like NREGS in a participative manner with the support of local bodies should be the strategy for the development of agriculture in Palakkad.

BCCP

In rice, significantly high incidences of dead heart, white earhead and leaf folder were recorded in conventional farming when compared to BIPM cultivation. The grain yield and the population of spiders and coccinellids were significantly high in BIPM.

The mean of two season's data revealed that coccinellid and spider counts were significantly high in organic farming. There was no significant difference in grain yield. White ear head count was significantly low in organic farming.

In coconut, the pest population came down significantly after release of the natural enemies when compared to control. Lowest pest count was recorded in *Goniozus nephantidis* released palms.

Large area demonstration of *Oryctes rhinoceros* management using *Metarhizium anisopliae* var. *major* and baculovirus in Kerala: All the grubs and pupae were found diseased 15 days after treatment of *M. anisopliae* var. *major* and the fresh incidence of attack was very low in palms.

Biocontrol of *Aphis craccivora* in cowpea using entomofungal pathogens : There is reduction in aphid population after treatment application and the lowest aphid count was recorded in *Verticillium lecanii* treated plot and it is on par with *Fusarium pallidoseum*, *Beauveria bassiana*, *Metarhizium anisopliae* and chemical treated plots. Significantly high population was recorded in control. Pod yield was on par in the treatment plots when compared to control.

Evaluation of anthocorid predator, *Blaptostethus pallescens* against spider mites in Bhindi (open field): The treatment1 (10 anthocorids / plant) and treatment 2 (20 anthocorids / plant) were on par and there is significant reduction in mite population after release of anthocorids when compared to control. Lowest mite population was recorded in chemical control. Yield was on par in all the treatments.

Survey for the natural enemies of Tea mosquito bug in cashew: Conducted surveys in Thrissur (dt.) mainly in Madakkathara area for collecting natural enemies of Tea mosquito bug. The ants collected as predators of tea mosquito bug are *Oecophylla smaragdina* Fabr., *Camponotus compressus*, *Crematogaster* sp. and *Tetraponera* sp., belonging to the family Formicidae. Spiders preying on cashew mirid bug were also collected and identified. The common spiders collected are *Hyllus diacanthus* (Salticidae), *Telamonia elagans* (Salticidae), *Oxyopes sunandae* (Oxyopidae) and *Oxyopes swetha* (Oxyopidae).

Conducted surveys to collect the natural enemies of *C. rotundus*. A mealy bug was collected from the roots of the weed and it was identified as *Geococcus citrinus*. But it has been reported as a pest of banana in Kerala. A caterpillar causing dead heart symptoms on the weed was collected and it was identified as *Nephopteryx* sp.

Biocontrol of *Chromolaena odorata* using *Cecidochoares connexa*: There was significant reduction in plant height on 30th and 60th days after release of the gall fly and all the other growth parameters were on par. Investigation on the differential performance of *Cyrtobagous salviniae* against *Salvinia*: A survey was conducted in Thrissur district to collect water samples from areas without *Cyrtobagous* on *Salvinia*. But the weevils were present in all the areas. Water and plant samples were drawn from two locations where *Salvinia* is controlled successfully and analysed. There is no significant difference between the two samples.

Started the mass production of the following biocontrol agents and antagonists for revenue generation and experimental purpose. *Trichogramma japonicum*, *B. bassiana*, *V. lecanii*, *F. pallidoroseum*, *M. anisopliae*, *Pseudomonas fluorescens* and *Trichoderma viride*.

CCRP

During the year two consignments of bud wood of cocoa consisting of 74 clones resistant to *Phytophthora* pod rot were imported from the International Cocoa Quarantine Centre, University of Reading UK. Out of these 53 clones survived.

During the year, 22 clones imported during September 2007 were field planted.

During the year 30 crosses involving 10 selected female and 8 male parents were made. The pods are in varying stages of development. 134 hybrid seedlings resistant to *Phytophthora* pod rot were field planted during the year.

Twenty two inbred genotypes were selfed to produce the next generation inbreds and the pods are developing in three plants and 19 turned out to be self incompatible.

Seventy seven inbred cross seedlings derived from 4 distant inbreds were field planted during the year.

Agricultural Entomology

Coconut root (wilt)/ leaf rot syndrome and perianth mite was managed by SRF technology in farmer's fields at Porathussery and Kuttikad, Chalakudi.

Assessed the bioefficiency of biorational insecticides for managing the key pests of jasmine.

Rodent attack in coconuts was effectively managed by integrated tactics at Mathilakam block panchayat.

Developed and evaluated management methods including MAT & BAT for the effective management of mango fruit fly.

Studied Tritrophic interactions of cowpea aphid, *Aphis craccivora*.

Isolated and carried out molecular characterization of native isolates of *B.thuringiensis* against *Spodoptera mauritia*.

Processing Technology

The project "Standardization of minimal processing techniques for selected fruits and vegetables" was conducted in the Dept. of Processing Technology, College of Horticulture, and Vellanikkara during the period 2005-2008. The protocol for minimal processing of the fruits and vegetables like jackfruit, breadfruit, pineapple, cowpea, coleus and elephant foot yam were standardized.

Surface sanitation to reduce the microbial levels on fresh cut products is the first step in the protocol for minimal processing. Surface sanitation with sodium hypochlorite solution (100ppm) was found to be effective in reducing microbial load on fresh cut products.

The effect of chemical preservatives like potassium metabisulphite and sodium benzoate alone as well as in combination with acidulants (citric acid), antioxidant (ascorbic acid) and firming agent (calcium chloride) in controlling decay, reducing browning and retaining firmness of fresh cut products were studied. Pre-storage treatment of fresh cut products with potassium metabisulphite (0.1%) or sodium benzoate (0.1%) in combination with ascorbic acid was found to enhance shelf life, reduce microbial load and improve appearance of fresh cut products. The natural preservative sodium chloride was not very effective in retaining visual quality of fresh cut products.

Feasibility of using ionizing radiation to control food borne pathogens in fresh cut products was studied. The fresh cut products were subjected to ionizing radiation at doses of 50 Gy, 100gy, 150 Gy and 200Gy. A gradual decrease in microbial population was observed with increasing dose of irradiation.

Higher dose of irradiation (200Gy) was effective in retaining visual parameters, reducing microbial load and extending shelf life of fresh cut products.

The effect of modified atmosphere packaging coupled with low temperature storage and irradiation on shelf life of pre-cut products were studied. The different treatments were poly ethylene (PE) cover (T₁), Ventilated PE cover (T₂), Poly propylene (PP) cover (T₃), ventilated PP cover (T₄), PE cover + ethylene absorbent (T₅), PE + KMS sachet (T₆), poly styrene tray wrapped with cling film (T₇), vacuum packaging in PE cover (T₈), vacuum packaging + nitrogen gas flushing in PE cover (T₉) and areca sheath tray wrapped with cling film (T₁₀). The products were stored under ambient and refrigerated conditions. Browning, reduction in green colour, suberisation, fermentation and decay were the main problems in storage of fresh of fresh cut products. The effect of irradiation in combination with refrigeration was also studied. Modified atmosphere packaging coupled with refrigerated storage prolonged the shelf life, reduced physiological loss in weight and microbial population in fresh cut products. Poly ethylene cover along with a sachet of KMS proved to be the best packaging material for the products. Packaging in polystyrene tray and wrapping with cling film was also found ideal for fresh cut products of pineapple, bread fruit and elephant foot yam. Combination of irradiation and refrigeration was effective in reducing the microbial load significantly by extending shelf life of products. The changes in the chemical constituents *viz.* acidity, ascorbic acid, TSS, starch, carotenoid and total phenol during the storage of the fresh cut products were studied

AIP project on multienterprises farming models to address the agrarian crisis of Wayanad district of Kerala. Dr. K.B Sheela and Dr. P. B pushpalatha are associated with the postharvest module of the above project. Dr. K.B Sheela organized three training programmes on fruit and vegetable preservation at Kambalakad, Mananthavady and Ambalavayal of Wayanad district and handled classes for the training programmes. Quotations were invited for the purchase of spices and fruit processing equipments. Spice processing equipments like Hammer mill, hybrid drier, continuous impulse sealer, destoner etc were purchased. Fruit processing equipments like homogenizer, refractometer, pulper, food processor, cooler etc were purchased.

The project "Process optimization for production of value added products from snapmelon and watermelon was conducted in the Dept. of Processing Technology, College of Horticulture, Vellanikkara during the period 2005-2008. The snapmelon types collected under the NATP project as well as those collected from farmers field were evaluated for their physico-chemical attributes. In general the fruits were non-acidic rich in carbohydrate and contain less sugar. The types vary in size and pulp content. The placenta which is being wasted during extraction of seeds is a very good raw material for processing in to value added products. Both pulp and placenta is to be processed and preserved separately to get a shelf life of 9 months. Placenta is rich in Beta carotene.

Vacuum concentration of snapmelon pulp and placenta was found advantageous as it reduce the bulk of raw material and provide easiness for storage. Shelf life of concentrated material is approximately one year. The concentrate can be reconstituted to different value added products. An array of value added products *viz.*, RTS, squash, blended beverages, jam, wine, concentrate etc were developed based on ripe snapmelon. Recipe for pickle and sauce was developed based on tender fruits. Analysis of mineral constituents in snapmelon has shown that it is a very good source of phosphorus and potassium (1.16-1.25%).

Physico-chemical composition of watermelon types was studied. The red fles which is the most economically important part of watermelon constitutes 54-55% of fruit weight. High variability exists among the types collected with respect to biochemical composition. The average T.S.S. of pulp was 7.2 ° brix. The pulp was identified as good source of lycopene and the content ranged between 4.10-5.55%. The netted type of Goa was found to possess maximum lycopene content. Different value added products *viz.*, jam, sweetened juice, squash, wine, sauce, blended beverages and rind based products *viz.*, jelly, wine, pickle, pulp and rind mixed products *viz.*, jam, jelly, sauce, wine, blended beverages etc were developed using watermelon. Protocol for extraction of lycopene colour from watermelon flesh was developed.

Extraction of pulp, separating the juicy layer and thick pulp layer, vacuum concentration, and vacuum drying of pulp followed by extraction of lycopene with acetone and evaporating acetone to leave lycopene is the crucial steps in lycopene extraction.

Technology for developing squash and syrup from the juice separated from thick layer was developed. The recipe for preparation of ice-cream, shake etc using vacuum concentrated pulp was developed. An "instant mix" with watermelon colour concentrate and condensed milk was developed using vacuum concentration and spray drying technology. The product can be used as a basic material for preparation of naturally flavoured and coloured milk, ice-cream, shakes, halwa etc.

The protocol developed for extraction of colour from watermelon flesh and "ready to use instantmix" formulated will be filed for patent

Standardized the recipe for the preparation of sweetened concentrated coconut milk and coconut toffee under the project entitled "Product diversification in coconut"

Plantation Crops and Spices

Findings of the project Domestication studies on jeevakom was presented in ZREAC meeting at RARS, Pattambi and also through the dissemination seminar on medicinal plants at Parakkadavu, Ernakulam.

Soil moisture stress induced flowering in vanilla- A moisture stress of one to one and a half months during November-December is sufficient to induce flowering in vanilla. Soil moisture stress altered the physiological and biochemical parameters in vanilla. Changes in physiological parameters due to moisture stress could be used to visually assess the extent of moisture stress in the garden. For inducing flowering in vanilla, spraying of growth regulators like NAA and Ethrel each at 100 ppm and GA 50ppm during November was found effective. Spraying NAA 50 or 100ppm at monthly or trimonthly interval and spraying BA 50ppm at monthly interval on fruit bunches improved size and weight of vanilla beans and content of vanillin.

Olericulture

A high yielding amaranth line Kannara Local was proposed for farm trial in the 29th ZREAC meeting held at pattambi on 20-05-08.

In the SHM project entitled "Establishment of Model nutrition gardens of Kerala" vegetable gardens were raised in the homesteads of 128 farmers in Thrissur, Palakkad and Ernakulam districts. Inputs like seeds, fertilisers, organic manures were distributed to them. Training programmes were also conducted to selected farmers.

High yielding and yellow vein mosaic resistant F₆ generation okra segregants developed out of the cross *Abelmoschus caillei* x *A. esculentus*

Superior drumstick genotypes Viz. MO-144, MO-95, MO-70 and AD-4 were recommended for release by ZREAC.

Tetraploid and triploid of Ivy gourd was developed which were found to be high yielding and having less astringency.

Germplasm of various under exploited vegetable crops such as drumstick, ivy gourd, curry leaf, pointed gourd, sweet gourd and miner leafy vegetables is maintained and evaluated.

Pole types (71 no.) and photoinensitive bush types (25 no.) of Hyacinth bean are collected, maintained and evaluated for yield and other attributes. Selected 10 pole types and 12 bush types for further comprehensive evaluation.

Germplasm collected within the country and outside are maintained and evaluated for yield and other attributes.

Efficacy of plant bioregulators were conducted in 6 different crops viz., Ash gourd, Pumpkin, Watermelon, Bitter gourd, Tomato and Chilli, each for 3 seasons to find out doses and time of application of different plant growth substances.

Mosaic resistant F₂ and BC₁F₄ segregants of bitter gourd developed which were evaluated and progressed.

Results of the studies on standardisation of the optimum stage of harvest of fruits revealed that in okra, fruits can be harvested for seed purpose at 18 days & 24 days after anthesis in Aruna & Salkeerthi respectively for getting maximum germination percentage & vigour index.

Seed extraction & processing experiments in tomato (Mukthi) revealed maximum germination and vigour when the seeds were extracted manually by fermenting the pulp and then drying in shade.

Germplasm collections of ash gourd and oriental pickling melon were evaluated and promising lines identified.

Five accessions of chilli were found to be resistant to both bacterial wilt and mosaic during field evaluation involving fifty-three chilli accessions.

Snake gourd accession, TA-19-1 is recommended for farm trial and farm trials are going on at Thrissur, Ernakulam, Palakkad and Malappuram districts.

Yield of oriental pickling melon varieties Mudicode and Soubhagya was significantly higher when planted in trenches as compared to pit system of planting during both rabi and summer seasons.

Plant Pathology

Etiology and management of die back disease of mango graft in nursery: The pathogens causing die back disease were identified as *Colletotrichum gloeosporioides* (Penz) Sacc and *otyodiplodia theobromae* Pat. The leaf blight causing pathogen were identified as *C. gloeosporioides*, *Pestalotiopsis mangiferae*, *Cylindrocladium mangiferae*, *Drechslera australensis* and *Alternaria alternata*. The fungicides viz 1% Bordeaux mixture, 0.15 % Copper hydroxide, 0.3% Captan, 0.1% hexaconazole and carbendazim and the bioagents, *Trichoderma viride* and *Pseudomonas fluorescens* (2% each) were equally effective in the management of die back disease of mango. Two varieties, Alphonso and Malgoa were found highly resistant to die back disease. The highest Phenol content was recorded in Alphonso followed by Malgoa.

Performance of oyster mushroom (*Pleurotus* sp.) on organically amended agro wastes : Paddy straw was selected as best substrate for oyster mushroom cultivation giving early spawn run, mushroom production & maximum yield for all species Among the organic amendments evaluated, except dry biogas slurry, all organic amendments had superior effect in reducing the time for spawn run and increasing the yield. The performance of different species of oyster mushroom evaluated, varied with organic amendments. Mushrooms packed in pin pricked PP bags and in PP bags without ventilation under refrigerated condition recorded maximum shell life.

Biocontrol consortium for the management of bacterial wilt of chilli and *Phytophthora rot* of black pepper and vanilla.

Developed four consortial formulations of bioagents with shelf life of 6-12 months viz., *Trichoderma harzianum* + *Bacillus magaterium*, *T.harzianum* + *T. viride*, *T harzianum*+*Pseudomonas fluorescens* and *B. magaterium* +*P. fluorescens* for the management of *Phytophthora rot* of black pepper, vanilla and bacterial wilt of chilli

Isolated potential antagonistic endophytic fungi, *T. viride* and *T. pseudokoningii* from black pepper for the first time.

Isolated potential antagonistic endophytic bacteria, *Bacillus megaterium* which is reported to be phosphorus solubilizing bacteria from black pepper for the first time.

Development of bioagents consortia for plant disease management and commercial application.

Field experiments conducted to evaluate the efficacy of bioconsortial formulations on the management of rhizome rot and bacterial wilt of ginger using infected seed rhizome and bacterial wilt of chilli revealed that, combined application of *T. harzianum* + *P. fluorescens* is the best combination for the management of these three diseases

50% coconut water, a cheap liquid medium has been developed for the mass multiplication of *Trichoderma*, *Pseudomonas* spp. and *Bacillus* spp.

The concentration of coconut water can be further reduced to 25% by the addition of nutritional supplements like MgSO₄ (2g/l) or dextrose (15g./l) for the mass multiplication of both *Trichoderma* and bacterial bioagents. In addition tapioca powder @ 5g/l can be used in case of *Trichoderma*. Dried coconut leaf bits + neem cake at the ratio of 9:1 is a good economic solid substrate for the large scale multiplication of *Trichoderma* spp.

Development of Plant growth promoting microorganisms consortia technology for *ex vitro* establishment of micropropagated vanilla (*Vanilla planifolia* Andr.) and ginger (*Zingiber officinale* Rosc.): A consortia of **AZB₁₁** (Azotobacter species. from Valathala) + **FP₁₃**

(Fluorescent Pseudomonads from Ettumannur) and **B₉** (Bacillus species. from Kolavayal) + **Fp₈** (Fluorescent pseudomonads from Ambalavayal) were found to be the most efficient PGPM consortia for the growth and establishment of micropropagated vanilla and ginger respectively. These results indicate variation in the efficiency of isolates depending on the location from which it is isolated. Hence, there is a need to identify suitable PGPM for different crops of Kerala.

Characterization of phosphate solubilising bacteria and *Azospirillum* from rhizosphere of cucurbitaceous vegetables in Kerala: In the present studies, **PSB3** (Phosphate solubilising bacteria from Payannam 1) and **CASP 13** (*Azospirillum* from Payannam 1) have been identified as efficient isolate in growth enhancement of ivy gourd. Similarly, **PSB12** (Phosphate solubilising bacteria from Vellanikkara) and **PSF 2** (Phosphate solubilising fungus from Malamukku) have been found to be efficient isolates for growth enhancement of bitter gourd. Among the *Azospirillum* isolates obtained from bitter gourd rhizosphere, **BASP13** (*Azospirillum* from Payannam1) and **BASP16** (*Azospirillum* from Chuvannamannu) have been found to be efficient in enhancing the growth of bitter gourd.

Isolation and screening of different AMF cultures for selected cucurbitaceous crops : Based on the various growth parameters viz; plant height , number of leaves, number of branches, fresh weight and dry weight of plants and yield observed under pot culture and field condition, AMF-3 (Payannam -2) and AMF-3(Vellanikkara) cultures were found to be efficient in enhancing the growth and yield of ivy gourd and bitter gourd respectively

Centre for Plant Disease Identification and Documentation: Plant disease specimens of ornamental plants and field crops were collected, identified and preserved by wet method in formaldehyde solution and by dry method in herbarium sheets. Photographs of these specimens were documented in CDs and were also laminated and displayed in plant disease museum. The plant disease specimens brought by the farmers were also identified and documented.

Plant physiology

Standardised the procedures for chemical test like Peroxidase reaction, NaOH test, Phenol colour reaction, lugol reaction and Potassium dichromate test to analyse the seed purity in 10 rice varieties based on the biochemical component of seed.

CPBMB

Molecular markers detected for bacterial wilt and ToLCV resistance in tomato

Developed F₂ population in tomato for mapping disease resistance gene

Developed Stress related Expressed Sequence Tags in Black pepper

Developing RILs in tomato through Single Seed Descent method

In vitro pollination in turmeric was attempted and seed set and development was obtained in the media. : Half MS + 2x vitamins + BA 1 mg l⁻¹ + Kinetin 1 mg l⁻¹ + Picloram 0.2 mg l⁻¹ + Sucrose 3% + Phytigel 0.18%

Half MS + 2x vitamins + BAP 0.5 mg l⁻¹ + Kinetin 1 mg l⁻¹ + NAA 0.5 mg l⁻¹ + Sucrose 3%

Seed set was obtained in Kacholam, through *in vitro* placental pollination with pollen grains suspended in ME₃ medium. Culturing medium identified for ovule development is ½ MS + 2, 4-D 0.2 mg l⁻¹.

Breaking seed dormancy of 7-8 months to 7 days in Kodampuli

Standardized RAPD markers for gender dimorphism in Kodampuli

Standardized protocol for direct organogenesis from immature endosperm of Kodampuli

Evolved 40 resistant plantlets against *Phytophthora* foot-rot of black pepper

Designed new lab model device for biogas production from TC waste.

Identified two methanogenic bacteria for evolving methane gas from TC waste

Genetic diversity of *Pseudomonas fluorescens* of western gnats was assessed by RAPD and Rep PCR. Molecular diversity was noticed and both the techniques were equally effective

Nitrogen fixers, 81 P solubilizers, 25 *Pseudomonas fluorescens*, 22 *Trichoderma* and 16 lignin degraders were isolated

The P-solubilizing bacterium PB1 solubilized 34.5 µg/ml within 7 days

Two pigment producing bacteria were identified by 16S rRNA sequencing as *Serratia marsecens* and *Chromobacterium violaceum*

The native isolate Pf-10 of *Pseudomonas fluorescens* produced maximum antagonism index of 199.2 on the bacterial wilt pathogen *Ralstonia solanacearum*

A repository of 500 native *Bacillus thuringiensis* isolates was prepared

Full length *Cry1Ac* gene from the isolate KAU 474 was cloned

10 isolates recorded 100% mortality in bioassay experiments with the test insect *Diaphania indica*

The parasporal crystal protein *cry46* from the native isolate KAU 41 produced cytoplasmic blebbing, cytoskeletal alterations and nucleus condensation in Dalton's Lymphoma Ascites tumour cells under *in vitro* conditions.

Bio Informatics Centre

The Centre is actively engaged plant based research on gene & protein sequence analysis, protein structure prediction, molecular docking and metabolic pathways analysis. The main objectives of the Centre include creation and maintenance of databases in the field of agriculture, provide educational and training facilities in different areas of Bioinformatics, promote R& D using Bioinformatics, provide E-mail & internet services and CD-ROM literature services on biotechnology to the scientists, students and other staff of KAU. Centre has developed and is updating a Database on Indian Spices, Database on Rice, Database on Improved Crop varieties at KAU, Farmers Portal, and Database on Spices and Herbs for Wellness.

Studied the action of photochemicals Convolvine and Curcumin with parkin protein, which could be used as a promising leads to treat Parkinson's disease.

Studied the efficacy of natural anti oxidants, curcumin (*Curcuma longa*), Cirsilineol, Rosmarinic acid (*Ocimum sanctum*), Hydroxychalcone (*Cinnamomum verum*), and Eugenol (*Eugenia caryophyllata*) in the treatment of stress induced insulin resistance via Type II diabetes

Identified the action of piperine against lung cancer.

Predicted the anti-oxidant properties of curcumin and baccoside against Amyloid beta A4 protein against Alzheimers disease

Studied the antiviral properties of Eupatorium odoratum against Chikungunya Virus

Soil Science & Agricultural Chemistry

Amelioration of Subsoil Acidity by Calcium Sources in Laterite Soils of Black Pepper Garden

The study revealed that a sub surface zone with high concentration of exchangeable Al exists in laterite soil of the pepper garden of College of Horticulture and the by product phospho gypsum was found to be a good ameliorating agent for the sub soil acidity.

Quantity-Intensity Relations of Phosphorus with Reference to its Bioavailability in Laterite Soils

Application of the different amendments namely leaves of *Pongamia pinnata*, *Cleistanthus collinus* & Lime have significantly improved the available P and soluble P in laterite soil. The radio active Phosphorus activity measurements indicated that the applied P though contributing to the available pool in amended soils, this might be routed through the inorganic fraction Ca-P and not coming to the soluble/labile pool.

RKVY project on 'Vermi Compost Production Unit at College Of Horticulture, Vellanikkara'. The project was sanctioned on 19th May 2008 with a financial outlay of 10 lakhs for a period of one year. The long term aim of the project is to focus the capabilities of Vermi technology through the strengthening of the existing vermi compost unit at college of horticulture through the following short term objectives.

Setting up of a technology business to develop and refine the vermi bio technology

Setting up of a laboratory for quality testing, certification and promotion of vermi compost and agro products.

Setting up of a model organic farming unit with the use of vermi compost and allied products.

So as to achieve the above mentioned objectives the existing structures of bio gas, vermi rearing units, quail farming structures and compost production were renovated. The irrigation facilities necessary for organic farming and connected rain water harvesting structures were newly created. Fruit crops and vegetables were also raised by following the principles and methods of organic farming. Certain other options of vermi technology such as the use of earth worm meal for the aquaculture, cultivation of azolla and aquatic flower plants using enriched vermi products and the milky mushroom production with the worm cast as the casing material were also tried.

AICRP on Soil Test Crop Response

The centre has developed target yield equation for pumpkin. The targeted yield equation developed by the center for second crop rice have been test verified in two locations each at Palakkad and Thrissur districts. In both the locations the targeted yield was achieved and hence the STCR technology was found to be superior. Frontline demonstration trials (FLD) on Nendran Banana are being conducted in collaboration with the department of Agriculture, Kerala State at 2 locations in Ponnani Taluk of Malappuram district and at 2 sites in Iringalakuda Taluk of Thrissur district. The bio metric observations recorded are in conformation with the STCR technology

Pomology and Floriculture & AICFIP

Investigations on the "Performance evaluation of anthurium (*Anthurium andreanum* Lind) under two climatic regimes" were conducted under two climatic conditions (Vellanikkara, Trichur and Nelliampathy, Palakkad) Based on the evaluation conducted on ten cut flower varieties of anthurium, Aymara Titicaca, Benicito and Chichas are recommended for the plains (Vellanikkara) and Salasaga, Caesar, Esmeralda, Titicaca and Benicito for higher altitude (Nelliampathy) of Kerala. Similarly, among the pot plant varieties, Trampolino, Mia, Condor, Coralis and Pumasillo are recommended for the plains (Vellanikkara) and Mia, Condor, Excellent and Bonina for higher altitude (Nelliampathy) of Kerala.

An investigation on the evaluation of aquatic plants for water gardening, 22 aquatic plants were studied for the vegetative and floral characters. Based on their growth habit, they were classified into deep water aquatics (*Nymphaea alba*, *Nymphoides indica*), shallow water plants (*Nelumbo nucifera*), submerged ones (*Utricularia australis*, *Najas minor*), marginal plants (*Ipomoea aquatica*, *Hygrophysa aristata*) and bog plants (*Angelonia salicariae folia*, *Crinum viviparum*). Among the different media combinations, sand and clay (1:2) and sand + soil + clay (1:1:1) were found to be best for vegetative growth and flowering respectively.

Integrated nutrient management studies in *Dendrobium* showed that application of inorganic fertilizers improved vegetative as well as floral characters. Plants receiving NPK 30:10:10 @ 0.1% with vermiwash (3%) and panchagavya (3%) produced maximum number of large sized flowers.

Project entitled "Response of tuberose (*Polianthes tuberosa* L.) to organic manures and growth promoting microorganisms" consisted of three different experiments to evaluate the response of tuberose, single and double varieties to organic manures and growth promoting microorganisms. The results clearly indicated that poultry manure either alone or in combination with chemical fertilizers are beneficial for growth and yield improvement in tuberose. Application of 100:50:50 kg ha⁻¹ NPK + poultry manure @ 22.22 t ha⁻¹ and poultry manure alone @ 29.23 t ha⁻¹ were the doses resulted in maximum yield and net income.

The project entitled "Regulation of cropping in mango" funded by KSCSTE was started in April, 2008. Treatments for induction of flowering as per the technical programme were superimposed during August-September, 2008. Flowering data recorded indicate the positive response of trees to paclobutrazol application. In unproductive old trees, flowering, even cauliflorous could be induced by severe pruning and cultural application.

Project entitled 'Scheme for development of a biotechnology based self contained floriculture unit by rural women' was concluded. Altogether, 600 rural women were trained in different aspects of commercial cut flower, loose flower and cut foliage production, propagation techniques, value addition and post harvest handling. The crops included were orchid, anthurium, heliconia, gerbera, jasmine and foliage plants. Trainees were imparted theoretical and practical knowledge on production technology with emphasis on organic practices.

Entrepreneurship development programmes were undertaken by imparting hands on training in flower production at the farmer's field; follow up by regular visit, and supply of planting materials. The percentage of increase in income of entrepreneurs ranged from 40 to 80 per cent.

In the BARC project on 'Crop improvement and extension of post harvest longevity of commercial flowers and foliage plants through the use of radiation', irradiation was carried out in fifteen flowering plants, twenty five foliage plants, fourteen cut flowers and 100 *in vitro* cultures. Mutants were evaluated and promising variants in tuberose, coleus, aralia, philodendron and monstera were multiplied for further field trials.

The SHM project on 'Product diversification in floriculture' envisages imparting technical know how to rural women and unemployed youth in diversified floriculture activities like cut foliage and pot plant production, value addition and dry flower production. During the year, 79 rural women were trained in different aspects of floriculture. Two demonstration units were established for cut foliage and pot plants and one for production of dry flowers / plants and floral craft for the purpose of demonstration of technology to beneficiaries / farmers and for conducting training programmes.

A garden was established in the premises of the College of Horticulture. The central circle was landscaped and maintained. Germplasm collections of one hundred species/ varieties of shrubs, ornamental bananas, bromeliads, exotic varieties of high value ornamentals were maintained. Collection of ornamental palms, foliage plants and flowering ornamentals were enriched. The commercial flowers and plants were already collected were maintained. New rare and high value ornamental plant species were added to the existing collection. Collection of ornamental plants having therapeutic value and high

value ornamentals like *Adenium* and *Euphorbia* was started. The effect of organic stimulants on the rooting and establishment of the species of jasmine was studied.

Hybridization works were undertaken in papaya. Flowering and fruit characters and post harvest studies were recorded in papaya and sapota. Treatments to enhance seed viability and germination were carried out in papaya. Biometrical observations of the accessions maintained in the germplasm of fruit crops like papaya, pummelo, annona and sapota hybrids were recorded. Germplasm on various minor fruits is being maintained. Applied growth regulators to improve flowering and fruit set in mangosteen and the observations on flowering, fruit set, fruit drop and yield are recorded. Various bioregulators are tried in mangosteen to improve the rate of growth of mangosteen grafts in nursery. Carried out repair and maintained irrigation lines and general upkeeping of the orchard and newly planted area.

Germplasm of mango with 155 varieties is being maintained. Biometric and yield observations are being recorded. The hybrids Ratna & H.151 and varieties Prior & Muvandan recorded higher yields. Selected trees of Prior and Alphonso were treated with Cultar and observation on flowering and fruit set was recorded. General up keeping of the orchard was done using weedicides and bush cutter.

Production of tissue culture plants of the hybrid variety Amritha was started. The protocol was standardized and rapid multiplication was initiated. 2500 plantlets were planted out and being hardened.

Home Science

About 53.68 per cent male and 49.8 per cent female agricultural labourers had stage I hypertension. Among agricultural labourers type of family, family size, use of pickle, pappad fried food items, smoking, tobacco chewing, alcohol consumption, lack of regular physical exercise, family history of hypertension and BMI were identified as risk factors for hypertension.

Among women coir workers, the intake of most of the food groups and nutrients were found to be lower than RDA. About 70 per cent of women working in organised sector and 85 per cent in unorganised sector had anaemia. All the women coir workers had negative energy balance.

Constituents like moisture, fat, calcium, phosphorus and iron were comparatively high in marine fish products viz cutlet and sticks. Peroxide values were also high in marine fish products. Fresh water fish varieties had highest protein and vitamin A content. The yield of fish muscle was also more in fresh water varieties like katla and tilapia. All the organoleptic qualities were superior for fresh water fish products. The highest microbial population was observed in products made with marine fish varieties through out the storage period. But shelf life of the product irrespective of fresh water or marine varieties with acceptable maximum total plate count was found to be 30 days.

Nutritional profile of women participatory in kudumbasree programmes was conducted in Thrissur District – among 120 women in the age group of 20-40 days, of which 100 women were participating in kudumbasree activities. There were no illiterates among the respondents. Monthly income of KM families (Kudumbasree member families) varied from RS. 2001- 4000 and in NM (Non member), it was between Rs.1001-3000. Food consumption pattern revealed that the mean intake of all foods except flesh foods were significantly below the RDA among KM and NM respondents. Biochemical examination of haemoglobin showed that 46.6 per cent of KM respondents were normal with a haemoglobin level of 12g/100ml as against 10 per cent in NM respondents. Reduction of more severe forms of malnutrients was observed and also slight reduction in the less severe forms of undernutrition even among the poor women was an encouraging observation. The study has highlighted the emerging trend that rural women at the subsistence level have high potentials as economic providers for their households and could act as promoters of health and nutrition of families.

Meat analogues were prepared using green gram as the base, blended with soyabean and wheat in different proportions. Gluten was used as texturising agent and spices like ginger, garlic, pepper and cinnamon were used for flavouring. Totally 10 treatments were tried with different proportions including one control with 100 per cent green gram. From this three treatments were selected based on maximum index scores, T₄ (107.75), contro (93.73) and T₆ (88.93). The selected 3 treatments were stored

for a period of 6 months in metallised polyester laminate pouches under ambient storage conditions. Even though there was a reduction in the chemical constituents during storage, nutrients like proteins, calcium and iron of T₄ and T₆ were comparable to meat. More than meat, it had the added quality of unsaturated fats and fibre and is also cholesterol free. The low microbial load of the products is also a point of significance. Regarding acceptability, the treatment T₄ was found to be highly acceptable, followed by T₆. Since the products are of plant origin, this can be consumed by the vegetarians. This can also be consumed by the non vegetarians who have to avoid meat for health reasons. This product can also be used in therapeutic diets as a source of good quality protein of acceptable sensory qualities comparable to meat but without the adverse effects of meat. Hence, T₄ (60% green gram, 10% soya and 10% wheat) can be recommended as meat analogue with acceptable qualities.

A DBT funded project entitled standardisation and quality evaluation of banana based probiotic fermented food mixtures was completed. *Lactobacillus acidophilus* was the probiotic organism used for fermentation of food mixtures. *Lactobacillus acidophilus* strain (MTCC 447) obtained from IMTECH, Chandigarh was tested for its probiotic characteristics, like the effect of pH, bile salt concentration and antibacterial activity against enteropathogens, 56 combinations were prepared using banana flour, defatted soyflour, green gram flour, ripe mango, tomato and papaya pulp; of which 14 food mixtures were selected based on the mean scores obtained. Optimisation of variables for the fermentation of food mixtures with *Lactobacillus acidophilus* was carried out and maximum total viable count in the product was taken as the criteria for selection. For all the treatments, fermentation with 25g of substrate concentration at pH 4.5 and incubated at 37.5°C for 24 hours gave maximum total viable count of *Lactobacillus acidophilus* ranging from 9.13 to 9.46 log₁₀ cfu/g.

For each food mixtures 2 treatments were followed (autoclaved and fermented, autoclaved and unfermented). The freeze dried food mixtures were subjected to organoleptic evaluation and there was no significant difference in the appearance, colour, and texture of the fermented and unfermented food mixtures. But fermented food mixtures has significantly ($p < 0.05$) higher acceptability scores with regard to flavour, taste and overall acceptability. Fermented food mixtures showed significantly higher values for moisture, acidity, protein, calcium, iron, thiamine and riboflavin.

Based on nutrient composition, acceptability and presence of viable count of *Lactobacillus acidophilus* in the 14 fermented food mixtures 6 fermented food mixtures with maximum quality attributes were selected by applying geometric mean scores. The viable count of *Lactobacillus acidophilus* in these food mixtures varied from 9.13-9.43 log₁₀ cfu/g.

These 6 food mixtures were subjected for storage studies for 6 months and quality evaluation of stored products were conducted each month. Even after 6 months of storage, the products show *Lactobacillus acidophilus* with a viable count of *Lactobacillus acidophilus* above the desired level for a probiotic food (4.7 to 8.9 log₁₀ cfu/g). So these fermented food mixtures can be recommended as good probiotic foods.

RTL

Established a central laboratory for soil and plant analysis based fertilizer recommendations for Horticultural Crops. Information sheet, guidelines for soil and plant sample collection and protocols for fertility assessment and recommendations have been finalised. This facility is now open for farmers on payment basis.

Agricultural Meteorology

A sound database has been developed on onset of monsoon and rainfall for the State of Kerala since 1871 onwards

If the onset of monsoon is early (before 25th May), the monsoon rainfall over Kerala is likely to be below normal.

The monthly rainfall was in increasing trend in October and November, while decreasing in December during the north east monsoon.

A multiple linear regression equation has been developed to estimate total coconut production of State of Kerala seven months ahead. Such models are also developed in case of cashew for estimating the cashew production of State before the crop harvest commences. However, they need to be revalidated

The quality of monsooned Malabar coffee appears to be better if the monsoon activity is good. Monsoon breaks like in 2002 adversely affected the quality of coffee to a greater extent.

The economic impact of AAS showed that there was a benefit in the case of AAS farmers when compared to non-AAS farmers

An eight node cluster super computer was installed at CUSAT, DAS for running the WRF model. It is made operational for the weather forecasting three days ahead.

Agricultural Extension

In the Action research on coconut mite control, the standard practice of application of Stem Remedy Formulation (SRF) was continued. The technique for application of botanicals in solution to the coconut trunk has been standardized, and it will be easier than the application of botanicals through the roots. The spraying is done to a height of about 2 metres on the coconut trunk, by using the rocker sprayer. This can also be applied using any standard spray equipment. There were two sets of treatments in stem remedies, one using Neem @10,000 ppm and the other using extract of garlic. Both sets have been very successful, in increasing the yield and also in reducing the attack by the mite.

The spraying of the stem with the adjuvant, along with the acaricides has increased the yield substantially, and has reduced the infestation to a considerable extent. The returns from the farm have also improved very much. The technique of stem spraying is unique, and has never been attempted on coconut in the scientific world.

This has been slated as a breakthrough in the application of management techniques against the coconut eriophyid mite. The Director of Research has also directed the Research stations under the KAU to take up the trials in the respective stations on the application of Stem remedies. Some of them have already initiated the process. Others are following suit.

Olericulture

KAU research projects

1. Collection, evaluation and selection of improved chilli varieties.
(VEG-01-01-04-79/VKA (14)-KAU).
2. Incorporation of mosaic resistance to bacterial wilt resistant genotypes in chilli
(*Capsicum annuum*) (VEG-01-07-93/VKA (14) KAU)
3. Screening tomato lines resistant to bacterial wilt (VEG-01-02-03/87-VKA (14) ICAR)
4. Screening brinjal lines resistant to bacterial wilt.
(VEG-01-03-01/87 -VKA (14) ICAR)
5. Varietal trial in cucumber
(VEG-02-03-01-87/VKA (14) ICAR Co-ord)
6. Selection of suitable cucurbit varieties-cucumber/melon
(VEG-02-03-02-80/VKA (14) KAU NP)
7. Selection of suitable cucurbit varieties- pumpkin
(VEG-02-04-01-79/VKA (14) KAU NP)
9. Breeding for mosaic resistance in bittergourd
VEG-02-05-07-95 VZM – 14 KHDP
10. Selection of suitable cucurbits – Ashgourd
VEG-02-06-01-86/VKA (14) KAU/NP
11. Screening for non-bolting types of Amaranthus
VEG-03-00-01-81/VKA (14) KAU/NP
12. Varietal trial in bhindi
VEG-04-01-01-84/VKA (14) KAU/NP

- 13 Screening bhindi varieties resistant to yellow vein mosaic virus
VEG-04-01-03/85-VKA (14) ICAR
- 14 Varietal trial in cowpea
VEG-04-02-02-88/VKA(14)ICAR Co-ord
- 15 Varietal trial in vegetable cowpea
VEG-04-02-03-87-VKA (14)KAU NP.
- 16 Survey collection and maintenance of germplasm of dolichos bean VEG-04-03-02-88/VKA(14)KAU/NP
- 17 Survey collection and maintenance of germplasm in winged bean
VEG-04-04-01-84/VKA(14)KAU/NP
- 18 Germplasm maintenance and evaluation of promising genotype of Drumstick
VEG-05-00-01-85/VKA(14)KAU/NP
- 19 Improvement of asexually propagated under exploited vegetable through polyploidy.
VEG-05-01-02-93/VKA(14)KAU
- 20 Efficacy of plant growth substances for the improvement in productivity of certain import vegetable crops of Kerala.
VEG-06-02-02-89/VKA(14)KAU/NP
- 21 Standardization of pruning techniques in oriental pickling melon.
VEG-06-02-03-2000/VKA(14)KAU
- 22 Studies on physiological maturity of seeds
VEG-06-02-08/93/VKA(14)KAU
- 23 Maintenance of nutrition garden, demonstration plot and specimen plot
VEG-08-00-01-77/VKA(14)KAU
- 24 Maintenance of vegetable arboratum.
VEG-08-00-04-79/VKA(14)KAU/NP

Extension programmes

Highlights of extension activities

(Attach photographs of important activities)

Agricultural Engineering

For meeting the fourth objective namely "Conservation and Management of Soil and Water Resources to mitigate drought and other natural calamities" of the NAIP project "Multi-enterprise farming models to address the agrarian crisis of Wayanad", three training programmes were conducted to farmers during the period.

Agronomy

Dr.Mercy George accompanied UG students to Tholur grama panchayat under NSS programme & Farmers field school on 05/03/09.

Dr.Mercy George took the 2008 batch students on study tour to Mattupetty, Kolahalamedu, Vagaman, Kunnarakam, & Mankombu for familiarising with the cropping systems & soil types from 24/01/09 to 26/01/09.

BCCP

Supplied biocontrol agents to farmers. Visited farmer's fields and suggested remedial measures for weed and pest problems.

Conducted demonstration trials at the farmer's field.

CCRP

During the year a field day on cocoa was organized in the CCRP farm. The programme was sponsored by

the Directorate of Cashewnut & Cocoa Development, Kochi.

A training programme on Cocoa diseases and pests was organized in the form of Mr. Thomas, Kanjirappally as a part of the DCCD funded project.

Classes on cocoa cultivation were handled by the faculty members in farmers' seminars organized by Cadbury India Ltd and Manarkad Social Service Society in Attappady and Kattappana respectively

Produced four video CDs on cocoa cultivation and processing on small scale

Published booklets on cocoa processing both in Malayalam and English

Published a book on Cocoa in India

The ATIC SAIU on cocoa products is visited by 353 farmers and 2256 students

Plant Breeding & Genetics

Undertaken the GI Registration of Pokkali rice. Certificate granted during September 2008 and Certificate handed over to producer groups during December 2008

Agricultural Entomology

Actively participated in Tholur Village adoption Programme of the KAU by undertaking the following activities

One Day Interactive session with farmers for Comprehensive agrl. Development of Tholur panchayat

Discussion meeting with Panchayat officials for formulating proposals

Interactive session with coconut farmers for addressing field problems

Conducted Farmers Field School in 50 acres of rice for 14 weeks

Plantation Crops and Spices

Photographs with a brief write up of 11 varieties of spices and medicinal plants released from the department were exhibited in the KAU pavilion in the pooram exhibition

Olericulture

Dr.K.Krishnakumari participated in the implementation of 1000 organic village programme and vegetable cultivation in schools under SSA programme.

The staff members of this department associated with the village stay programme of Rawae students and all other activities connected with that programme.

Dr. T.E. George, Dr. K. Krishnakumary and Dr. T. Pradeepkumar played a major role in the installation and maintenance of KAU Pavilion in Trichut Pooram exhibition during March - April 2009.

A stall was set up by the Department in the 'Onachantha' held at ATIC, Mannuthy during 9-10 September, 2008

Plant Pathology

Conducted training – 5 trainings on mushroom cultivation, 2 trainings on biocontrol aspects and training on microbiological techniques

Visited rice fields of Tholur Panchayath adopted by KAU and identified bacterial leaf blight disease incidence and suitable control measures were suggested which was found very effective in keeping the disease under control

34 batches of visitors (farmers, students and college teachers) came to the Department to gain knowledge about mushroom cultivation and plant disease aspects.

617 numbers of. Farm advisory services were conducted.

Soil Science & Agricultural Chemistry

Scientists of the Department, Dr.K.A.Mariam, Dr.P.K.Sushama, Dr.P.R.Suresh and Dr.Betty Bastir worked as resource persons for RAWE and handled several classes to the farming community. Dr.P.R.Suresh acted as the Programme officer of NSS unit of the college. The Department participated in the KAU stall in Thrissur Pooram Exhibition for one month duration and imparted information on preparation of vermi-wash and vermi- compost to about 10,000 beneficiaries

Agricultural Meteorology

Under the ISRO and State Planning Board, 58 Automatic Weather Stations have been installed across the State. The data on temperature, pressure, humidity, wind, rainfall and sunshine are being collected at hourly interval. The data are being communicated to the Space Applications Centre, Ahmedabad through satellite communication system. Hourly data are updated in MOSDAC site of ISRO. Two such AWS were commissioned (one each in KVK, Thrissur and Adat) during the year in Thrissur District

Under the Integrated Agromet Advisory Services (IAAS) of the IMD, weekly agromet advisory services are being prepared and disseminated to the farming community. These bulletins are delivered directly to the selected farmers. These bulletins also appear in the 'Mathrubhoomi and Deshabhimani Dailies'. AIR, Radio Mango, IFFCO Mobile Service and Local TV channels also disseminate the same for the benefit of the farming community.

RTL

Installation of Instruments and Training Programme on Soil Testing at Soil Testing Laboratory, Kadmath, Union Territory of Lakshadweep.

A team of Soil Scientists comprising Dr P. Sureshkumar, Professor and Head, Radiotracer Laboratory, College of Horticulture, Kerala Agricultural University and Dr.P.R.Suresh, Associate Professor, Dept. of Soil Science and Agricultural Chemistry, College of Horticulture, Kerala Agricultural University reached the Soil Testing Lab, Kadmath Island, U.T. of Lakshadweep on 30th January, 2009.

Different officers and staff members of the Department of Agriculture, UT of Lakshadweep participated in the programme:

Inspection and installation

The team, after preliminary inspection of the lab, which was non functional for a long spell, checked each and every equipment in the lab. They noted the following:

One of the Distilled water unit and electronic balance were found usable.

Seven equipments which were earlier recommended to be written off were removed from the lab:

The new equipments procured were unpacked and examined for their performance and were installed.

The following equipments are in good working condition now:

1. Conductivity Meter(Eutech)
2. Conductivity Meter((Model - LT-16)(Labtronics)
3. pH Meter – Portable(Model – LT-14)(Labtronics)
4. pH Meter(Model – pH510)(Eutech)
5. Flame Photometer (CL22D)(Elico)
6. Electronic Balance(Model – GE7101)(Sartorius)
7. Electronic Balance(Model – APX-203)(Denver)
8. Rotary Shaker(Rotek)
9. Hot Air Oven(Labline)

Training

The basic principles in soil testing analyses, care and maintenance of equipments and handling of different glass wares and reagents were explained and demonstrated to the staff. The steps for calibration of different equipments and hands on training were given to the trainees. The training schedule included methods for collection and preparation of soil samples for analyses, Estimation of pH, EC, Organic Carbon, Available P, Available K & Na, Available Ca & Mg.

The distillation plant for extraction of lemon grass oil was installed, commissioned and the working of the plant was demonstrated.

The programme was concluded on 4th February, 2009.

Recommendations of the Team

1. The lab now is almost operational and the upkeep and maintenance of the lab should be strictly adhered to as per the guidelines given. For this, action may be taken to appoint regular laboratory staff.
2. The lab is now equipped for soil analysis. Once the Pelican block digester and the digestion fume hood are in working condition, Plant analysis can also be started.
3. For Flame Photometer, Petrogas/Cooking Gas Cylinder may be made available
4. The chemicals/ glasswares and other items essential for routine analysis which are appended herewith may be purchased at the earliest.

Farm Advisory Services

Department	In person	Over telephone	Through letters
Agricultural Engineering	12	26	-
CCRP	60	450	5
Agri.Entomology	56	25	5
Processing Technology	62	37	5
Olericulture	-	185	26
Plant Pathology	588	28	1
CPBMB	10	10	5
RTL	120	-	-
Ag.Extension	163	45	26

Radio talks/ TV programmes/ Audio-Video cassettes

Topic	Date	Name of Scientist	Venue
Agricultural Engineering			
Doordarshan Programme on Land preparations before the onset of monsoon for rainwater conservation	17-06-08	Dr. K.P.Visalakshi	Vellanikkara and Mannuthy campus
Agricultural Economics			
Agri.Scenario and Food Security	4-6-08	Dr.P.Indira Devi	AIR, Thrissur
Pesticide use in food crops status and social aspects	10-2-09	Dr.P.Indira Devi	AIR, Kozhikkode
Agronomy			
National Food Security	27-03-09	Dr.P.S.John	Doordarshan, Thrissur
National Food Security	27-03-09	Dr.P.S.John	AIR, Thrissur

CCRP			
Farm level processing of cocoa	25-11-08	Dr.S.Prasanna kumari Amma	
Cocoa cultivation	25-11-08	Dr.E.K.Lalitha Bai	
Intercropping tubercrops in coconut plantations	6-2-09	Dr.S.Prasanna kumari Amma	AIR, Thrissur
Plant Breeding & Genetics			
Various means & schemes for paddy seed production-a. Discussion.	5-05-08	Dr.RoseMary Francis	AIR, Calicut.
Agricultural Entomology			
Pseudostem borer of banana	18-06-08	Dr.Susannamma kurien	AIR, Thrissur
Honey bees	28-07-08	Dr.Mani Chellappan	AIR, Thrissur
Biocontrol of rice pests	30-07-08	Dr. Pathummal Beevi	AIR, Thrissur
Pheromones in Pest control	06-10-08	Dr.Jim Thomas	AIR, Thrissur
Handling of pesticides with care	31-10-08	Dr.Sosamma Jacob	AIR, Thrissur
Processing Technology			
Preservation of fruits and vegetables (video conferencing)	Feb'2009	Dr. K. B Sheela	ATIC Mannuthy
Preservation of fruits and vegetables (video conferencing)	25-01-09	Dr. P. B Pushpalatha	ATIC Mannuthy
Different preservatives used in food processing	11.05.2008	Dr. P. B Pushpalatha	AIR, Thrissur
Minimal processing of tender coconut	02.04.2008	Dr. P.B Pushpalatha	Kairali TV
Plantation Crops and Spices			
Turmeric	14-8-08	Dr.Alice Kurian	AIR, Devikulam
e-guide on plantation crops (Hort-1202)		Dr.M.R.Shylaja Dr.B.Suma	COH, Vellanikkara
Olericulture			
Summer vegetable cultivation		Dr. Salikutty Joseph	AIR, Thriissur
Organic Vegetable Cultivation	13-11-08	Dr. Salikutty Joseph	AIR, Kozhikkode
Plant Pathology			
Video conferencing on 'Mushroom cultivation'	10-12-08	Dr. T. Sheela Paul	AITC Mannuthy
Home Science			
Radio talk on low cost balanced diets with local foods	18-3-08	Dr. V. Usha	AIR, Thrissur
Ag.Extension			
Group farming in rice-prospects and strategies	4- 6-08	Dr.P.Ahamed	AIR, Kozhikkode

Number of publications:

Scientific papers	Technical Bulletins	Popular Articles	Books
Agricultural Engineering			
2	Nil	1	Nil
Agronomy			
5	1	7	1
CCRP			
1	2	Nil	Nil (VCD- 4)
Agricultural Entomology			
9	1	1	
Processing Technology			
8	3	5	4
Plantation Crops and Spices			
7	1	1	1
Olericulture			
4		20	3
Plant Pathology			
4	-	-	1
CPBMB			
15	-	-	-
Soil Science & Agricultural Chemistry			
2	-	-	-
Pomology and Floriculture & AICFIP			
29	1	-	2
Agricultural Meteorology			
8	4		2
Ag.Extension			
2	-	-	1

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BCCP

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CCRP

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Plant Breeding & Genetics

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Agricultural Entomology

Renita G. and Ushakumary,R.2008. Effect of different bioagents in improving the yield characters of nematode infested rice plants under flooded conditions. Proc. 20th Kerala Science congress.

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Ag.Extension

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Books

Agricultural Economics

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Agronomy

George Thomas. C. 2008.*Theettapul krishiyil puthanunarvu.Keralakarshakan* 54(5): 42-44 (Oct).

George Thomas, C. 2008.*Nelkrishiyude akamporularinju.Keralakarshakan* 54(7): 17-20 (Dec.)

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George Thomas, C. 2009.*Kapada shastrangal vazhimaaratte, namukku vendathu susthira krishiretikal.* Karshakan 17(1):16-19(January)

George Thomas. C. 2008. Forage crop production in the Tropics. 2nd Edition . Kalyani Publishers, New Delhi

CCRP

Mallika, V.K and Prasannakumari Amma, S. 2008. *Cocoa processing at farm level* (English & Malayalam) Published by the Directorate of Extension and funded by the Directorate of Cashewnut & Cocoa Development

Processing Technology

Jacob JohnP.2008. A hand book on post harvest management of fruits and vegetables – Published by DAYA publications. New Delhi.

Raju, V.K, Sheela K. B. and Pushpalatha, P.B 2008. Pazham, Pachakkari Samskaranam- Oru Swayam Thozhil Samrambam, KAU Publication, Mannuthy.

Pushpalatha P.B. 2008 Process optimization for production of value added products from snapmelon and watermelon, KSCSTE Trivandrum.

Sheela,K.B 2009.Post Harvest management of fruits and vegetables in : *Basics of Horticulture* (Ed. Dr. K.V Peter New India Publishing Company, New Delhi).P.497-506 (1 chapter)

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Plantation Crops and Spices

Miniraj, N., Nybe, E.V., Ashasankar, M. and Lissamma, J. 2008. Oushadhikaliloode Arogyam- Manninum Manushyanum (Mal). Directorate of Extension, KAU

Olericulture

Rana, M. K., Rajan, S. and Baby Lissy Markose 2008 *Sweet potato* (In) Rana, M. K. (ed) *Olericulture in India* Kalyani Publishers, Ludhiana p 488-53

Krishnakumari, K. 2008 Agathi and Chekurmanis (In) Peter, K.V (ed). *Underutilized and Under exploited horticultural crops* Vol.III New India Publishing Agency, New Delhi p 359-368

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Krishnakumary, K. 2008 Homestead vegetable cultivation (In) *Homestead Farming*. Kerala Language Institute, Trivandrum p 77-105

Pradeepkumar, T, Suma, B., Jyothibhaskar and Satheesan, K.N. 2008 Management of Horticultural Crops, Part I. New India Publishing Agency, New Delhi. 451

Pradeepkumar, T, Suma, B., Jyothibhaskar and Satheesan, K.N. 2008. Management of Horticultural Crops, Part II. New India Publishing Agency, New Delhi. 453-996

Peter, K.V. and Pradeepkumar, T. 2008. Genetics and Breeding of Vegetable Crops. ICAR, New Delhi. 435

Plant Pathology

Rehumath Niza T.J. 2008 Important diseases of coconut in "A hand book to coconut farmers" (Malayalam) published by KAU, COH, Vellanikkara

Pomology and Floriculture & AICFIP

Valsalakumari, P.K., Rajeevan, P.K., Sudhadevi, P.K. and Geetha, C.K. 2008. *Flowering Trees*. New India Publishing Agency, Pitam Pura, New Delhi. 288p.

Radha, T. and Mathew, L. 2008 *Tropical and sub-tropical fruits* (In) *Basics of Horticulture*. Dr. K.V Peter (ed.) New India Publishing Company, New Delhi

Radha, T. 2008. Released varieties of fruit crops in India. (In) *Basics of Horticulture*. Dr. K.V Peter (ed.) New India Publishing Company, New Delhi

Radha, T. 2008. 'Mavu krishi Keralathil'. (Mal) Kerala Agricultural University (Revised)

Parameswaran, N.K. 2008 *Apomixis in plants*. (In) *Basics of Horticulture*. Dr. K.V Peter (ed.) New India Publishing Company, New Delhi

Parameswaran, N.K. and Dhinesh Babu, K. 2008. Polyembryony and its prevalence in horticultural crops. (In) *Basics of Horticulture*. Dr. K.V Peter (ed.) New India Publishing Company, New Delhi

Sobhana A and Rajeevan P.K. 2008. *Gladiolus*. Kerala Agricultural University, KAU P.O., Thrissur. p. 60. (Technical Bulletin)

Agricultural Meteorology

Agricultural Meteorology. PHI Learning (p) Ltd., New Delhi. Pp.364. Climate Change and Agriculture over India- PHI Learning (p) Ltd., New Delhi (In press) Forewarning of TMB in Cashew- KAU Publication

Ag.Extension

Jayasree Krishnankutty, Renjith, A.M., Kaleel, F.M.H. (Eds.). A Primer for Coconut Farmers (Mal.), Kerala Agricultural University, Vellanikkara: 21-26.

Details of sale of seeds/ planting materials / products / biocontrol agents etc.

Item	Quantity	Revenue
Agronomy		
Tapioca setts	225setts	225
Tapioca tuber	4012.4kg	20062
Amorphophallus tuber	132506kg	19884
Fodder grass	500kg	2000
Sweet potato	117kg	936
Coleus	40.5kg	405
Yams	36kg	360
Total		43872
BCCP		
<i>Pseudomonas fluorescens</i>		
Enriched with cowdung	1172 kg	29300
<i>Trichoderma viride.</i>		
Enriched with cowdung	100 kg	2500
<i>Trichogramma japonicum</i>	437cc.	21850
<i>B. bassiana</i>	12 kg	600
<i>V. lecanii</i>	112 kg	5600
<i>F. pallidoroseum</i>	5 kg	250
<i>M. anisopliae</i>	10 kg	500
Total		134330
CCRP		
F ₁ Cocoa Hybrid seed pods	1,24,203	5,06,400
F ₁ Hybrid cocoa seedlings	8103	81,000
Budded cocoa plants	5001	1,00,000
Total		6,87,400
Processing Technology		
Squashes	4050 Nos	2,02,500
Jams	1590 Nos	87,450
Pickles	550 Nos	27,500
Total		3,17,450
Plantation Crops and Spices		
Black pepper cuttings	20,000	47188
Bush pepper	600	8330
Ginger	835 kg	9555
Turmeric	400 kg	1290
Kacholam	34 kg	300
Coconut- auction		3,50,000
Total		4,16,663
Olericulture		
Vegetable seeds	917.85 Kg	9,02,527
Plant Pathology		
Mushroom spawn	24667 pkts	4,12,047
Fresh mushroom	5583 pkts	84,859

Mother spawn	155 bottles	17,195
Total		5,14,101
CPBMB		
TC Cultures of black pepper	250 × 250	62500
Tissue culture plants of black pepper	5000 × 10	50000
Total		1,22,500
Pomology and Floriculture & AICFIP		
Grafts	1432	42,960
Commercial flowers and ornamental plants (planting materials)	5157	186151
Flower seeds	3800 g	3800
Mango, sapota, jack and other fruits		47,000
Total		2,79,911
RTL		
Soil/plant samples tested	200	12,200

Other details if any

Agricultural Statistics

Yield Prediction in Cocoa- PG Project is in Progress

Changing Scenario of Kerala Agriculture- an overview- PG Project in Progress.

Prediction of Future's Prices of Rubber, PG Project in Progress- College of Cooperation and Banking.

Forecasting Volatility of the Indian Stock Market- PG Project in Progress, College of Cooperation and Banking.

Handled classes for UG Course SAC 416 (2+1) for the students of KCAET, Thavanur for two Semesters besides the routine courses for UG and PG students of COH and College of Co-operation and Banking.

Plant Breeding & Genetics

Dr Rose Marry Francis, Dr. Dijee Bastian, Dr. Jiji Joseph Study tour for optional course Pbn 4105 and Pbn 4107 with 2003 batch students – 24-25 April Coimbatore- TNAU, SBI, CICR, Ooty – IARI Reg. station Wellington.

Dr. E.Sreenivasan, Dr. Rose Mary Francis, and Dr. Jiji Joseph study tour with 2006 batch 19 August to 8th September – South India.

Dr. Jiji Joseph 16-10-08 RAWE village stay programmed at perumatti.

Dr. Rose Marry Francis & Dr. Dijee Bastian RAWE village stay programmed at Perumatti.

Dr. Dijee Bastian Associated with PG academic cell of College of Horticulture, Vellanikkara.

Dr C.R.Elsy Common IPR cell of Kerala Agricultural University.

Dr. Jiji Joseph – CO – PI, RKVY – Paddy mission Kerala Agricultural University.

Dr. E. Sreenivasan IT nodal officer of College of Horticulture, Vellanikkara.

Under the Monitoring & guidance provided by Dr. Rose Mary Francis 120 MT of paddy seed of various High Yielding Varieties have been produced under ICAR Mega seed project operating from RARS, Pattambi. 8.21 MT of Best Seed of various High Yielding Varieties of paddy has been produced under NSP (crops).

33 trails under Crop Improvement Division, RARS, Pattambi has been laid out and completed at RARS, Pattambi under her monitoring.

Plant Physiology

UG teaching: Phys.2201: Elementary Crop physiology(2+1) - From 28.04.08 to 27.09.08

PG teaching: Crps.601: Plant water relations and mineral nutrition (2+1)-From 28.07.08 to 2.01.09

As i/c of Academic matters PG the following activities are attended.

Associated with conducting PG entrance examination of KAU at College of Horticulture, Vellanikkara.

Conducted College council for approving the Technical programmes of PG 2008 admission.

Conducted orientation day for PG 2008 admission.

Attending routine work related to PG programmes of the college.

Pomology & Floriculture

Dr.Sarah T.George is i/c of Labour management cell of COH

Dr.T.Radha is i/c of Technical cell of COH

Dr.N.K.Parameswaran is i/c of Placement cell of COH

Dr.P.K.Sudha Devi and Dr.Ajithkumar are handling the charges of Hostel Wardens of L.H and M respectively

Finance 2008 – 2009

Head	Expenditure (Rs)	Internal Receipts
Non-plan	6,56,81,560	Rs.17,90,525-00
Plan	42,89,246	
ICAR	20,74,158	
Other EAPs	52,22,818	

COLLEGE OF AGRICULTURE, PADANNAKKAD

Name of Head of station : Dr.I.John Kutty

Deputation of Scientists for Seminars/ Workshops/ Symposia

Name & Designation	Name of Seminar	Venue	Date
Dr.P.C. Balakrishnan ADR, Coconut Mission	Zonal work shop	ORARS, Kyaymkulam	06-08-08
	Mimi POP Work shop	Vellanikkara	23-08-08
	National Seminar on Organic farming	CPCRI, Kasargode	15-10-08
	Climate change and food security	Sub center, Manjeshwar	31-10-08
	Zonal Work shop	RARS, Pilicode	18-02-09
	Interface-2008	CTCRI, TVM	07-05-08
Dr.D.S.Radhadevi	International Symposium on Induced Mutation	Vienna, Austria	12.8.08 to 15.08.08
Dr.I.John Kutty	National conference on Recent advances in waste management	Zonal Agricultural Research Station Solhapur	29.8.09 to 30.08.09
Dr. M. Govindan, Professor	State level workshop on Coconut	Perumba	31.10.08
Dr.I.John Kutty	Soil water conservation and crop management technology under rain fed agriculture	Banaras Hindu University, Varanasi	20.2.09 to 21.2.09

Deputation of Scientists for Training Programmes/Seminars/Summer School/ Winter School/ Short Course.

Name & Designation .	Details of Training			Sponsoring organization
	Topic	Venue	Date	
DR.P.C.Balakrishnan, ADR	Water management	ARS, Chalakkudy	24-05-08	ICAR
Dr.Usha C.Thomas	Refresher course on Environmental Sciences	Academic Staff College Trivandrum	9.6.08 to 30.6.08	UGC, New Delhi
Dr.Amrita V.S.	Orientation Program IT Oriented	Academic Staff College Trivandrum	23.7.08 to 12.8.08	UGC, New Delhi
Dr.Allan Thomas	Orientation Program IT Oriented	Academic Staff College Trivandrum	6.11.08 to 03.12.08	UGC, New Delhi
Dr.B.T.Krishna prasad	Refresher course on Life Sciences	Academic Staff College Trivandrum	15.12.08 to 5.01.09	UGC, New Delhi
Dr.K.M.Sreekumar	Winter school on Flavor, Nutraceuticals and food color from Horticultural crops	IISR, Calicut	7.01.09 to 28.01.09	ICAR New Delhi

Dr.R.Gladis	Refresher course on Environmental Science	Academic Staff College Trivandrum	24.02.09 to 17.03.09	UGC, New Delhi
Dr. Allan Thomas Assistant Professor	'Empowerment and personal excellence' for the NSS Programme Officers of KAU	CTI, Mannuthy	March 30 th and 31 st 2009	NSS

Details of Seminars/ Workshops/ Symposia conducted at the Station.

Particulars	Topic	Venue	Date
Karshaka seminar in connection with Mangofest	Mango cultivation, Preparations of mango value added products	College of Agriculture Padannakkad	25/5/08 & 26/5/08

Academic Programmes.

Intake capacity & No. of students enrolled during 2008-09	Out turn of students during 2008-09				
	Male	Female		Male	Female
UG	3	25	UG	3	16
PG (discipline-wise)	-	-	PG	-	-
Ph.D (Discipline-wise)	-	-	Ph.D	-	-

Intake capacity: 29

Study tours

- A. South India study tour for B.Sc.(Agri.) students of 2006 batch was conducted from 5.08.08 to 21.08.08
- B. North India Study tour for B.Sc.(Agri.) students of 2005 batch was conducted from 27.10.08 to 17.11.08.
- C. Students of 2005 batch visited City waste processing unit Kozhikode, CRS Madakathara, Cadbury unit, Meat processing unit Mannuthy, Diary unit Mannuthy, Yarn Dying unit at Erode, Salem Cooperative sugar mill from 04/3/09 to 8/3/09.
- D. Students of 2006 and 2007 batch visited KILA Thrissur, Dordarshan Kendra, Kole Lands & Vytilla, AMPRS Odakkali 28-01-2009 to 02.02.2009.
- E. Students of 2005 batch visited Anthurium farm and Horticulture Research Station, Chttalli, Coorg on 13.02.2009
- F. Students of 2008 batch visited Agrometobservatory and Institute CPCRI, Kasaragod
8. Other activities (brief outline only)

Students Union activities

1. Mango fest and Kissan Mela 2008 was organized on 25th and 26th may 2008. Program included exhibition of mango varieties from all over Kerala, minor fruits, Mushroom. Seminars for farmers and training programs for Kudumbasree units were given. Sales of mango fruits and its products, and mango grafts were arranged.
2. Environmental day program WED was celebrated in the college under the combined auspicious of nature club and NSS unit. This included inter-class quiz competition, poster competition on 5th June. June 7th quiz competition was conducted for the nearby high school students.
3. A debate on religious and Society was conducted on Aug 4th under the combined effort of Student union and Science forum

4. In connection with 62nd Independence day celebration freedom fighter Sri.Narayanan Nair and Karshaka Thilakam Smt K.V.Madhavi were honored on 14th August 2009
5. Student Union and Arts club were formally inaugurated by A.T.James District Collector and Srinandakumar Cine artist respectively. Variety of cultural programs were conducted on that occasion.
6. Iftar eve was celebrated in the holy month of Muslims on 25th September.
7. Hostel day celebration was conducted on 27th September 2009
8. Fresher day to welcome fresher 2008 batch of students was conducted on November 2008
9. New year was celebrated with gift exchange, film show and Cake cutting, campfire and new year message from Associate Dean
10. A trucking to Ranipuram and tour programs to historical places of Kannur district and Silent valley were conducted by the Nature club
11. Annual sports meet was conducted on 23rd February 2008. Students, teaching and non-teaching staff and farm laborours were participated.

NSS activities

12. World Environmental Day was celebrated from 4th to 7th June Activities include quiz competition, tree planting and manuring.
13. One day seminar on Kinesthetic and learning by doing skill on 27th June 2008
14. Sadhbhavana pledge on 20-8-2008
15. NH Avenue and college premises cleaning on 29th and 30th September 2008 as part of NSS Ruby Jubilee celebration
16. The Ambilathukkara Village Adoption Program from 17.10.2008 to 26.10.2008
17. Theertamkara pond protection program on 06.01.2009
18. Poster competition and College portico and lawn cleaning was done as part of Republic day celebration
19. Seven day program 'Healthy youth for healthy India at Valia parambe Island was conducted. Activities include plastic eradication program, Boating and interaction with fisherman in the island, Agricultural technology dissemination program, mangrove planting, cultural program and visit to Ranipuram hill.

Sports and games

20. *Participation of College team in various sports events conducted is detailed below. Men Badminton team won championship. Men Volley ball won second position and women basketball team got second position*

Sl.No.	Event	Date	Venue
1	Football	18 th to 20 th April 2008	Padannakkad
2	Cricket	14 th to 18 th May 2008	Panhangad
3	Badminton and Table tennis	26 th to 27 th September 08	Mannuthy
4	Volley ball	20 th to 21 st January 09	Vellayani
5	Basket ball	29 th 30 th January 09	Mannuthy

21. Ms.Arya A. (2007) and Raghil Raj (2007) represented KAU team in all India Inter Agri sports meet held at K.V.V. Jabalpur from 3rd to 6th March 2009
22. Inter class sports competition of Basket ball, Volleyball, badminton and table tennis were conducted from 5.1.09 to 8.1.09. Annual athletic meet was conducted on 9th January 2009

Research Programmes

a. Major Research achievements (highlights)

1. A strain of Entomopathogenic fungus *Metarrhizium anisopliae* which is highly virulent on coconut rootgrub *Leucopholis coneophora* is isolated. This culture was named as Padanekkad strain. Another Entomopathogenic fungus *Fusarium cocophilum* is found infecting on coconut rootgrub which is a new report.
2. Karimunda a shade tolerant type exhibited higher Net Assimilation Rate and lower carbon isotope discrimination than shade sensitive Panniyur-1 under very low light intensity. Carbon isotope discrimination emerged as an important parameter for selecting plants for shade tolerance. This work was part of the project on carbon isotope discrimination as a signature for shade tolerance in black pepper.
3. Indigenous Technology Knowledge (ITK) project: This project was implemented to collect the indigenous technical knowledge from farmers of Northern Kerala and validating the selected indigenous technical knowledge. About seven experiments were conducted and eight experiments are in progress to validate the various ITKs identified. Assistance is also being given to encourage farmer's innovative ideas.
4. Hariyali Watershed Development Project:

Consultancy services for the preparation of project plan and monitoring of the Hariyali Watershed Development Project is done by the scientists of the College.

Details of Research Projects

Completed Projects during 2008-09.

Name of Project	Funding Agency	Name of PI	Name of Co-PI	Outlay
Carbon Isotope Discrimination as a signature for shade tolerance in black pepper	KSCSTE	Dr.B.T. Krishnaprasad	Dr.M.S.Sheshshayee, UAS, Bangalore Dr.Abdul Khader, CoA, Vellayani	10.01
Use of parapheromones and kairomones in different types of traps for the management of cucurbit fruit fly <i>Bactrocera cucurbitae</i> Coq	KSCSTE	Mr.Ramesha	Dr.A.M.Ranjith Associate Prof. Dr.Jim Thomas Entomology, CoH, Vellanikkara	4.44

Extension Programmes

Highlights of extension activities

- Regular conduct of scientist – wise presentations about the summer/ winter schools/ trainings /workshops attended at the department/institution level for the effective dissemination of the knowledge acquired.
- Farmer's doubts on the cultivation of fruits, vegetables and medicinal plants were cleared as and when they visited
- Mushroom spawn, Trichoderma and Pseudomonas produced and distributed to farmers.
- Scaling up of water productivity in Agriculture for livelihood through teaching cum demonstration: A seven day training programme on 'Scaling up of water productivity in Agriculture for livelihood through teaching cum demonstration' for 50 farmers was conducted at College of Agriculture, Padannakkad from 18th to 26th August 2008. A total of 29 classes were conducted on various topics related to Water Productivity in Agriculture,

including field visits to a nearby watershed, Central Plantation Crop Research Institute, Kasaragode and Instructional Farm attached to the College. Good response and active participation of the trainees resulted in the successful conduct of the programme.

- Mangofest Kissan Mela was conducted on 25th and 26th May 2008 under the auspice of student union. Mango varieties were exhibited mango products were prepared and sold.
- Expert team visited Kappimala on 8th May 2008 to study the bud rot of coconut along with Agricultural Officers, Department of Agriculture, Kannur
- Regular Conduct of Krishi Darshan Programmes for the benefit of school students was organized in more than 1300 school/VHSC students visited the College.
- Scientists of the College participated in the district level research extension interface conducted at Kasragod (12th February 2008) and Kannur (27th February 2008) district.
- Training on vegetable cultivation was given to school teachers to promote scientific cultivation of vegetable in schools. Program was sponsored by SSA conducted by College of Agriculture, Padnekkad at Pepper Research Station, Panniyur. Training was provided to 71 teachers on 19th September and 96 teachers on 24th September 2008.
- A training programme on vermi-compost technology with special emphasis on practical training was conducted from 27-08-2008 to 30-08-2008 at College of Agriculture, Padannakkad. Three groups viz., Pratheeksha activity group (Trikkaripur), Kairali activity group (Valiyaparamba) and National activity group (Valiyaparamba) were imparted with training. Six trainees per batch were present for the training for two days each. Each trainee was provided with 250 g of vermi worms to start the vermicomposting on their own.

Radio talks/TV Programmes/Audio-Video Cassettes.

Topic	Date	Name of Scientist
Betelvine cultivation	17.05.08	Dr.Dr.Usha C. Thomas
Vegetable Cultivation	18-12-2008 AIR,Kannur	Dr.A.Rajagopalan,
Coir pith composting	16-02-2009 AIR, Kannur	Dr. Allan Thomas
Coconut Mission Activities	16-05-08	DR. P. C. Balakrishnan
Productivity enhancement of coconut	17-10-08	DR. P. C. Balakrishnan
Question & Answers	In every week	DR. P. C. Balakrishnan
Interface of coconut	25-11-08	DR. P. C. Balakrishnan

List of Publications

Scientific papers

1. Amritha, V. S. and Beevi, S. P. 2008. Occurrence of different varieties and types of *Hirsutella* spp. on coconut eriophyid mite
2. Usha, C.T., Chandini,S. and Thomas, A. 2008 Standardisation of nutrient management schedule for increased yield in betelvine. National seminar on Piperaceae, 2008 IISR,Calicut..p.365
3. Saji Gomez and T.Ahmed 2009 Value addition in apricot fetches more Indian Horticulture 54:1 61-64

Popular Articles

Saji Gomez and Anitha P. 2008 Pazham samskaranam Adaayathinu Karshakasree 14 (2) p 52

No. of visitors to the Institution

Farmers 2500
School students: 25 groups

Staff strength as on 31.3.2009

Scientific	:	21
Administrative	:	14
Supporting	:	7
Others (Specify)	:	-
Total	:	42

Details of Sale of Seeds/ Planting materials/ Biocontrol agents etc.: Annual receipt for the year 01-04-2008 to 31-12-2008 and 01-01-2009 to 31-03-2009

Sl.No.	ITEMS	Production as on 31-03-2009	Sales as on 31-03-2009
	Farm		
1	WCT Seedling	7160	6560
2	T x MYD and T x GB seedlings	1445	1445
3	WCT Seed nut	5870	0
4	T x MYD and T x GB seed nuts	3665	0
5	CDO seedlings	113	98
6	CDO seednuts	1030	0
7	Harvested ripe coconut	120032	120032
	RF		
1	Areca Mohitnagar	13010	3101
2	Areca Sreemangala	600	554
3	Areca Sumagala	1310	1130
4	Areca Mangala	490	488
5	Saigon	1400	0
6	Mango graft	23000	21120
7	Cashew graft	3100	355
8	Sapota	130	129
9	Guava layer	60	60
10	Moringa seedling	560	350
11	Narakam layer	125	125
12	Tissue Culture Banana	75	75
13	Bananna sucker	1480	1480
14	Grandnaine sucker	175	175
	Vegetable seeds		
15	Amaranthus	6.5 Kg	3.3 Kg
16	Bitter gourd	5.0 Kg	2.8 Kg
17	Bringal	2.25Kg	0.35 kg
18	Bhindi	21Kg	18 Kg
19	Cow pea	35.2 Kg	35.2 Kg
20	Pumpkin	12.5 Kg	11 Kg
21	Ridge gourd	28 Kg	26.0 Kg
22	Snake gourd	24 Kg	20.1 Kg
23	Tomato	3.5 Kg	3.1 Kg
24	Cow pea (Bush)	10 Kg	4 Kg

25	Ash gourd	8.25Kg	6Kg
26	Cucumber	5.9 Kg	4.2 Kg
27	Chilli	0.83 Kg	0.43 Kg
28	Vermicompost-worms	375 Kg	335 Kg
29	Mushroom spawn	459 bottles	389 bottles

NB. Vegetable seeds are under preparation and new crops are also in the field. Also the total receipt is calculated considering the ripe coconut which amounts to Rs.3.6 Lakhs.

Total receipt as on 31-03-2009 Farm : Rs. 610113
RF : Rs. 1374000
Grand Total : Rs. 1984113

Finance 2008 - 09

Head	Expenditure(Lakh Rs)	Receipts (Lakh Rs)
Plan	223.2	-
Other EAPs	6.51	-
Revolving Fund	17.67	18.65

COLLEGE OF FORESTRY, VELLANIKKARA

Name of the Head of Station : Dr.B.Mohan Kumar

Thesis submitted during 2008-2009 (MSc. Students)

Discipline	Name of the Student	Major Advisor	Title of Thesis
Dept. of Forest Management & Utilization	Harsha T Hegde	Dr.K. Gopikumar	Evaluation of tree species for growth , wood properties and leaf nutrient content
Dept. of Forest Management & Utilization	Puttaswamy.H	Mr. S. Gopakumar	Floral biology and seed technological aspects of <i>Jātorpha curcas</i> .Linn.
Dept. of Tree Physiology and Breeding	Samom Khelen Singh	Mr. A.V.Santhoshkumar	Influence of host and mineral nutrition on the growth of sandal seedling(<i>Santalum album</i> .Linn)

Study tours

1. Acted as the Tour Leader for the All India Study Tour of 2004 and 2005 Batch B.Sc. Forestry from 5-4-2008 to 27-4-2008-Dr.K.Sudhakara
2. Took the 2005 Batch B. Sc. Forestry students to Marayur Sandal Division as part of the Project Work from 15-12-2008 to 18-12-2008- Dr.K.Sudhakara
3. Took the 2005 Batch B. Sc. Forestry students to VFPCCK Seed Laboratory, Alathur and Research Fields as part of the Course Forest Seed Technology on 30-10-2008-Dr.K.Sudhakara
4. Took the 2005 Batch B. Sc. Forestry students to the KFRI Forest Seed Centre as part of the Course Forest Seed Technology on 25-9-2008 - Dr.K.Sudhakara
5. Took the 2004 Batch B. Sc. Forestry students to Periyar Tiger Reserve as part of the RAWE programme from 14-8-2008 to 17-8-2008- Dr.K.Sudhakara
6. Accompanied the 2004 admn. BSc Forestry students on various RAWE modules-S.Gopakumar
7. Accompanied 2006 admn forestry students to Wayanad as part of Ethnobotany practicals-S.Gopakumar
8. Accompanied 2008 admn forestry students to Peechi WLS and Vazhachal forest division as part of Dendrology practicals. -S.Gopakumar
9. Conducted the southIndia study tour for 2006 -2007 admission of BSc forestry students from 3.10.08 to 9.10.08.- Dr.Kunhamu & Dr.M.M.Animon.

Students Union activities

1. The inauguration of the Students Union, *Vipanchika*, was done by Dr. Alexander Jacob, IPS, the Director of Ramavarmapuram Police Academy on 11th of August 2008. It was followed by cultural programmes.
2. Lectures on "Time Management" and "Career Guidance" were conducted under Planning Forum activities.

3. Inter-collegiate arts competition "Orma'08", many students who had won prizes in Sandram'08 participated in several events including *thiruvathirakkali*, drama, mime, *oppana* etc.
4. 'The show me' film festival was conducted in the college seminar hall from 9th to 12th December 2008.
5. Conducted the Inter Class Sports competition "Wake and Fight '08".
6. Vanamahotsava celebrated on July 11, 2008 along with students of St. Mary's College, Thrissur by planting saplings and by giving a talk on importance of planting trees to our environment on the day

NSS Activities

1. NSS Unit organized a college cleaning campaign Vice Chancellor, KAU was the chief guest.
2. Tree planting activities organized in the college campus on June 5, World Environment Day.

Sports and Games

1. COF Team participated in the Volley Ball Basket ball tournaments held at COA, Vellayani in Jan 2008.

Research Programmes

a. Major research achievements (Summary and highlights, Department/discipline wise):

Department of Forest Management and Utilization

1. The growth performance of 50 tree species grown in the college farm was evaluated. Based on preliminary data, fast growing tree species were identified. Heartwood, sapwood, bark content etc. were estimated. Sp gravity and calorific values were also estimated.
2. As part of the plant diversity studies in Attappady hills, 475 plants were documented and herbarium prepared. Developed a CD on flowering plants of Attappady which provides information on local name, English name, Habit, Habitat, Distribution and botanical features of 475 plants.

Department of Wood Science

1. Developed an On-line (web enabled & CD) manual of timbers of Kerala Timbers of Kerala which will provide accurate & up to date information using a click and query system. Emphasis is on timber identification, utilization & criteria based selection.

Department of Silviculture and Agroforestry

1. Agricultural transformations brought by market economies in the recent past, including the incorporation of exotic trees such as rubber (*Hevea brasiliensis*), cacao (*Theobroma cacao*), and spices, however, has led to the decimation of some of these traditional gardens. Yet, the homegarden survived in Kerala and elsewhere, and today it is regarded as the epitome of sustainable land use in the tropics. Homegardens offer food and nutritional security to the subsistence farmers, besides acting as a source of cash income. Often they function as the loci for experimentation with new tree species and cultivation techniques, and thus have the potential to contribute to the development of other agroforestry systems, and to extension efforts that seek alternatives for agricultural development. Fruit trees are paramount in the home gardens of most areas including the peninsular India. Of the 38 native fruit and nut yielding tree taxa reported from Kerala home gardens, about 30 are underexploited and

hitherto did not attract much scientific or managerial attention. Intraspecific variations also abound among the home garden components as well as those in the natural habitat implying the potential for further improvement of indigenous fruit trees.

Extension activities

1. Provided farm advisory services to farmers on general silviculture and tree evaluation issues.- Sri.S.Gopakumar
2. Delivered a talk for during the Nature Camp held at Mangalavanam wildlife sanctuary on 31st January 2009 to school students..-Dr.M.M.Animon.
3. Actively participated in Trichur Agri.Horti festival .College of Forestry has won the first prize instituted for the educational institution gardens in Trichur district.Classes were handled for unemployed youths on tree planting , landscaping and seedling production during the period under report.- Late.Dr.K.Gopikumar.

List of Publication

Book chapters

1. MOHAN KUMAR, B. 2009. Self sustaining models in India: Bio-fuels, eco-cities, eco-villages, and urban agriculture for a low carbon future. In Osaki, M., Braimoh, A., Nakagami, K., and Saito, O. (eds). Designing Our Future from Local and Regional Perspectives - Bioproduction, Ecosystems, and Humanity. United Nations University, Tokyo, Japan (invited).
2. Gowda, H.B.S. and MOHAN KUMAR, B. 2008. Root competition for phosphorus between coconut palms and interplanted dicot trees along a soil fertility gradient. In: Towards Agroforestry Design: An Ecological Approach. Advances in Agroforestry Series, Volume 4. Jose, S. and Gordon, A. (eds), Springer, The Netherlands, pp 175–193.
3. MOHAN KUMAR, B. 2008. Carbon sequestration potential of multipurpose trees: a synthesis. Environment, Agroforestry and Livestock Management. S.S Kundu, O.P. Chaturvedi, J.C.Dagar and S.K. Sirohi (eds). International Book Distributing Co., Lucknow, India, ISBN 81-8189-227-5 (invited).
4. Felix Francis, K. Sudhakara and K. V. Peter. 2008. Underutilized trees for energy. *in* K. V. Peter (ed.) Underutilized and underexploited horticultural crops, Vol. 4, 2008. New India Publishing Agency, New Delhi (India) pp. 379-398.

Research Papers

1. Saha, S.K., Nair, P.K.R., Nair, V.D., and MOHAN KUMAR B. 2009. Carbon storage in relation to soil size-fractions under some tropical tree-based land use systems. Plant and Soil, Springer, The Netherlands (in press).
2. Nair, P.K.R., Nair, V.D., MOHAN KUMAR, B. and Haile, S.G. 2009. Soil carbon sequestration in tropical agroforestry systems: A feasibility appraisal. ENVIRONMENTAL SCIENCE AND POLICY, doi:10.1016/j.envsci.2009.01.010 Elsevier Scientific Publishers, Amsterdam, The Netherlands
3. Kunhamu, T.K., MOHAN KUMAR, B., Viswanath, S., and Sureshkumar, P. 2009. Root activity of young *Acacia mangium* Willd trees: influence of stand density and pruning as

studied by ³²P soil, injection technique. AGROFORESTRY SYSTEMS, DOI: 10.1007/s10457-009-9205-2, Springer, The Netherlands.

4. Saha, S.K., Nair, P.K.R., Nair, V.D., and MOHAN KUMAR B. 2009. Soil carbon stock in relation to plant diversity of homegardens in Kerala, India. AGROFORESTRY SYSTEMS, 76(1): 53–65, DOI 10.1007/s10457-009-9228-8, Springer, The Netherlands.
5. Kunhamu, T.K., MOHAN KUMAR, B., Viswanath, S. 2009. Does thinning affect litterfall, litter decomposition, and the associated nutrient release in *Acacia mangium* stands of Kerala in peninsular India? CANADIAN JOURNAL OF FOREST RESEARCH, 39(4): 792–801, doi:10.1139/X09-008, Canada.
6. Ramachandran Nair, P.K., MOHAN KUMAR, B., and Nair, Vimala D. 2009. Agroforestry as a strategy for carbon sequestration. JOURNAL OF PLANT NUTRITION AND SOIL SCIENCE: 172: 10–23, DOI: 10.1002/jpln.200800030, Germany.
7. MOHAN KUMAR, B. 2008. Forestry in ancient India: some evidences on productive and protective aspects. ASIAN AGRI-HISTORY, 12(4): 299–306, India.
8. MOHAN KUMAR, B. 2008. Standing stock of thorny bamboo [*Bambusa bambos* (L.) Voss] in the homegardens of Palakkad and Malappuam districts in Kerala. JOURNAL OF TROPICAL AGRICULTURE, 46(1-2): 32–37, India.
9. MOHAN KUMAR B. and Takeuchi K. 2009. Agroforestry in the Western Ghats of peninsular India and the Satoyama landscapes of Japan: a comparison of two sustainable land use systems. SUSTAINABILITY SCIENCE, Springer, The Netherlands (in press).

Seminar/ workshop

1. Sudhakara, K. and Sneha, S. 2008. Restoration and conservation of shola forests presented in National level seminar on “ Bio Diversity of Natural Sholas and its conservation in Nilgiris”.
2. Vidyasagaran, K., Babu Jose 2008. “Ecological impact assessment of Sabarimala forest with special reference to Pilgrimage activities” In: International Seminar on Biodiversity conservation and Management from 3 to 6th February 2008 at CMFRI, Cochi.

No. of visitors (farmer group/students)

1. Professor Kadambot Siddique, FTSE, Chair in Agriculture and Director, Institute of Agriculture, The University of Western Australia, M082, 35 Stirling Highway, Crawley, Western Australia 6009, Australia
2. A group of 40 Foresters, undergoing in-service training in Forest Dept. on 23-5-2008

Important Visitors

1. Dr. P.K.R Nair Distinguished Professor, University of Florida, USA (20-10-08 to 25-10-09)

Staff strength as on 31.3.09

Staff	Total
Scientific	12
Administrative	7
Supporting	2
Other (Specify)	1 post of classIV temporarily filled up by posting E.E.hand

Details of sale of Seeds/ Planting materials / Bio control agents etc.

Item	Quantity	Revenue
Forest seedlings	91000	670203.00

Finance 2008 – 2009

Head	Expenditure	Receipts
Non plan	9487308	-
Plan	2005116	-
ICAR & ICFRE	2706744	529885 (Internal)
Other EAPs	1555511	-
Revolving Fund	574173	670203.00

COLLEGE OF CO-OPERATION, BANKING & MANAGEMENT

Name of Head of the Station : Dr. U. Ramachandran

Students Union Activities

The following Programmes were conducted for the year 2008-2009

1. Union Inauguration
2. Interclass Arts Festival
3. Gardening and cleaning in Collatoration with NSS
4. Football Match
5. Wall Magazine Inauguration
6. Freshers day for 2008 batch

Extra curricular activities

Students of the College were able to participate in a one day cleaning campaign held on 26th may, 2008, in the college.

NSS Activities 2008-2009

Participation in NSS National level campus.

30 NSS Volunteers of our college attended various NSS national level campus organized in various districts of Kerala by State NSS cell.

Participation in Sramadhanamin the Kole lands of Kanimangalam Padasekharam (9th 11th April 2008).

30 NSS Volunteers and NSS Programme officer of our unit participated in the 'Sramadhanam' by harvesting the paddy from the kole lands of Kanimangalam padasekharam at Thrissur.

Participation in the survey in Tholoor Grama Panchayat

15 NSS Volunteers were participated in socio-economic survey at Tholoor Grama Panchayat jointly organized by the Panchayat and Kerala Agricultural University. Competions conducted by NSS Unit.

Writing competition

We have successfully conducted an essay writing competition ("Youth and NSS") and a poster making competition ('AIDS-A Deadly Menace' on 17th November, 2008. There wase whole hearted participation from the part of NSS Volunteers.

Visit to SOS Children's Village

As part of NSS activities, one day camp was conducted on 20 th December, 2008. Seventy five volunteers participated in the camp.

In addition to these major achievements. The regular programmes like independence Day, Republic Day and Gandhijayanthi Celebrations and cleaning programmes were conducted by the NSS Unit.

Celebrated Independence Day on 15th August, 2008

Celebrated Independence Day on 15th August, 2008

Celebrated Independence Day on 15th August, 2008

Celebrated Independence Day on 15th August, 2008

List of publications

Scientific papers : 6

Popular Articles : 1

Books : A Book titles "Co-operative theory" has been accepted for publication by KAU. Authored by Dr. G. Veerakumaran

A chapter in Book titles Entrepreneurship development- Indian cases on change agents-ISBN-13: 978-0-07, by Sri. Philip Sabu and Dr. A. Sukumaran.

Other details if any

Income from fees : Rs. 33,04,781

Miscel. Receipts : Rs. 25,864

Total : Rs. 33,30,645

Finance

Head	Expenditure	Receipts (Rs)
Non-Plan	1,07,07,304	-
Plan	28,35,609	1,13,29,000
ICAR	10,49,988	10,50,000
Revolving Fund	5,14,594	21,21,550

FACULTY OF VETERINARY AND ANIMAL SCIENCES

COLLEGE OF VETERINARY AND ANIMAL SCIENCES MANNUTHY

Name of Head of the Station : Dr. E. Nanu, Dean

Study Tours:

Dr.Sathu.T and Stipendiary Trainees to Meat Products of India, Koothattukulam & Kolahalamedu.

Dr. George T. Oommen officiated as the Tour Officer of All India Study Tour of 2004 batch of B.V.Sc &A.H. students Nov.8-Dec.1, 2008.

Dr. K.M. Lucy- South India Study tour – 2006 Batch students – February- 2009

Dr. Metilda Joseph accompanied students to Kerala Livestock Development Board, Mattupatty for frozen semen training from 21/2/2009 to 22/2/2009.

Dr. Hiron M. Harshan accompanied study tour to Kodaikanal with 2008 batch students from 21/12/2008 to 22/12/2008

Dr.A. Kannan & Dr.A.Prasad – Tour Officer & Accompany's Officer for 2006 batch South India Study Tour.

All India Study Tour – Tour Officer Dr. P.J. Rajkamal.

Other activities (brief outline only) - Additional Charges

Departmental staff members are entrusted with the duties of surgery unit of Veterinary Hospital Kokkalai and Mannuthy and Radiology Units and Endoscopy Units.

Dr.P. Anitha & Dr.Deepa G. Menon participated and presented Posters in the National Seminar on Food security through Innovations in Food Processing and Entrepreneurship Development at KAU on 29-30/9/2008.

Dr.P. Anitha participated and presented a Poster on Foraging Ducks in Kerala at a National Seminar conducted by BCST & KSVC at COVAS on 20.1.2009.

Dr.Deepa G. Menon participated and a presented Poster on Health Card for Captive Elephants in Thrissur at a National Seminar conducted by BCST & KSVC at COVAS on 20.1.2009.

Dr. K.P. Sreekumar – Professor Academic, COVAS, Mannuthy.

Dr. V. Ramanth a. Officer i/c. of Library, COVAS, Mannuthy

Officer i/c. of Central Instrumentation Labs.

Dr. K. Kathiyani – Asst. Warden, LH, Mains, COVAS, Mannuthy up to 30.3.2009.

Student union activities

Dr. P.I. Geevarghese, Professor & Head acted as Staff Editor, Students Union, College of Dairy Science and Technology, Mannuthy.

Dr. P.I. Geevarghese, Professor & Head acted as the Officer i/c. of the Placement Cell of the CV & AS, Mannuthy.

Dr. P.I. Geevarghese, Professor & Head acted as Head of the Department of Dairy Technology and Dairy Husbandry of the College of Dairy Science and Technology, Mannuthy.

Sri. P. Sudheer Babu, Asst. Professor acted as Associate Patron, Students Union, CV&AS, Mannuthy.

Sri. P. Sudheer Babu, Asst. Professor acted as the Officer i/c. of the Placement Cell of the College of Dairy Science and Technology, Mannuthy.

Extra curricular activities :

Dr.K. Radha has taken charge as Assistant Warden, Ladies Hostel (Annexe)

Dr. George T Oommen	Elected National Vice-president of Association of Food Scientists and Technologists (AFST), India.
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Judging committee members in literary and debate

(Dr. Shibu Simon) Synchrodance (Dr. Hiron M. Harshan)

Dr.A. Kannan – Asst. Warden, U.G. Hostel (Men’s)

Dr.A.Prasad - Asst. Warden U.G. Hostel (Men’s)

Dr. C.R. Lalithakunjamma:

As a resource person in the training programme on “Rabies diagnosis” in the Department of Preventive Medicine for 2 batches.

As a resource person in the training programme on “Brucellosis” in the Department of Microbiology for 2 batches.

Dr. N. Vijayan:

Attended the General Council meetings of KAU, as a G.C. member.

Functioned as Assistant Warden of the P.G. Men’s Hostel.

Member, Enquiry committee on death of Peacock in KAU Campus

Co-Principal Investigator – Documenting the traditional particularly tribal, knowledge as the conservation and sustainable use of biodiversity

As a resource person in the training programme on “Rabies” in the Department of Preventive medicine

As a resource person in the training programme on “Avian Influenza” in the Department of Veterinary Public Health

Dr. N.D.Nair:

1. Functioned as Academic Officer in charge of the P.G.
2. In-charge of the student’s Counseling Centre.
3. District Veterinary meet Ernakulam : Talk on “emerging diseases of animals” on 3.1.2009.
4. Talk on “Gross pathological basis of diagnosis” at Kalpetta, Wayanad on 3.2.2009.
5. “Common Postmortem lesions in animals and diagnosis of diseases – District Veterinary meet – Seminar at Thodupuzha on 21.2.2009.
6. Gross Pathological basis of diagnosis of diseases of animals – District Veterinary meet – Trichwe & ASCAD Seminar on 26.2.2009.
7. ASCAD Seminar and Dist. Vet. Meet at Calicut – Seminar on macroscopic lesions interpretation and correlation to diseases on 6.3.2009.
8. National Seminar on Recent Advances in the diagnosis and control of Animal diseases in the particular reference to Public Health, Ernakulam – moderator on 13 – 15th March.

Dr. Mammen J. Abraham:

1. As a resource person in the training programme on “Rabies diagnosis” in the Department of Preventive Medicine for 2 batches.
2. Member, Expert Committee on assessing the health status of Pigs in the AICRP on Pig improvement, Mannuthy.

NSS activities :

Functioned as Programme Officer, NSS till 22-08-2008 (Dr. N. Vijayan)

Sports and Games :

Members of the department acted as officials in the interclass athletic meet 2008-09 (Dr. N. Vijayan).

Judging in interclass games (Dr. Shibu Simon and Dr. Hiron M. Harshan)

Deputed for Annual Athletic meet activities of the college.

Veterinary College became the winner in the KAU Cricket Tournament held at Fisheries College Panangadu from 14th – 18th May 2008.

Vishu S Shaji Participated in the YMCA All India Basket Ball Tournament held at Hyderabad from April 17th to 23rd 2008.

Veterinary College team win the Men Championship and also the overall Championship in the KAU Athletic Meet held at Vellayani in 27th and 28th May 2008.

The following students participated in the South Zone Cricket tournament held at Chennai on 23rd May 2008.

The Veterinary College Men team got 1st Prize in the KAU Table Tennis tournament held at Faculty Club on 17th & 18th Oct. 2008.

Keerthi A.J. Participated in the Interuniversity Swimming Competition held at Anderi Sports Complex, Bombay from 21st to 24th Nov. 2008.

The following students participated in the Inter University Basket Ball Championship held at Karnataka.

Jobin Jose Kattoor, Vishnu & Shaji, Joseph J Kallinkal & Anoop P.

Our College team got 1st Prize in the KAU Basket ball in the Men's Sessions conducted at Veterinary College on 29th & 30th Jan. 2009.

The team participated in the KAU Football tournament and become winners. The tournament was held at Veterinary College Mannuthy on 24th & 25th Feb. 2009.

NCC:

Captain (Dr.) George. T. Oommen, Associate NCC Officer, R& V Squadron NCC, Mannuthy

Dr. Justin Davis, ANO, NCC Unit

Research programmes

Major Research achievements (highlights)

(Attached photographs of salient findings)

Details of Research projects.

(a & b). AICRP ON GOAT IMPROVEMENT

All India Coordinated Research Project on Malabari Goat Improvement.

Annual report.

The objectives of the Project are

1. Characterization and evaluation of Malabari goats under field conditions.
2. Generation of baseline information on management practices, population trends, feeding system, disease pattern and mortality, socioeconomic and gene marker traits under village conditions.

3. To select the genetically superior males from the farmer's flocks and to establish an elite germplasm centre.
4. To use superior sires for improving the productivity of goat farmers' flock.
5. To evaluate the socio-economic status of goat breeders and the economics of goat production under village conditions.
6. Evaluation of performance under intensive, semi-intensive and extensive system of management.

Highlights & Achievements

Three field centers of Tellechery, Badagara and Tanur belonging to three northern districts of Kerala forms the field centers of study. Since the movement of goats is very high two more field centers have started, one at perambra in calicut district and Thavanur in Malappuram district, to get the required number of animals for the implementation of technical programme. The goat farm attached to College of Veterinary and Animal Sciences, Mannuthy is utilised for the elite germplasm centre. A total of 1270 goats were registered during the year 2007-2008. Of these 81.73% were available for recording till the end of the year.

- The overall least square mean body weights recorded were 3.12 ± 0.11 , 8.28 ± 0.18 and 15.99 ± 0.33 kg respectively for below one, three and six months of age.
- The overall mean of chest girth at below one, three and six months of age were 35.47 ± 0.45 , 46.12 ± 0.46 and 56.67 ± 0.58 cm respectively. Corresponding values for overall means of body length were recorded as 32.49 ± 0.50 , 42.30 ± 0.46 and 50.51 ± 0.63 cm. The overall mean heights at withers at below one, three and six months of age were 35.67 ± 0.46 , 45.17 ± 0.45 and 55.32 ± 0.58 cm respectively.
- Peak yields of milk in Malabari goats were recorded and the mean peak yields recorded was 1237.62 ± 75.44 ml.
- The percentage of singles, twins, triplets and quadruplets were 24.00, 61.47, 13.19 and 1.05 respectively. The percentage of multiple births was higher in Tanur (79.29%) than in Badagara (74.87%) and Tellichery (74.56%).
- The heritability estimates of body weights at below one, three and six months of age were 0.636 ± 0.436 , 0.023 ± 0.229 and 0.799 ± 0.476 respectively.
- Genetic and phenotypic correlations were estimated for body weight and body measurements. Positive genetic correlations were reported in most of the cases. The heritability estimate of peak yield was 0.846 ± 0.561 .
- Genetic correlation coefficients estimated with peak yield to body weight and body measurements were positive and significant except with chest girth at six months of age. They ranged from 0.08 (for chest girth at sixth month and peak yield) to 0.88 (for peak yield and body weight at third month). Phenotypic correlations were positive except with body length and chest girth at six months of age.
- Prediction equations were developed for estimation of body weight using chest girth, paunch girth, body length and height at withers for below one, three and six months of age.
- The phenotypic and genetic parameters estimated in the present study were utilized to construct different selection indices in Malabari goats. Eleven indices were constructed. Based on the best index, the expected genetic progress in body weight at six months of age was 1.490 kg

An index was also constructed with the objective of increasing milk production together with the body weight at different ages by incorporating dam's peak yield as one of the traits. This index had the r_{IH} value of 0.5703.

**COLLEGE OF VETERINARY AND ANIMAL
SCIENCES, POOKOT, LAKKIDI PO, WAYANAD**

Name of the Head of the Station : Dr V Jayaprakasan,

Research Programmes

a. Major research achievements (highlights)

i) Molecular Characterization of local pigs of Kerala using micro satellite markers(completed)(2005-2008)

Blood samples were collected from 300 indigenous pigs from various districts of Kerala and were grouped into four populations based on the geographical distribution and morphological characteristics. DNA bank was constructed for the indigenous pigs of Kerala. These DNS samples were characterized using 25 microsatellite markers chosen from the pig genome map. The allele size range, number of alleles and their frequencies, heterozygosity values(H_e), which indicate the usefulness of the markers and the level of informativeness of the markers as measure by polymorphic information content were calculated statistically. The number of alleles varied from 3-18 and the heterozygosity values of the markers ranged from 0.4105 to 0.9482. The PIC values for different loci varied from 0.3374 to 0.9459. Phylogeny analysis for genetic divergence/similarity among different populations was conducted by calculating the genetic distance between the breeds using the Neis genetic distance method. It was found that the Ankamali pigs were different from the other indigenous groups of pigs in Kerala.

ii) Genetic Evaluation of milk Production & milk composition traits of crossbred cattle in Wayanad District.

Two hundred and eighty cows which calved during the month of June 2007 from Ambalavayal, Sulthan Bathery, Meenangadi, Mananthavady, Vythiri and Thrikkaipetta formed the animals for the study. Milk samples were tested for its composition-fat & SNF during early, middle & late lactation using Gerbers method and lactometer. Total solids were estimated using gravimetric method. Blood samples from these animals were collected, DNA was isolated and polymorphism studies using microsatellite markers DRB3, BM1508, SRCRSP9 and HUU1117 is in progress.

iii) Identification of herbs /plants having acaricidal property and *in vitro* testing of their extracts for screening acaricidal properties:

Plants were screened based on the information gathered from the tribal population of Wayanad. Fifteen selected plants were collected from different parts of Wayanad district, shade dried prior to extraction. Extracts (cold) of ten plants were done using three different solvent systems and the extracts tested for acaricidal property. None of the extracts were found to have acaricidal activity against *Boophilus annulatus* ticks. Further extraction of the ten plants using different polar gradient solvents is now in progress. Colonization of *Boophilus annulatus* and *Haemophysalis sp.* in progress Documentation

Herbarium preparation is in progress. Passport data of collected plants and photographs of the plants in wild were taken.

iv) Title of the Project:- Investigation on the role of Dogs in the

transmission of brugian filarial infections to humans and molecular epidemiology of filarial infection. Name of PI: Dr. Reghu Raveendran

v) PCR assay for the amplification for *Dirofilaria repens* using specific primers
5'CCG GTA GAG CAT GGC ATT AT-3- forward and 5 'CGG TCT TGG

ACGTTI GGGT TA-3' reverse (Vakalis *et al.*1999) was standardized which amplifies a product of 246 bp.

- vi) Two PCR assays for specific detection of *Brugia malayi* were standardized. *Brugia malayi* specific primers 5'-GCG CAT AAA TTC ATC AGC AA-3'[Forward(BM1)] and 5' -ATG ACA ACT CAA TAC TCG AC-3'[Reverse(BM2)](Chansiri *et al.*,2002) were used. It amplified a product of 294 bp.
- The *Brugia malayi* specific primers SLX1 (Forward) 5'-GTC TAC GAC CAT ACC ACG TTG A-3' and SLX 2 (Reverse) 5'-GAA ACA TTC AAT TAC CTC AAA C-3'(Chansiri *et al.*2002) were used for amplification of SLX gene of *B.malayi*. It produced a 294 bp fragment.).
- vii) A well equipped PCR laboratory has been established at Department of Veterinary Parasitology with facility for molecular diagnosis.
- viii) Title of the Project: Study of Herbal Acaricides as Means to Overcome the Development of Resistance in Ticks to Conventional Acaricides. Name of PI: Dr. Reghu Raveendran.
- Out of the four Herbal extracts tested, the extracts labeled CVP-04-P₃-A₄ and CVP-08 P₄-A₄ showed promising acaricidal activity.
- Table: Percentage death observed in adult immersion test using four plant extracts and ethanol as control.
- ix) Title of the Research:-Revised deworming schedule of luminants of

Research high lights.

- a Treatment of 46 calves belonging to small holders with Pyrantel at 10-16 days and subsequent faecal sample examination after one week revealed that none of the calves were positive for *Toxocara vitulorum* infection. This emphasizes the use of Pyrantel at 10-16 days to get rid of *Toxocara* infection in calves with a single dose of Pyrantel.
- b Anthelmintic resistance by FECRT test in 37 goats in Thrissur district Revealed that none of them had Anthelmintic resistance to Benzimidazoles.

Extension Programmes

a) Highlights of extension activities

1. Microbiological examination of drinking of water
2. Quality evaluation of Milk and Meat samples
3. Microbiological examination of feed materials
4. Screening of serum samples and animal serum samples against Brucellosis.
5. Milk samples were subjected to isolation and identification of various pathogens including *Escherichia coli*, *Vibrio parahaemolyticus*, *Staphylococcus aureus*, *Streptococcus*, *Salmonella*, *Clostridium* and Coliforms.
6. Meat inspection
7. Participated in Flower show exhibition at Kalpetta by arranging a stall on Zoonotic diseases.
8. Participated in Exhibition at Engineering College, Kalpetta by arranging a stall on Zoonotic diseases.
9. Dr. C T Sathyan is giving technical consultancy to Nature fresh Milk Project at Maneed, Ernakulam implemented by Kudumbasree.
10. Dr C T Sathyan is giving technical consultancy to Rabbit meat processing unit at Cherayi, Ernakulam implemented by Kudumbasree.
11. Dr. C T Sathyan is giving technical consultancy to Nature fresh Milk unit at Kannadi, Palakkad implemented by Kudumbasree.
12. Dr. C T Sathyan was deputed to take classes for veterinarians working in the state laboratory for Live stock, Manne and Agricultural products, Ernakulam on 17 Dec 2008. at the Dept. of Dairy Science, COVAS Mannuthy.
13. Number of clinical samples screened from 1-4-2008 to 31-3-2009=163

14. Seromonitoring of samples under the Animal Disease Control Project. Number of samples tested from 1-4-2008 to 31-3-2009=1293
15. Dr. Chintu Ravisankar delivered a talk on Zoonotic diseases to farmers on 24-1-2009 at Sulthan Bathery.
16. Sri M.M. Arif , M.L.A. Inaugurating the blood parasite detection camp
17. Classes for farmers of Pozhuthana grama panchayath handled by Dr. Bipin K C and Meppadi grama panchayath by Dr. Deepa P M.
18. Classes for veterinarians of Kozhikode district by Dr. Deep P M.
19. Classes for para veterinary staff of Wayanad district by Dr. Bipin.
20. Quality control of feed stuffs presented at Dairy instructors training, Sulthan Bathery, on 18-2-2009 by Dr. A Ally
21. "Feeding schedule of dairy cattle" presented at seminar by ambalavayal Milk Society, Wayanad, 28-2-2009 by Dr. K Ally.
22. Lecture on 'Tips for reducing feeding cost in dairy farming' by Dr. Dildeep V at training session organized by AHD for dairy farmers at Pulpally.
23. Set up a Silage unit at Mananthavady.
24. Dr. Pramod K conducted class in the seminar conducted at Shreyas Hall Sulthan Bathery on 6-3-2008.
25. Infertility camp at Anchukunnu ICDP organized by V D, Panamaram attended by Dr. Pramod and Dr. Ambili Narayanan on 15-3-2008.
26. Infertility camp and awareness class at V D Kottathara attended by Dr. Jayakumar on 17-3-2008.
27. Class for farmers at Thrissilery grama panchayath organized by AHD, DDD and Thrissilery APCOS on 26-3-2008 by Dr. C Jayakumar.
28. Class for farmers on infertility problems in cattle at DVC, Kalpetta organized by KLDB on 20-5-2008 by Dr. C Jayakumar.
29. Infertility camp at ICDP centre Chethalayam organized by College of Dairy Science and Technology, KAU on 6-6-2008.
30. On the job training for VHSC students (Livestock management) from Govt. VHS, Mundry Kalpetta. On 30-10-2008.
31. On the job training for VHSC students (Livestock management) from Survajana Govt. VHS, Sulthan Bathery on 1-11-2008.
32. Class for farmers on infertility problems in cattle at pozhuthana grama panchayath hall organized by RAIC on 5-11-2008 by Dr. C Jayakumar.
33. Class for ladies self help group from Koduvally panchayath on cattle reproduction and infertility at COVAS, Pookot organized by Dept. of LPT. Three sessions, one each by Dr. Abdul Azees, Dr. Jayakumar and Dr. Pramod.
34. Infertility camp at Kabanigiri and Seethamound ICDP centre organized by Mullankolly panchayath on 17-3-2009- Dr. Jayakumair and Dr. Pramod.
35. Infertility and disease investigation camp by NAIP at Nellyampum, Kenichira grama panchayath on 23-3-2009-Dr. Jayakumair and Dr.Pramod.
36. Conduct of Postmortem Examinations, Laboratory examination of clinical samples received, Histopathological examination of Tissues.
37. Ambulatory clinic was run at Thrikkaippatta panchayath and attended clinical cases on a daily basis. Dairy study class by Dr. John Abraham for doubling the Milk production through Scientific Management practice at Prince Auditorium Sulthan Bathery Organized by Dairy Dept. and K.L.D.B. Board on 19th April 2008.
38. Conducted seminar by Dr. John Abraham for doubling the milk production through scientific management practice at St. Joseph parish hall Pullarampara, Thiruvambadi organized by Animal Husbandry Dept. and KLDB Dairy Development on 22nd April, 2008
39. One day seminar of Sustainable Rural Livestock Production System for farmers of Mananthavady and Bathery Block organized by World Vision India at Seminar Hall Veterinary College Pookot on 17th July, 2008- Dr. John Abraham

41. One day seminar for farmers on recent trends in Dairy cattle production and management of Manathavady and Bathery Block organized by World India at Seminar Hall Veterinary College, Pookot on 22nd July, 2008- Dr. John Abraham
42. One day seminar for dairy farmers on recent trends in Dairy cattle production and management organized by A H D at panchayath community hall Mananthavady on 25th July, 2008.- Dr. John Abraham
43. One day seminar for dairy farmers on doubling milk production through scientific management practice organized by A H D at Varadoor Co-operative Society, Varadoor on 30th July, 2008.- Dr. John Abraham
44. Chingam-1 Farmers day at Vengapally Krishibhavan Auditorium on 17th August, 2008 on recent trends in Dairy cattle production and management.- Dr. John Abraham
45. Training programme for the project staff on Impact of Animal Husbandry in the Socioeconomic scenario of rural Keralites organized by RVP Kabani on Animal husbandry and Livestock management on 28th August, 2008- Dr. John Abraham
46. One day seminar for the beneficiaries of Vidharbha package on scientific dairy cattle production and management at the Seminar hall Veterinary College, Pookot organized by A H D Dept. on 26th September, 2008- Dr. John Abraham
47. One day seminar on Scientific dairy cattle production and management of Animal Husbandry Dept. at Puthiyedam, Payyampally on 27th September, 2008- Dr. John Abraham
48. Class for V H S C students on scientific dairy cattle production and management at Seminar Hall COVAS, Pookot on 30th October, 2008- Dr. John Abraham
49. One day seminar for SHG's & micro entrepreneur on sustainable rural livestock production system at the Seminar hall Veterinary College, organized by Wayanad Micro Credit training centre of the State Bank of Travancore on 20th November, 2008- Dr. John Abraham.
50. One day seminar for the beneficiaries of Vidharbha package on scientific dairy cattle production and management at the seminar hall, Veterinary College, Pookot organized by AHD Dept. on 11th December, 2008- Dr. John Abraham
51. One day seminar for young farmers on self sustainable livestock rearing system organized by OISCA and MSSRF on 18th December, 2008- Dr. John Abraham
52. Scientific training for SGSY members of Koduvally block panchayath on scientific farm planning and construction at Veterinary College, Pookot on 5th January, 2009- Dr. John Abraham
53. Investors meet 2009 on breeds of poultry suitable for limited range for rearing organized by AHD Dept. at M S Swaminathan Foundation on 14th January, 2009- Dr. John Abraham
54. Two days workshop for dairy extension officers on production strategies and mechanization in dairy farms held at Shreyas Auditorium, Sulthan Bathery on 20th January, 2009- Dr. John Abraham
55. Class for the officers of vegetable and fruit promotion council, Kambalakkad on commercial Emu farming at training centre Kambalakkad on 30th January, 2009- Dr. John Abraham
56. District level investors meet-Animal Husbandry Dept. on commercial Emu farming prospects and opportunities at co-operative bank auditorium Pulpally on 5th March, 2009- Dr. John Abraham
57. Two days workshop for dairy co-operative administrative staff on dairy co-operative and meat production at Shreyas auditorium, Sulthan Bathery on 14th March, 2009- Dr. John Abraham
58. Classes on Orthopedic surgery for officers of AHD at COVAS Mannuthy.
59. Gave talk to public about dog care in Kalpetta Flower show.
60. Judged the Kalpetta Flower show-Pet show

COLLEGE OF DAIRY SCIENCE AND TECHNOLOGY, MANNUTHY

Name of Head of the Station : Dr.R.Rajendrakumar

Academic programmes

Intake capacity & No, of students enrolled during 2008-09			Out turn of students during 2006-07		
	Male	Female		Male	Female
UG	5	11	UG	2	12
PG (discipline-wise)	Nil	Nil	-		
Ph.D (Discipline-wise)	Nil	Nil	-		

Study tours

1. South India Study tour was conducted from 18-08-08 to 31-08-08. During the tour the students for B. Tech (D.Sc & Tech.) 2006 admission students. Visited the important Dairy and food plants in Chennai, Bangalore, Mysore and Hyderabad.
2. As part of the courses Agronomy and Forage Production, Food Technology, Fat Rich Dairy products, the students visited KLD Board Farm at Dhoni, CIFT, Kochi, Aavin Dairy Plant at Erode, Pentagon foods, Kunnankulam, Snow cap Industries, Thrissur, K.S. Milk, Thrissur during the year 2008-09.
3. North India Study tour for B. Tech 2005 admission students was conducted from 24-02-09 to 19-03-09. The team visited the major dairy plants and institutions like Amul Anand, IRMA, NDDDB, Mother Dairy, New Delhi, Baroda Dairy, Nestle factory, IARI, New Delhi, Punjab Agricultural University, Ludhiana, NDRI, Karnal.

a. Student's Union activities

The students union activities for the year was inaugurated on 07-7-08. An interclass debate and a seminar on scientific writing was organized. Independence day, Onam and Christmas were celebrated in the College. A film festival including classic films was arranged. A class on understanding the classic films was also organised. The College Magazine

"EE SISIRAVUM PINNITTU" was released during the period.

b. Extra-curricular activities

The students are participating in various extra curricular activities like intercollegiate quiz and debates, University Art festivals and harvest festivals in farmer's field.

c. NSS activities

A new unit of N.S.S. was sanctioned for the College. Dr. E.K. Kurien, Assoc Professor has taken charge as the Programme Officer.

d. Sports and games

The College eventhough lacks a Physical Education Teacher, our teams are participating in all the sports events arranged by the University. The College Football, Cricket, Badminton and Table tennis team could gain commendable positions in intercollegiate tournaments.

Extension programmes

a. Highlights of extension activities

1. Milk product preparation demonstration in District Cattle show held at Palakkad during 23-24 November, 2008.
2. Milk product preparation demonstration in District Cattle show held at Kozhikode during 19-22, December, 2008.

List of publications

Scientific Papers:

1. Rajendrakumar. R. and Das. H. Modelling of single Screen Vented Extruder for Concentration Cooking of Viscous food material.
J Food Sci Technical, 200744 (1) 94-99
2. E.K. Kurien, S. Sajeena, V.M. Abdul Hakkim. Erodibility of three well defined series of laterite soils in Kerala under simulated rainfall conditions. Indian Journal of Soil Conservation 36 (2) 74-77, 2008.
3. Beena. A.K., Geevarghese, P.I. and Riya. T. George. Assessment of spoilage potential of a psychrotrophic spore former isolated from sterilized skim milk with special emphasis on heat resistant proteolytic activity. In the National Seminar on Food Security through innovations in food processing and entrepreneurship development, September 2008.
4. Beena.A.K., and Geevarghese, P.I. Enzyme detergents for dairy plant sanitation in National Seminar on Recent Advances in Sanitation in Food Industries, May 2008.
Beena. A.K., Geevarghese, P.I. Ranjini. A.R. and Riya. T. George. Psychrotrophs – A threat to food security. In the National Seminar on food security and nutrition, May 2009.
5. Beena. A.K., Geevarghese. P.I. and Jayavardhanan. K.K. Detergent potential of a spoilage enzyme produced by Bacillus species isolated from sterilized skim milk in 21st Kerala Science Congress, Kollam, January, 2009.
6. Beena. A.K., Geevarghese. P.I. and Riya.T. George. Spoilage potential of psychrotrophic isolate from pasteurized milk with special emphasis on heat resistant proteolytic activity. In the 6th International Food Convention, Mysore, December 2008.
7. Beena. A.K., Ambiliy. R. and Riya.T. George. Detection of *chromobacterium violaceum* in water used in an organized dairy plant. In Annam – 2008. National Food and Agro biodiversity Festival, December 2008.
8. Beena. A.K., Geevarghese. P.I. Probiotic dairy foods for health. In Annam – 2008 National Food and Agro biodiversity Festival, December 2008.

9. Ranjini. A.R., Beena. A.K. and Ambili. R. Isolation of *B. cereus* and *Salmonella* from commercially available ice cream samples. In National Seminar on Food Security through innovations in food processing and entrepreneurship development, September 2008.
10. Ambili. R., Beena. A.K., and Ranjini. A.R. Bacteriological quality of ice cream obtained from some retail shops in Thrissur. In National Seminar on Food Security through innovations in food processing and entrepreneurship development, September 2008.

Finance

Head	Expenditure	Receipts
Non-plan	--	
Plan	5746905	48,10,000
ICAR	1139645	11,40,000
Other EAPs	2,18,085	Nil
Revolving Fund	--	

FACULTY OF FISHERIES

COLLEGE OF FISHERIES, PANANGAD

Name of Head of Station : Dr. C. Mohanakumaran Nair

Faculty Position :

	Sanctioned	In position	Vacant
Professor	4	0	4
Associate Professor	11	2	9
Assistant Professor	38	22	16
Total	53	24	29

Academic programmes:

Intake capacity & No. of students enrolled during 2008-09	Out turn of students during 2008-09				
	Male	Female		Male	Female
UG	10	25	UG	13	22
PG (Discipline-wise)	1	1	PG	3	3
Ph.D.(Discipline-wise)	-	2	Ph.D	-	-

Thesis submitted during 2008-09 (Discipline wise)

Title of Thesis

- i. Bajania Viralkumar C : Growth and Survival of Penaeus Monodon in monosex and mixed-sex culture under laboratory conditions
- ii. Tank Ketan V : Evaluation of Spirulina Fusiformis as a protein source in the diet of Penaeus Monodon
- iii. Pan Biak Lun K : Screening of "Lab-Lab", selected Mangrove plant and seaweed for Antimicrobial compounds
- iv. Mathivanan A. : Studies on Electrophoretic identification of fish species used in surimi (products)and their quality evaluation
- v. Gomathi P : Structure and function of the accessory nidamental gland in the Indian squid, Loligo Duvauceli Orbigny (Mollusca : cephalopoda)
- vi. Seena Augustine : A study on oogenesis and ovarian maturation in Puntius Pookodensis Anna Mercy and Eapen Jacob 2007
- vii. Jayasree P.S : Structure and the seasonal changes of the macrobenthic community in relation to the Hydrography of a prawn filtration pond
- viii. Maya Ramachandran : Influence of Hydrographical parameters on the composition and seasonal variation of the plankton population in a prawn filtration Pond

7. Study Tour:

1. All India Tour from 24.02.09 to 16.03.09 – 2005 B.F.Sc. Batch
2. South India Tour from 06.01.09 to 11.01.09 – 2006 B.F.Sc. Batch

Other activities

Students Union activities

The new Student' Union 'Neeharam' was formally inaugurated on 21st July 2008 by Prof. Mercy Williams, the Worshipful Mayoress of Cochin Corporation. Arts Club was also inaugurated on the same day by Mr. Anzal Rahman, the Cine Artist.

Inter-batch Arts Festival was conducted from 27th July to 1st August 2008.

A Career Guidance programme of ICFAI Business School was organized jointly by the Student's Union and the Placement Cell on 4th August 2008.

In association with Green Peace Foundation, Student's Union conducted a Photo Exhibition and Film show on River Periyar and its pollution from 23 to 25th September 2008.

A Quiz on Gandhiji was conducted on 4th October 2008.

On the Inter-collegiate Arts Festival, held at KAU Headquarters during 2 to 5th November 2008, College of Fisheries secured their third position. Ashfaq A of 2005 CoF, was declared the 'Kalaprabhitha' of Orma, 2008.

A film festival was organized by the Student's union from 23 to 25th November 2008.

The college day was celebrated on 10th December 2008 in all decorum and dignity with colourful programmes.

A National Seminar on Global Recession and Fishery industry in India was conducted on 12th December 2008, by the Student's union and the Alumni Association of College of Fisheries. The Hon'ble Minister for Fisheries, Government of Kerala, Sri. Sharma inaugurated the Seminar on 12th December 2008.

The Republic Day was celebrated with a lot of cultural programmes and a special lecture delivered by Retd. Colonel Mr. Makkar on leadership and motivation.

The new Student's union was formally inaugurated by Sri. C.M. Dinesh Moni. MLA. The Cine Artist, Miss Manasa inaugurated the Arts Club of the college on the same day i.e. February 5th 2009.

A seminar on Cancer awareness by the famous Oncologist, Lakeshore Hospital, Dr. Gangadharan, and a Seminar on the Methodology of stock assessment of Marine Fishes by Dr. E. Vivekanandan, Principal Scientist, CMFRI were conducted on 12th February 2009 and 30th April 2009.

A seminar on Geographical Indication pertaining to Indian Fisheries Scenario by Dr. K.S. Purushan, Former Dean of College of Fisheries, Panangad was also organized on 2nd June 2009.

Extra curricular activities

NCC activities

Sports and Games

The Inter class competitions and the College Annual Sports Day was conducted in a befitting manner during the month of May 2008.

Inter Collegiate Tournament:

Our college has activity participated in all the Inter collegiate tournaments conducted by Kerala Agricultural University. The college team has secured the following positions:

Cricket (M)	- Runner up
Table Tennis (M)	- Runner up
Table Tennis (W)	- Winner
Shuttle Badminton(M)	- Runner up

For the first time, the college has organized the Inter Collegiate tournament in cricket in our campus during the month of May 2008.

Friendly matches: Friendly matches in Cricket and Football were held prior to the Inter collegiate tournament.

League Matches: The college has participated in the D. Division cricket league matches.

Inter University: The college players has represented the LAU in the Inter University tournaments: Football, Basket ball and in the All India Inter Agr. Tournaments.

Research Programmes

Major research achievements (highlights)

As a part of the DST project on 'Ornamental fish culture for income and employment generation and to enhance socio-economic status of the rural population of Kumbalam Panchayat, Kanayannur Taluk, Ernakulam District, Kerala State, India', 116 farmers were trained in 7 batches in ornamental fish culture during the period. A welfare society under the name 'Kumabalam Panchayat Ornamental Fish Farmers Welfare Society' was registered in which all the trainees have taken membership and the society is participating in local exhibition to establish market link post training monitoring revealed that most trainees of 2007-08 who had started ornamental fish culture earned around Rs.5000/- per month. Stock assessment studies conducted as a part of the MPEDA project "Stock assessment and development of capture breeding technology of *puntius denisonii* an indigenous ornamental fish of the Western Ghats of India" had revealed heavy post harvest mortality and fishing pressure on this endemic population as it was a much coveted export item. Realizing the gravity of the situation the export of this species has been banned now. Attempts at artificial propagation of this species got a filling when captive ripe fishes were successfully breed in an artificial habitat. It in the first successful *exsitu* breeding of this species in Kerala. More studies are going on to standardize and upgrade this method. As a part of a PG project, ovarian maturation, breeding and easily embryonic development of an indigenous ornamental cyprinid of the Western Ghats, *Chela fasciata* Silas was studied. Oogenesis stages were studied histologically. It was found to be a multiple spawner with protracted spawning individual spawning intermittently season. The size at first maturity for female was 45.75mm TL and for male 36.25mm TL. Fecundity ranged from 2669 to 4437 eggs. The fertilized eggs hatched at the end of 21 hrs. Free embryo staged lasted for three days after which they started feeding.

Puntius pookodensis Anna Mercy, Eapen Jacop 2007 is newly discovered species from Pookode Lake, Wayanad, Kerala. As a part of a PG project, reproductive biology of this species was studied. Stages of oogenesis was studied histologically. Oocyte diameter studies revealed it as a multiple spawner with a protracted spawning season with the individual spawning intermittently. The size at first maturity was 38.5mm TL for female and 32.5mm TL for males. Fecundity was low (426-823 eggs) and showed a positive lineage relationship with the length of fish, weight of fish and weight of vary.

An experiment to determine growth and survival of *Penaeus monodon* in monosene and mixed sex culture under laboratory conditions over a 50 days period showed that growth was significantly more in all female culture than in all male or mixed sex culture and there was no significant difference in survival.

Another study to evaluate the blue green alga *Spirulina fusiformis* as a parotein source in the diet of *Renaeus monodon* revealed highest growth rate and survival when *spirulina fusiformis* was used as a supplementary protein source along with clam meat compared to clam meat alone.

In a study to lab-lab, the mangrove plant *Avicennia officinalis* and the seaweed *Gracilaria costicata* for potential antimicrobial compounds it was found in the *in vitro* experiments that the extracts of the mangrove leaves and the seaweed showed strong antimicrobial activity and have the potential to be used as alternatives to antibiotics in aquaculture. The active principle was indicated as a polysterolic lipid quinove with isoprenoid side chains.

Studies on electrophoretic identification of fish species used in surimi (products) and their quality evaluation were carried out using threadfin bream (*Nemipterus japonicus*) and bulls-eye (*Priacanthus hamrur*). Threadfin bream and bulls-eye surimi and sausage were effectively identified by comparing their SDS-PAGE pattern with species specific SDS-PAGE pattern in their extracts of water soluble proteins and salt soluble proteins. Adulteration/substitution with their species could be identified by the same technique. In a study of the structure and function of the accessory nidamental gland in the Indian squid, *Loligo duvanceli*, it was found that accessory nidamental gland (ANG) could be classified into four stages namely immature, ripening, ripe and spent. High antibacterial activity against gram negative bacterial strains, *Escherichia coli* and *Pseudomonas aeruginosa* and gram positive *Staphylococcus aureus* was detected in the ANG-butanol extracts of ripe glands. Further investigations pointed at unsaturated fatty acid components in the extract as the possible active principles.

Title of project: Structure and seasonal changes of the Macrobenthic community in relation to hydrography of a prawn filtration pond.

Name of the student: Smt. Jayasree P.S. (2006-14-104)

The study was carried out in a prawn filtration pond to find out the seasonal variation of macrobenthos and to correlate them with the seasonal variation in the hydrographical and sedimentary characteristics of the pond. Polyhactes, tanaids, amphipods, bivalves and gastropods were the benthic groups obtained. Among the gastropods, tanaids and polychaetes were dominant forms. Benthic populations were maximum during post monsoon months and showed a decreasing trend and with the onset of monsoon, it further decreased. Among different hydrographical parameters studied, seasonal variations in water temperature, pH, primary production and chlorophyll were significant. Among the sedimentary characteristics, sediment pH was found to be varying significantly.

Title of project: Influence of hydrographical parameters on the composition and seasonal variation of the plankton population in a prawn filtration pond.

Name of the student: Smt. Maya Ramachandran (2006-14-107)

The study was carried out in a prawn filtration pond in the campus to study the influence of hydrographical parameters on the plankton population. The highest values for salinity and pH were observed in post monsoon period. The highest temperatures were measured during pre monsoon season. Alkalinity and hardness showed correlation with pH, indicating the presence of calcium and magnesium. Nutrients were effectively recycled in the pond due to shallow depth. Total phytoplankton count was high in monsoon. The total zooplankton was maximum in pre monsoon months. Total zooplankton did not show any significant correlation with hydrographical parameters except temperature and pH.

Screening of "Lab-lab", selected mangrove plant and seaweed for antibacterial compounds. K.Pau Biaklun

Technical and socio-economic problems related to improve extensive culture of shrimps in Pokkali fields were assessed.

Studies were conducted on the disease problems playing fish and shrimps in Kuttanad.

Evaluation of the impact of prawn farming on the subsequent paddy culture and vice versa in one crop prawn and one crop paddy rotational farming system was done.

Indigenous plant protein sources were evaluated as partial substitute for fish meal in diets for carps.

In composite culture of carps substrate based biofilm led to significant enhancement in growth and survival.

Stock identification and genetic characterisation of prawns from different states done with DNA markers like RAPD.

The detection kit for white tail disease (WTD) of *Macrobrachium rosenbergii* is in the final stages of development. The diagnostic kit uses reverse transcriptase loop mediated isothermal amplification (RT-LAMP) for amplification of the two RNA viruses, MrNV and XSV, the causative agents of WTD. The kit diagnoses the presence of the two viruses separately using two different sets of four primers each. This diagnostic method is more sensitive than RT-PCR, which is currently the most sensitive method for diagnosis of WTD. Extensive standardization has been carried out to optimize the reaction in terms of time and quantity of ingredients used. Positive result can be detected within 15 min by the formation of whitish precipitate. Since the method uses a constant temperature of 63°C for amplification of the nucleic acid, it eliminates the use of expensive thermal cycler. The other advantages of this farmer friendly kit will be its sensitivity, rapidity, simplicity/ease of operation and lesser cost as compared to RT-PCR.

Radio Talks/TV programmes/Audio-Video Cassettes

Topic	Date	Name of School
1. Ornamental Fish Culture	05.02.09	Dr. T.V. Anna Mercy
2. Interview with trainees on the Ornamental Fish village	06.02.09	Dr. T.V. Anna Mercy

List of publications:

Scientific papers:

- Jayachandran, K. V. & Anitta Sebastian, 2007. Growth pattern and meristic studies of the Banded Estuarine prawn *Macrobrachium sulcatum* (Henderson and Matthai) of Vembanad Lake (Kerala). *Proc. Indian Natn. Sci. Acad.*, 73 (4) : 227-229.
- Jayachandran, K. V., 2008. Biodiversity of marine prawns of the family Penaeidae Rafinesque, 1815 of Indian waters. *Glimpses of Biodiversity–Rajiv Gandhi Chair spl. Pub.*, 7:207-220.
- Jayachandran, K. V., 2008. Sustainable exploitation of freshwater prawn diversity of India for food and livelihood security with emphasis on planning. *National Academy of Sciences, Annual Conference* (Abstract)
- Jayachandran, K. V., 2008. Indian palaemonid decapod crustaceans : taxonomic status, research challenges and conservation needs. *National Bureau of Fish Genetic Resources, National seminar on aquatic biodiversity* (Abstract).
- Jayachandran, K. V., 2008. Ornamental freshwater prawns In : *Ornamental fish breeding, farming and trade*, (Kurup et al., (eds.)), Department of Fisheries, Government of Kerala : 99-106.
- Jayachandran, K. V., 2008. Biodiversity of marine prawns of the family Penaeidae Rafinesque, 1815 of Indian waters In : *Glimpses of Aquatic Biodiversity. Rajiv Gandhi Chair Spl. Pub.*, 7 : 79-92.
- Jayachandran, K. V., Tessa Thomas, & A. V. Raji, 2008. Caridiniian shrimp resources of Kerala Waters (Decapoda, Atyidae). *Proc. Indian Nat. Sci. Acad.*, 74(2): 47-50.
- Indira, B., P. Natarajan, K. V. Jayachandran & A. Gopalakrishnan, 2008. Utilization of Inland fish diversity of Kerala State for livelihood security. *Proc. Natl. Sem. Envntl. Mgt. Livelihood* : 28-35.

Presented a paper entitled “Water quality parameters of mangrove area of Panangad with special reference to major nutrients”, authorized by Sukham Monalisha Devi, N.N. Raman, K.V. Jayachandran, V. Malika and S. Shyama, in the National Seminar on Aquatic Chemistry “Aqasem ‘09”, organized by the Department of Chemical Oceanography, Cochin University of Science and Technology during March 26-28, 2009.

Two students completed their P.G. programmes in the Department

Shyla G., Nair, C.M., Salin, K.R., Sherief, P.M., Mukundan, M.K. (2009) Liver oil of pharaoh cuttlefish *Sepia pharaonis Ehrenbergii* 1831 as a lipid source in the feed of giant freshwater prawn, *Macrobrachium rosenbergii* (De Man 1879). *Aquaculture Nutrition*, 15, 273-281

Sindhu S., Krishnakumar, S., Nambudiri, D.D. and Korath, A. (2008) Quality changes during storage of smoked ‘cubes’ and ‘gillet steaks’ prepared from marine perch *Lethrinus lentjan* (Lacepede). *Fish. Technol.* 45, 189-196.

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- Salin K.R. & Nair C.M. 2008. Rice – prawn (*Macrobrachium rosenbergii*) farmers changing to organic mode in paddy fields of Kuttanad, Kerala, India. Presented at World Aquaculture 2008, 19-23 May 2008 (Busan, Korea). World Aquaculture Society, Baton Rouge, USA.
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- Shyla G., Nair C.M., Salin K.R., Sherief P.M. & Mukundan M.K. 2009. Liver oil of Pharaoh cuttlefish *Sepia pharaonis* Ehrenberg, 1831 as a lipid source in the feed of giant freshwater prawn, *Macrobrachium rosenbergii* (De Man 1879). *Aquaculture Nutrition* 15, 273-281.
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Popular articles

Report of the Task Force on Inland Fisheries and Aquaculture, Kerala 2008. Reported submitted to the Government of Kerala.

Books :

- Macrobrachium: The culture of Freshwater Prawns 2008. Michael B.New, C.Mohanakumaran Nair, Methil Narayanan Kutty, K.R.Salin & M.C.Nandeessa. Macmillan India. 195 p.
- Natarajan, P., K. V. Jayachandran, S. Kannaiyan, Babu Ambat & Arun Augustine (eds.), 2008. *Glimpses of Aquatic Biodiversity*. Rajiv Gandhi Chair Spl. Pub., 7 : 284 p.
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Contributed Chapter in Book:

- Sergio Zimmerman, C.Mohanakumaran Nair and Michael B New. Grow-out Systems – Polyculture and Integrated Culture, In: Freshwater Prawns – The Farming of Giant Freshwater Prawn. 2nd Edition (Michael B New & Wagner C Valenti, eds.) Blackwell, UK. (2009, in press).

No. of Visitors to the institution: 416

Important visitors:

1. S. Sharma, Fisheries Minister
2. Thomas Issac, Finance Minister
3. N.G. K. Pillai, Director, CMFRI
4. C.K. Padmanabhan, President Kumbalam Panchayat

Staff strength as on 31.03.2009:

Scientific	: 24
Administrative	: 23
Supporting	: 19
Others	: Permanent Labourers - 8 Casual labourers -

14. Details of sale of seeds/planting materials/bio-control agents etc.

Item	Quantity (Kgs)	Revenue (Rs.)
1. Amaranthus	2.2	2,200.00
2. Banana Sucker	74 nos.	518.00
3. Bhindi	13.9	12,510.00
4. Bittergourd	1.35	2,430.00
5. Cowpea - Anaswaa	23.8	9,520.00
6. Cowpea - Bhagyalakshmi	2.9	1,160.00
7. Cowpea - Kanakamoni	12.75	2,550.00
8. Cowpea - lola	0.6	720.00
9. Pumpkin	0.25	375.00
10. Fish seeds	2,10,126 (nos.)	1,67,194.00
Total		1,99,177.00

Finance 2008-09

Head	Expenditure	Receipts
Non-Plan	29762203	1021436
Plan	3293288	-
Other EAPs	2711109	-

FACULTY OF AGRICULTURAL ENGINEERING

KELAPPAJI COLLEGE OF AGRICULTURAL ENGINEERING AND TECHNOLOGY, TAVANUR

Name of the Head of the Station : Dr. V. Ganesan , Professor & Dean

Academic Activities

Intake capacity & No. of students enrolled during 2008-09			Out turn of students during 2008-09		
	Male	Female		Male	Female
UG : 46	12	23	UG : 21	7	14
PG(Discipline wise) :15	Nil	Nil	PG	Nil	Nil
Ph. D (Discipline wise) : Nil	Nil	Nil	Ph. D	Nil	Nil

Study Tours

1. 30-7-2008 – to wind Farm in Suzlon Energy Limited, Attappady – (2004 Batch) conducted by Dr. Geetha Susan Philip, Asst. Professor
2. 4/9/2008 and 5/9/2008 – 2004 Batch – Central and Water Conservation Research Training Institute – Udthagamandalam – Conducted by Dr. M. Sivaswamy, Professor
3. 4/10/2008 – (2004 and 2005 Batch) – Nadukkara Agro Processing Ltd, Muvattupuzha – conducted by Dr. K. P. Sudheer, Asst. Prof.
4. 22/10/2008 – (2004 Admn) – Dairy Plant and Meat Processing Plant, KAU – Dr. Santhi Mary Mathew, Assoc. Prof.
5. 10/11/2008 to 24/11/2008 – (2004 Admn.) – South Indian Study Tour – Er. Renukamamai J. & Er. Sathian. K. K, Assistant Professors
6. 23/ 12/ 2008 – 2005 and 2006 Admission – Water Sheds Wayanad – Er. Asha Josheph, Asst Prof.
7. 13/3/2009 – (2006 Batch) – Pavizham Modern Rice Mill, Kalady – Er. Rajesh. G. K. Assistant Professor .

Research Programmes

Major Research achievements(highlights)

Precision Farming Development Centre

An experiment was conducted at the Precision Farming Development Centre to find out the best irrigation method for a Crop Geometry (3 sucker per pit at a spacing of 4m x 3m) in Banana(Nendran). The distribution patterns of the micro sprinklers were studied. The KAU micro sprinkler shows a comparable distribution pattern and the saving for a farmer is @ Rs 6 per sprinkler head. It is found that a micro sprinkler in the centre of the pit, in the three suckers per pit is the best irrigation method. The B-C ratio of the treatment with ALBL micro sprinkler is highest among different micro irrigation methods, followed by KAU micro sprinkler. It is found that from the convenience point of view, a micro sprinkler in the centre is more beneficial. Though, all the methods have given significantly superior yields over control, ALBL micro sprinkler has given the best yield which was superior to other methods. Among the three micro sprinkler methods the ALBL micro sprinkler and KAU micro sprinkler has the maximum B-C ratio but the initial investment of the KAU micro sprinkler is lowest. Hence the irrigation method with KAU micro sprinkler is recommended.

Extension Programmes

Highlights of extension activities

AICRP on Farm Implements & Machinery (ICAR)

1. A trained team, operating rice transplanters successfully in Kerala, was deputed to Andhra Pradesh and introduced rice transplanters.
2. Tractor operated rotovators, post-hole diggers, paddy seeder and multipurpose minitiller were evaluated.
3. Ten different paddy combines were field evaluated for paddy .
4. Extensive field evaluation on transplanters and reapers were carried out.
5. Involved in harvesting paddy at Kuttanad and Nedupuzha
6. Zero till drill for pulses & daincha and Raised bed planter for upland paddy & pulses were successfully evaluated in rice fallow for first time in Kerala to use residual soil moisture.
7. Introduction of labour saving machinery and fallow land cultivation – training to Mangalam farmers– May,2008
8. Introduction of labour saving machinery- training to Vadavnnur farmers- 17-2-09-FIM
9. Introduction of labour saving machinery- training to Kanhangad farmers- 21-2-09-FIM

Finance 2008- 2009

Head	Expenditure	Receipts
Non-plan	2,10,92,263	
Plan	29,53,253	
ICAR	54,61,924	2,46,57,000
Other EAPs	2,43,429	
Revolving Fund	437520	397908

KAU HIGH SCHOOL, VELLANIKKARA

Name of Head of the Station : Deborah Cyril

Dr. Kaleeswaran Memorial Endowment awarded for 2008 to 6 students who won full A+. Mrs. Lalitha Kaleeswaran Award for the best performing student of Class X 2008 awarded to Kum. Anjaly. S.

Exhibition

Mathematics Club (2008-09)

U.P. Students participated in Sub-District level Maths Exhibition and won overall First.

First Prize Winners : 1) Amrutha Ashok(VII) Working Model, 2) Arjun. T.P (VII) (Puzzles), 3) Prabin Nandakumar (VII) (Maths Lab)

Second prize: 1) Prabin Nandakumar (VII) Number chart

District level: H.S students participated in District level Maths exhibition and won aggregate first.

First prize winners: 1) Amrutha. K.K (X) (Other chart) 2) Amrutha Ashok(VII) (W.M) 3) Arjun. T.P (VII) (Puzzles), 4) Jayalakshmi. P.R (Pookkalam design)

Second prize winners: 1) Sheena. K. Joseph IX (puzzles) 2) Anusree. P.S IX (Number chart) 3) Jayalakshmi. P.R IX (Geometrical chart) 4) Shilpa Haridas (X) (Ramanujan Paper presentation)

Third prize winner: 1) Nithin Mathew (Working Model) 2) Feba Devassy & Sukanya. K.S (Group project)

Our Magazine "Ganitha Kusumam" won 2nd prize in district level

State level competition:

a) First prize in working Model (Amrutha Ashok Std VII)

b) First prize in 'Balaganitha Sasthra Cognress'-(Topic Mathematics in Nature)(Ajay.S Std. VII)

c) 'A' grade in puzzles (Arjun.T.P VII)

d) 'B' grade in other chart (Amrutha. K.K Std X)

Magy teacher, guide of the above projects won Best teacher guide Award in the 738th state level Children's Maths congress conducted by Kerala Ganitha Sasthra Parishad during (2007-08). Our school won Best Maths Club Award (Troffy & Cash award Rs. 500/=) for the year 2008-09.

Work experience- Haris Soman (10th Eng) District level (Book Binding) first, State level- C grade.

Science Club

District level Science fair Aggregate 1st prize

Best Science Club Awards (for the past 8 years)

Science project 1st prize - Shilpa Haridas, Jayalakshmi. R

Science Working Model 1st prize- Csillag Thomas, Vishnudev.

Science Drama 1st prize-(for the past 7 years)

Best Script

Best Actor - Saifudheen

(Saifudeen, Dhanu, Sheena, Megha, Nimmy, Sneha, Haritha, Anusree)

Participated in the Southern India Science fair project

Drama Zonal level 1st prize, First Script, best Actor Award

Participated in the State level Project. Participated in the state level (consolation prize)

One of the project (Recycling Chicken waste) was selected to participate in the National level.

Science Congress District level 1st prize: Jayalakshmi.R

Teacher Project District level 1st prize State level 3rd prize.

The project upgrading childrens Science Project into developmental project won the 1st place in third National Teachers Science Congress. Participated in the ASEAN Youth Science Summit held at Philippines Manila and received an appreciation letter.

Finance

Head	Expenditure	Receipts
Non Plan 104-20-0005	43,07,032	9,86,043

CHAPTER III

RESEARCH

FACULTY OF AGRICULTURE

SOUTHERN REGION

NARP (SOUTHERN REGION), VELLAYANI

Name of Head of the Station : Dr. P. SIVAPRASAD
Associate Director of Research i/c.

Research programmes

a. Major research achievements (highlights)

AICRP on Forage Crops

[Principal Investigator : Dr. D.I. Suma Bai]

Identified 2 high yielding guinea grass clones with better adaptability

Developed two promising rice bean and cowpea cultures for release.

Developed 2 promising bajra-napier hybrids.

Identification of vegetable chilli (*Capsicum* spp.) genotypes suitable for the homesteads of southern region

[Principal Investigator : Dr. I. Sreelathakumary]

Twenty genotypes of bird pepper (*C. frutescens*) collected from different parts of Kerala were evaluated both under shade and open conditions. The genotype CF 51 was identified as high yielding both in shade and open. Comparative yield trials were conducted in 2002, 2003 and 2004. The genotype CF 51 recorded highest yield in all the trials. Farm trials were conducted in Thiruvananthapuram, Kollam and Pathanamthitta districts. The proposal for variety release was submitted to the Director of Research, KAU.

Thirty two genotypes of hot chilli / mali mulaku (*C. chinense*) collected from different parts of Kerala were evaluated. Comparative yield trials were conducted in 2003, 2004 and 2005. The genotype CC 30 was the top yielder followed by CC 13. Farm trials were conducted in Thiruvananthapuram, Kollam and Pathanamthitta districts with CC 30 and CC13. CC 30 was the highest yielder in all locations.

Collection and characterization of drumstick (*Moringa oleifera*) clones in the southern region of Kerala

[Principal Investigator : Dr. I. Sreelathakumary]

Limb cuttings of clones collected from different parts were established in the orchard. They showed considerable variability in yield and fruit characters. Highest yield was recorded from MO 27, MO 13 and MO 8.

Identification of vegetable amaranthus (*Amaranthus dubius*) with high yield and leaf blight resistance

[Principal Investigator : Dr. V.A. Celine]

Identified the resistant source to leaf blight caused by *Rhizoctonia solani* in amaranthus (*Amaranthus dubius*). Hybridisation to incorporate the resistance to *A. tricolor* is in progress. The high yielding *A. dubius* genotype Am 88 was given for farm trials.

Grafting in vegetables for biotic stress tolerance

[Principal Investigator : Dr. V.A. Celine]

Standardisation of protocol for grafting of tomato using bacterial wilt resistant root stocks is in progress. Results have shown that wedge grafting on three week old tomato and four week old brinjal root stocks were successful for grafting tomato. Three hybrids from IAHS, Bangalore Ruchi, Indam 519 and Naveen 2000+) were grafted using the standardized method. The highest yielder was Indam 519. The survival percentage was 100 for grafted plants whereas for non grafted ones it ranged from 63.5 to 75. The spotted wilt incidence was less in grafted plants.

Improvement and standardization of management practices of paprika (*Capsicum annuum* L.) for southern region

[Principal Investigator : Dr. I. Sreelathakumary]

Collected fifteen paprika accessions from different parts of the country and seed multiplication was done. Initial evaluation of the different accessions was done. The accession Paprika - 2 recorded highest yield.

Cataloguing of cashew germplasm with molecular markers and digitizing the morphological data

[Principal Investigator : Dr. V.G. Jalakakshmy]

The project entitled -“Cataloguing of cashew germplasm with molecular markers and digitizing the morphological data” was undertaken with the objective of fingerprinting the cashew accessions maintained in the three cashew research stations of Kerala Agricultural University, Madakathara, Anakkayam and Pilicode using RAPD and AFLP markers and to develop a soft ware to do store and utilize the morphological data of the germplasm accessions.

Hundred cashew accessions 50 from Cashew Research Station, Madakathara, 25 from Anakayam and 25 from Pilicode which were unique to the stations were selected for the RAPD analysis. Accessions were screened with 50 operon 10-mer primers and from them twenty which gave good amplification and polymorphism were selected for the analysis. The RAPD analysis of the 100 accessions of cashew with 20 primers yielded a total of 199 amplicons of which 171 were polymorphic giving an overall percentage of 85.92% polymorphism. Most of the amplicons produced were between molecular weight 0.1 and 1 Kb. Few were above 1Kb. The primers OPB-4, OPF-2, OPP-5, and OPP-9 gave very high polymorphism. The genetic divergence of these accessions were analysed based on the dendrogram constructed using the RAPD scores. No locality based clustering of the genotypes were noted however the accessions from Pilicode were found to be unique.

Considering the cost involved in the AFLP analysis sixty accessions which were more unique based on the RAPD and morphological markers were chosen for the AFLP analysis. This study could standardize the technique of AFLP analysis in cashew. The AFLP analysis was done based on 6 primer combinations. The genetic divergence of the accessions were calculated based on the AFLP scores. The genetic divergence based on the AFLP and RAPD scores in combination was more informative.

Cashew germplasm in India is maintained in eight centers under AICRP, including the National Cashew Gene Bank at NRC Putur and the regional cashew Gene banks. All these accessions are being characterized based on the IBPGR cashew descriptors. This contains 68

data fields for characterizing the accessions. DOCGERM is a user friendly database of cashew germplasm developed in Visual basic. This software is developed using the 68 data fields of cashew descriptor published by NRC Putur. It gives information about the cashew accessions in the germplasm for the 68 descriptor data fields at the fingertip. It has provision for adding and deleting data by the administrator. Provision is also given to select accessions having common characters at a time three characters can be used for selection. This facilitates the breeder to choose the material according to the breeding objective. All the cashew gene banks under AICRP is included. DOCGERM is a portable software package with ease of installation

Evaluation of seedling variability in selected varieties of *Anthurium andreanum* Linden

[Principal Investigator : Dr. P. Mayadevi]

The objective is to evaluate the variability arising in seedling progenies of *Anthurium andreanum* and to select promising lines for commercial cultivation.

Hybrids of more than 60 cross combinations and mother Plants belonging to 40 varieties of *Anthurium* are now being maintained. Several promising hybrids have been selected and they are being multiplied vegetatively by top cuttings and sucker splitting. Many more hybrids have started flowering and their character stabilized. This project also forms a part of a Ph.D programme of the Department of Plant Breeding and Genetics.

Standardization of organic farming practices for banana

[Principal Investigator : Dr. R. Pushpakumari]

The experiment is proposed to be conducted for three years. The first two years -in the Instructional Farm and third year, in the farmer's field.

The results of the first year experiment revealed that the different sources did not impart any significant influence on yield attributes like number of hands/bunch, number of fingers/hand, length and girth of fingers, peel-pulp ratio and bunch weight. However, coir pith compost registered the highest yield of 7.46 kg/plant followed by chemical source and poultry manure.

Though the time of application did not influence the banana yield, application of nutrients in three splits registered the highest bunch weight of 7.50 kg /plant. The continued nutrient supply over a longer period might have favoured better availability and absorption of nutrients resulting in higher yield.

Economics of different treatments revealed that highest net income was registered by the treatment receiving nutrients through chemicals in two splits. Among the different sources of nutrients chemical fertilizers recorded the highest net return of Rs.1, 90,000/annum. Among the different organic sources tested, poultry manure registered the highest net income (Rs.1,78, 00/-).

The lowest net return was by vermicompost and coir pith compost. This could be due to the higher unit price of these purchased inputs. The net income from these sources can be enhanced by preparing these composts in the farm itself. Thus it could be inferred that different organic sources could be effectively used as a substitute of chemical fertilizers with out any reduction in bunch yield of Nendran banana. Depending on the availability, any of the sources can be used by the farmer and going for two splits was more remunerative than three or four splits

The best treatments of the experiments will be evaluated in farmers' field during 2009-2010.

Different organic sources could be effectively used as a substitute of chemical fertilizers with out any reduction in bunch yield of Nendran banana. Depending on the availability, any of the sources can be used by the farmer and going for two splits was more remunerative than three or four splits.

Organic package for banana can be developed and recommended to those farmers who are interested in organic agriculture.

Developing an Integrated Farming System Model at Vellayani

[Principal Investigator : Dr. Sansamma George]

Components of IFS : Crop – duck – fish

Area : 50 cents

Fish: Pond size of 40mx20m was dug. The level of water in the pond to a column of 1m is maintained. 1000 fish fingerlings of fresh water fishes of different feeding pattern (surface feeder, column feeder and bottom feeder) has been introduced.

Larger fishes from the pond were harvested and sold for an amount of Rs. 500/ during the current year(2008 – 09). The fingerlings are maintained in the pond

Crops: Existing coconut as main crop is used as standards for pepper. Other crops-banana, tuber crops, ginger, pineapple, vegetables depending on shade intensity. The three sides of the pond and an area of 50 cents adjoining the pond is utilized for raising crops. All the crops are raised following the Package of Practices recommendations of Kerala Agricultural University

The produce from the crops raised are harvested and sold as and when they are mature. Banana and amorphophallus is being maintained in the site during the current season

Duck: A duck shed was constructed over the pond in such a way that the droppings will fall directly into the pond to provide enough quantity of manure for fertilizing the water area of the pond. 30 one month old ducklings were introduced in the system.

The egg production from the birds came down drastically by June – July, 2008 and hence they were culled @ Rs. 50/kg (live weight) and an amount Rs. 1900/(Rupees one thousand nine hundred only) obtained from the sale of 38kg (live weight) of duck was remitted as per Rt. no. 87/41811 dtd 21/11/08. Due to unavailability of funds under the scheme, fresh stock could not be purchased as planned during the year 2008 – 09.

The programme is a teaching cum demonstration model and hence no specific research data has been taken during the period

Integrated farming system is the most benign agricultural production system from an environmental perspective where crop and livestock production are in balance with nature. It is a means of achieving sustainable agriculture in a manner that balances food production, profitability, safety, animal care, social responsibility and environmental care.

Assessment of crop weather relations and formulation of crop weather advisories for the southern region of Kerala

[Principal Investigator : Dr. P. Shalini Pillai]

As a part of the State Planning Board funded project on “Assessment of crop weather relations and formulation of crop weather advisories for the southern region of Kerala” the weather data (temperature, relative humidity, rainfall, evaporation) for the past 25 years have been collected from Vellayani, Balaramapuram, Vellanad and Kottarakkara. The time series analysis has been done to assess the variability. The analysis revealed that with respect to the total annual rainfall, there is a decrease as we come towards the southern parts of the State as indicated by data from Vellayani and Balaramapuram. While the monsoon rainfall exhibits a low degree of variability, the summer rains (December – April) poses problems to the farmers with a very high degree of variability. Portable data acquisition systems have been installed in the representative sites located in the 5 districts of the southern zone. Pests and disease score cards have been prepared.

Establishing a polyclonal progeny orchard at College of Agriculture, Vellayani

[Principal Investigator : Dr. C.S. Jayachandran Nair]

Grafts of 20 mango varieties (76 grafts) and 4 jackfruit varieties (14 grafts) were added to the germplasm. The grafts will be planted in the main field with the onset of the monsoon.

Collection of fruit varieties will continue in the next financial year also. Collection of different varieties of ornamental plants was also done.

Mango varieties collected - Nasik Pasand, Chandrakaran, Amrapali , Ratna, Proir, Kesar, Alphonso, Kottaparamban, Mallika, Koalamban, Chandanam, Khudadath, Kalapadi, Neelum, Bangalore, Karpooram, Mylpelian, Sindhooram, Imampasand, Mulgoa, Jack varieties collected – Then Varikka, Singapore jack, Hybrid jack, Banduruthi

Formalities for construction of a green house and fencing have been completed. The work is in progress.

Biocontrol of pests of vegetable cowpea

[Principal Investigator : Dr. K. Sudharma]

Talc based formulation of the fungal pathogens *Beauveria bassiana* and *Fusarium pallidorozeum* were prepared and shelf life of the formulation was assessed. Good colony forming units were observed upto ten weeks after storage in the case of *F. pallidorozeum* .The shelf life of the talc based formulation of *B. bassiana* was shorter and good number of colony forming units were observed for six weeks only .The pattern of sporulation of *F. pallidorozeum* and *B. bassiana* was standardized in broth culture before formulation of the fungus. Field experiment was conducted to determine the effective dose of the formulated products of the entomopathogens.

Establishment of a Biocontrol lab for crop pest management in the Department of Entomology, College of Agriculture, Vellayani

[Principal Investigator : Dr. K. Sudharma]

Construction of the building for the biocontrol lab is progressing. Superstructure of the building is being constructed. Equipment worth Rs. 20.44717 lakhs were purchased.

Centre for Research on Green Technologies and Sustainable Agriculture (CRGTSA)

[Principal Investigator : Dr. Abdul Salam]

To generate good management practices (GMP) for the common crops of Kerala.

Major Crops: Rice, cassava, pulses, vegetables, spices, banana, pineapple, etc

Thrust areas : Technologies for the production of safe food

: Natural resource conservation and management

: Soil health management

: Water conservation

: Organic recycling

: Bio and organic pesticides preparation and application

a. To identify and utilize the indigenous traditional knowledge (ITK) along with scientific techniques to achieve sustainable crop production

b. To establish a model organic farm for research and training purposes

c. To establish model production units of organic inputs for training and demonstration

: Vermicompost, coir pith compost, enriched compost, etc

: Biopesticides and organic pesticides

: Biofertilizer

Technology Transfer and training

Training programmes on the use of GMP for sustainable agriculture will be regularly undertaken for farmers, house wives, unemployed youth, extension persons and NGOs. Seminars will also be organized regularly to popularize GMP for sustainable agriculture.

- a. Imparting training to farmers, extension workers and planners on principles and practices of green technologies and sustainable agriculture
- b. Refresher training programmes for the extension workers
- c. Establishment of model organic farms in farmers fields

Quality evaluation for safe food production

- a. Quality assessment and certification of organically produced food products
- b. Assessing the quality of organic inputs used in sustainable agriculture

MICROBIOLOGY

- Developed a consortium of Biofertilizers with the native organisms isolated from different tracts of Kerala for Nitrogen and Phosphorus nutrition of black pepper, vanilla and other crop plants of Kerala.
- Developed a compatible consortium of PGPR isolates from Kerala soils for growth promotion and suppression of phytopathogens in black pepper, vanilla and other crops of Kerala.
- 1500kg of microbial inoculants- Biofertilizers and Biocontrol agents have been supplied to the farmers.
- The mother culture and technological help are being given to other 5 production centres in KAU, which produced 6953kg of inoculants and supplied to the farmers.
- The Department is catering the need of pure cultures, technology consultancy etc for 27 microbial production units in Kerala including State owned State Biocontrol lab, State Biofertilizer production centres, 14 private firms and NGO's.
- Developed highly potential *Beauveria* and *Verticillium* for effective management of Pseudostem weevil of Banana and aphids of vegetables.
- Application of Biofertilizers- Arbuscular Mycorrhiza, P solubilizers and *Azospirillum* is useful to produce healthy and vigorous cashew seedlings in the nursery.
- Job training in microbial inoculant technology have been given to graduates.
- Quality analysis of microbial inoculants marketed in Kerala is being done regularly in the department.
- A biofertilizer production unit has been established at AHADS, Attappady to cater the requirement of tribal farmers of Attappady.
- 6 different training programmes, 2 per semester were conducted at different sites of Attappady to create awareness among the tribal farmers on the benefits of biofertilizer application.
- Efficient antagonistic fungi and native PGPR capable of suppressing dreadful pathogens such as *Phytophthora* and *Xanthomonas* infecting betel vine were isolated from rhizosphere and phyllosphere of healthy betel vine plants.

Re-domestication and popularisation of true kasthuri turmeric (*Curcuma aromatica* Salisb.) an endangered cosmetic cum medicinal plant

[Principal Investigator : Dr. B.K. Jayachandran, Plantation Crops]

Standardized production of kasthuri turmeric powder, one value added product. Two multi-coloured folders on Kasthuri turmeric one in Malayalam and one in English, published aiming at popularization of Kasthuri turmeric. A video film on Kasthuri turmeric cultivation is prepared. The video film will be helpful for popularizing the crops.

AICRP on Mushrooms

[Principal Investigator : Dr. Lulu Das, Plant Pathology]

Very high Mushroom yield was obtained from *Pleurotus sajor-caju* and *P.florida* trials. A very good collection of novel mushrooms were obtained during. Surveys conducted in May, June, November and December 2008.

Auricularia spp., Jews ear Mushroom could be successfully cultivate on paddy straw supplemented with wheat bran, Several recipes were standardized using *Auricularia* spp., This Mushroom can be recommended for cultivation through out the year.

AICRP on Plant Parasite Nematodes

[Principal Investigator : Dr. M.S. Sheela, Agricultural Entomology]

Hot spot areas of infestations of nematodes were identified in paddy, banana, pepper, ginger, turmeric, kacholam, thippali and koduveli and depicted in the map for the use of farmers and extension personnel.

Management of root- knot nematode infesting bitter gourd using organic amendments showed that the yield of fruits ranged from 8.2 to 11.5 tons per ha. Maximum yield was obtained in neem cake (11.5 tons per ha) followed by *Jatropha* cake (10.0 tons per ha) with an ICBR of 1:3.12 and 1:3.0 respectively. These treatments were better than the chemical carbofuran with an yield of 8.2 tons per ha.

Evaluation of biopesticides for the management of root- knot nematode in okra revealed that *Trichoderma harzianum* is the best one in increasing the yield (8.3 tons per ha) followed by *Pochonia chlamydosporia* (7.8 tons per ha).

The revalidation (demonstration) of management of nematode complex in banana in two locations showed that the highest yield (12.25 kg) was obtained in sucker treatment (paring+ hot water treatment) + carbofuran (0.05 g/a.i per plant) + neem cake (1kg/plant)). The increase in yield ranged from 2.2 kg to 3.75 kg per plant over the other treatment combination without neem cake application. The ICBR is high in treatment having of sucker treatment + carbofuran and ranged from 1:5.1 to 1:6.1 while in the treatment combination having neem cake the ICBR ratio ranged from 1:3.2 to 1:4.2.

The pest risk analysis in paddy due to *Meloidogyne graminicola* in nursery and main field revealed that in the nursery 90 per cent damage was due to this nematode alone while in main field, damage was assessed in terms of yield (grain and straw). The yield reduction being 50 to 60 per cent in field with an initial nematode population of 217 to 300 larvae per 200 g soil. (Average yield in this field is 1.2 t/ ha as against 3 t/ha in healthy area).

The pest risk analysis in banana, an initial population of 266 *Radopholus similis* per 200 g soil resulted in 50 per cent reduction in yield (bunch weight) of banana (9.5 kg per plant as against 18.0 kg in Nendran variety and 3 kg per plant as against 5- 6 kg in healthy plants of Robusta and Poovan variety.)

The pest risk analysis in vegetables (bitter gourd and cucumber) 247 *M. incognita* per 200 g soil at one month after sowing recorded 33 per cent loss in yield (10 to 15 t/ha as against 40-45 t/ha).

Management of root – knot nematode in vegetable by adopting various cropping systems prevalent in the area showed that there was 20 to 22 percent reduction in nematode population in the soil due to the non preferred host sweet potato variety Srce Bhadra when compared to preferred host okra, followed by brinjal and chilli. There were no statistically significant variation in the yield of okra, brinjal and chilli in various rotation sequence.

Experiments on the management of nematodes on banana using bioinoculants like *Bacillus macerans*, *Trichoderma viride*, *Pseudomonas fluorescens*, *Pochonia chlamydosporia* showed that the vigour of the plants was improved by various treatments when compared to untreated. The date of flowering was delayed for three weeks in untreated plants. The

reduction in nematode population at periodic interval was also noticed in bioinoculants treatments.

EXTENSION PROGRAMMES :

Agrometeorological Advisory Services, Vellayani Centre

As a part of the National programme on agrometeorological forecasts project on issuing agrometeorological advisory bulletins, a project on experimental agrometeorological advisory services, funded by the Department of Science and Technology, is in operation at Vellayani. Bulletins are prepared on the basis of the forecast prepared by the National Centre for Medium Range Weather Forecasting (NCMRWF). Each bulletin comprises the weather experienced during the previous week, forecast of weather for the next four days, current phenological stages of the major crops and the precautionary measures to be undertaken in case of the incidence of pests and diseases.

The basic input for the agro advisory is the medium range weather forecast. Local corrections are applied based on the long period climatic data and the past week's weather data observed, so as to achieve a reasonable and realistic weather forecast. These forecasts are then translated in terms of the most suitable management practices and plant protection measures to be adopted by the farmers. The weather parameters for which the NCMRWF issues the forecast include cloud cover, wind speed, wind direction, maximum temperature and minimum temperature.

Validation of the medium range weather forecasts was done as per the methods suggested by the NCMRWF. The weather forecast received from NCMRWF, New Delhi and the actual (observed) weather data of College of Agriculture, Vellayani, were compared to assess the validity of weather forecasting. Forecasts were received and agro advisory bulletins were prepared and distributed to the farmers during this period. These bulletins were also mailed to the NCMRWF, IMD and FICCI. The Agro advisory bulletins (both in English and Malayalam) were loaded into the weather watch web portal <http://www.indiaweatherwatch.org> that is coordinated by the FICCI, New Delhi. The weather-based advisories helped the farmers in minimising the loss of inputs i.e. seed, fuel, labour and time. The advisories have also play a great role in irrigation scheduling. When dry weather was predicted by the NCMRWF recommendation of commencement or continuation of irrigation, mulching, etc. could be wisely adopted by the farmers. Prediction of heavy rain with strong wind helped the farmers to withhold the irrigation, spraying of plant protection chemicals, fertilizer application etc. The advisories issued to the farmers have helped them to become more aware of the package of operations recommended for each crop by the Kerala Agricultural University. The advisories also included details regarding the possibility of adopting organic farming, method of preparation of bio-pesticides like neem-garlic emulsion, tobacco decoction, etc. and their mode of use.

AICRP on Mushrooms

[Principal Investigator : Dr. Lulu Das, Plant Pathology]

1. Classes were taken for students of National College, Ambalathara and Kendriya Vidyalaya, Pattom.
2. Sale of Spawned beds was launched on Nov 3 rd 2008.
3. Utilized waste mineral water bottles for the cultivation of mushroom was demonstrated to the trainees in departmental training program conducted during Jan 2009
4. Attended the mango fest conducted in Trivandrum during May 2008. and participated in the recipe competition held there

OLERICULTURE

Dr. M. Abdul Vahab participated in the meeting regarding the implementation of 1000 vegetable village programme at Kanakakunnu on 21-5-08 and 5-7-08.

Dr. M. Abdul Vahab participated in the meeting conducted by Sarva Shisha Abhian at Sreekariyam and took class on vegetable cultivation on 25-7-08.

Dr. M. Abdul Vahab participated in the judging committee for selecting best farmer in VFPCCK on 4-8-08.

Dr. M. Abdul Vahab took class on seed production to farmers in the seminar organized by Gandhi Smaraka Trust on 23-10-08 and 16-12-08.

Dr. M. Abdul Vahab took class on vegetable cultivation to farmers organised by KARMA on 24-10-08.

Dr. M. Abdul Vahab took class on kitchen gardening in Tholicode settlement area on 9-11-08

Dr. M. Abdul Vahab took class on vegetable cultivation to farmers in the seminar organised by KARMA and SHM on 24-11-08

Dr. M. Abdul Vahab attended the meeting conducted at the Sugarcane research centre, Thiruvalla on 15-12-08

Dr. M. Abdul Vahab visited the Travancore sugarcane Thiruvalla and gave proposals for the improvement on 20-12-08

Dr. M. Abdul Vahab took class on vegetables to farmers in a seminar organised by Malayalamanorama at Kattakkada on 17-1-09

Dr C. S. Jayachandran Nair, Professor, Pomology and Floriculture conducted a Training on gardening & beautification for Police Officers, 23rd to 28th of June 2008.

Dr. Shalini Pillai, Agronomy served as resource person for 6 training programmes on climate and weather related topics.

Dr. B.K. Jayachandran, Professor, Plantation crops conducted Training programmes in two districts viz., Thiruvananthapuram and Kollam for popularization of kashuri turmeric as part of the project "Re- domestication and popularization of Kasthuri turmeric (*Curcuma aromaticum* Salisb.) an endangered cosmetic cum medicinal plant".

Dr. Mary Ukkuru, Home Science

An exhibition cum sales of the product was arranged by the trained beneficiaries of the project during the arts festival held on 24.09 to 24.4.09 at College of Agriculture Vellayani.

In both the exhibition and in the sales, exhibits are well appreciated by the viewers and the consumers.

Training manual was prepared and distributed to the trained beneficiaries. It will enable the participants while establishing the micro enterprise and for subsequent use while running the enterprise.

LIST OF PUBLICATIONS

Scientific papers

Title	Journal /Proc.	Name of the author	Other details
Molecular characterisation of drumstick landraces using random amplified polymorphic DNA markers	Indian J.Hort	Resmi, D.S, V.A. Celine, K.B. Soni and L.Rajamony (2008)	65 : 503-505

Popular articles

Title	Magazine/ News Paper	Author	Other details
Our vegetable varieties	Keralakarshan	Sreelathakumary.I and V.A.Celine.2008	54 (4) : 19 -21
Cultivation of cucumber and pumpkin	Keralakarshan	Abdul Vahab.M. and I. Sreelathakumary.2008	54 (4) : 25 - 27

Dr. Sheela M.S., Principal Investigator, AICRP on Plant Parasite Nematodes

Sheela, M.S. 2008. Management of Nematodes in Plantation Crops. Paper presented in Fifth International Congress on Nematology from 13 – 18th July 2008, Brisbane, Australia. Proc. p. 316-317.

Sheela, M.S. and Nisha, M.S. 2008. Biointensive management of root- knot nematode in coleus (Chinese potato). Paper presented in Fifth International Congress on Nematology from 13 – 18th July 2008, Brisbane, Australia. Proc. p.46.

Sheela, M.S., K. Ajith and M.S. Nisha (2008). Impact of green leaf application on the management of plant parasitic nematodes and its effect on the population of predatory and saprophytic nematodes and microflora in soil. Paper presented in Fifth International Congress on Nematology from 13-18th July 2008, Brisbane, Australia. Proc. p.37-38.

Siji, J.V., Jayaprakas, C.A., Sheela, M.S. and Mohandas, C. 2007. Efficiency of *Chromolaena odorata* against *Meloidogyne incognita* infestation of Okra. National Symposium on Nematology in 21st century: Emerging paradigms on 22-23 Nov.2007 organized by Nematological Society of India and Assam Agricultural University, Jorhat. Abstract p. 75-76.

Nisha, M.S. and Sheela, M.S. Integrated management of Root-knot nematode in coleus, *Solenostemon rotundifolios*. National Symposium on Nematology in 21st century: Emerging paradigms on 22-23 Nov.2007 organized by Nematological Society of India and Assam Agricultural University, Jorhat. Abstract p. 86-87.

Remya, K.R. and Sheela, M.S. Potential of Entomopathogenic nematodes for the management of pseudostem weevil in banana. National Symposium on Nematology in 21st century: Emerging paradigms on 22-23 Nov.2007 organized by Nematological Society of India and Assam Agricultural University, Jorhat. Abstract p. 85-86.

Soil Science & Agricultural Chemistry

Jyolsana V.K. and Mathew, U. 2008. Boron nutrition of tomato grown in laterite soils of southern soils of Kerala. *J. tropic. Agrl.* 46 : 61-63

Neenu,S and Sudharmaidevi,C.R 2008. Synergistic effect of K and Na on the yield and tuber quality of coleus. Proc. 20th Kerala Science Congress. Jan 28-31, Thiruvananthapuram.

Dr. Suma Bai, Principal Investigator, AICRP Forage Crops

Popular articles - Prepared 2 leaflets viz. 'Guinea grass' and "Hybrid napier" both in English and Malayalam.

Technical Bulletin - Prepared a Research Report (2003-2007) for submission to the Quinquennial Review Team visited during September 16-18, 2008.

Dr. Lulu Das, Principal Investigator, AICRP Mushrooms

Scientific papers - 5
Popular articles - 3
Brochures - 1

MICROBIOLOGY

Scientific papers - 7
Technical Bulletin - 2
Popular articles - 3
Books - 1

BOOKS

Dr. V.L. Sheela, Professor, Pomology and Floriculture - author of the book **Flowers for trade** edited by Dr.K.V.Peter and published by New India Publishing Agency.

Dr.Sabina George, T., Professor, Pomology and Floriculture - author of the book **Ornamental plants for the garden** edited by Dr.K.V.Peter and published by New India Publishing Agency

FINANCE (2008 – 2009)

Head	Expenditure	Receipts
Non-Plan	10198457	
Plan	12122909	
ICAR	9767093	
Other EAPs	24821983	165112
Revolving Fund		
Total	46000442	165112

INSTRUCTIONAL FARM, VELLAYANI

Name of Head of station:

Dr.J.Arthur Jacob

Mushrooms

i) Conducted surveys and collected sixty two species of mushrooms. Their morphological characters were studied and identification done at generic / species level. The collected mushrooms include edible, nonedible, poisonous and hallucinogenic species.

ii) The following species of edible mushrooms are maintained by pure culturing along with spawn production and cultivation trials.

1	Paddy straw mushroom	:	<i>Volvariella volvaceae</i>
2	Oyster mushroom	:	<i>Pleurotus florida</i>
3	Oyster mushroom	:	<i>Pleurotus sajor-caju</i>
4	Pink oyster	:	<i>Pleurotus eous</i>
5	Oyster mushroom	:	<i>Pleurotus opuntiae</i>
6	Oyster mushroom	:	<i>Hypsizygous ulmarius</i>
7	Milky mushroom	:	<i>Calocybe indica</i>
8	Giant (milky)	:	<i>Tricholoma gigantean</i>
9	Shiitake	:	<i>Ganoderma lucidum</i>
10	Black ear mushroom	:	<i>Auricularia auriculae</i>
11	Button mushroom	:	<i>Agaricus bisporus</i>

iii) *Hypsizygous ulmaricus* outyielded all the Oyster mushroom varieties with a biological efficiency of 126 per cent followed by *P. florida* with 112 per cent biological efficiency. *P. eous* and *P. opuntiae* are short duration varieties (11 – 12 days) with a biological efficiency of 88 per cent.

iv) Vermicompost is found to be the best casing medium for milky mushroom production.

v) Rubber saw dust (80 %), rice bran (20 %) and 2 % sugar medium was found to be the best cultivation medium for *Ganoderma lucidum*.

Vanilla

Evaluated the effect of irrigation and shading techniques for vanilla cultivation as part of Western Ghat project. 50 per cent shade level was found to be superior over 25 per cent shade and open condition as far as the vine length and number of leaves are concerned. Treatment combination with mist irrigation & IW / CPE ratio 0.75 and shade level 25 per cent & IW / CPE ratio 0.75 yielded maximum number of flowers and beans.

Vegetables

Major research highlights of the project "Source efficacy of organic manures and microbial inoculants for nutrient scheduling in vegetable based cropping systems of Western Ghats" are furnished below.

First Crop:

Cowpea was raised as first crop during kharif season in cropping systems I and II and little gourd as perennial crop in cropping system III. In cropping systems I and II during both years vermicompost application with bio inoculants viz., pseudomonas and trichoderma recorded maximum yield. During first year package of practices recommendation with bioinoculants recorded maximum yield from coccinia.

Second Crop:

The second crop in cropping system I viz., tomato and in cropping system II viz., chilli was raised and observations were recorded. In both cropping systems I and II vermicompost application with bio inoculants viz., pseudomonas and trichoderma recorded maximum yield.

Third Crop:

The third crop after tomato in cropping system I and chilli in cropping system II was bhindi. Observations were recorded and in both cropping systems vermicompost application with bio inoculants viz., pseudomonas and trichoderma recorded maximum yield during first year in Cropping system I and II

Second Year:

First Crop:

During second year also vermicompost application with bio inoculants viz., pseudomonas and trichoderma recorded maximum yield for cowpea in cropping systems I and II. Observations are being recorded from cropping systems III during second year.

Second Crop:

The second crop in cropping system I viz., tomato and in cropping system II viz., chilli were raised and in both cropping systems vermicompost application with bio inoculants viz., pseudomonas and trichoderma recorded maximum yield. in cropping system I for tomato and chilli in cropping system II.

b) Details of research projects

Completed during 2008-09 :

Name of Project	Funding agency	Name of PI	Name of Co-PI	Outlay
Irrigation and shading techniques for vanilla cultivation in the Western Ghats	WGDP, Planning & Economic Affairs Department, Govt. of Kerala	Dr.M.S.Hajilal	Dr.A.S.Anilkumar Dr.K.Harikrishnan Nair Dr.B.K.Jayachandran	Rs 7.00 lakhs

List of publications

Scientific papers

Anilkumar,A.S. and Jayasree,P. 2008. Organic farming techniques for cultivation of long pepper (*Piper longum*). Aryavaidyan. XXI (2) : 118-121

Anilkumar,A.S. and Jayasree,P. 2008. Sustainable farming practices of kacholam (*Kaempferia galanga*) under partial shade. Aryavaidyan. XXI (4) : 225-228

Technical bulletins

Anilkumar,A.S., Hajilal,M.S., Harikrishnan Nair,K. and Arthur Jacob,J. 2008. Herbal garden – Instructional Farm, Vellayani. Kerala Agricultural University, Mannuthy, Thrissur

Anilkumar,A.S., Hajilal,M.S., Harikrishnan Nair,K. and Arthur Jacob,J. 2008.Oushadhavila Paripalanam. Kerala Agricultural University, Mannuthy, Thrissur

Popular articles

Geetha,D. 2009. Koon Krishi – Arogyathinum adhayathinum. Kera karshakan. (1 / 2009) : 68-70

Sobhana,G. 2008.Samagra – An innovative approach for income generation and livelihood security. Paper presented in the Nat Seminar at Trichi

Sajitha Rani,T.S. 2009. Koval Oushadamoolyamulla pachakkari(Malayalam). Kerakarshakan,2009 Republic special.

Books

12.I) No. of visitors to the Institution (Farmer groups / students)

Farmer groups : 500
Students : 6000

II) Important visitors

Date	Name and designation
01.01.2009	Mr.Menahem Pal, Agronomist (Landscaping), Israel
01.01.2009	Shalva Davis, Shira Levine, Modin, Israel
12.01.2009	Smt.Bijimol, MLA
13.02.2009	Sri.S.Sukumaran,IAS, Secretary to Government, Agri. Department, Govt. Secretariat
06.03.2009	Midi Rieses, Switzerland

Production details of seeds and planting materials during 2008 – 09

Cro / Variety	Quantity produced during 2008-09 (kg)	Quantity sold during 2008-09 (kg)
Amaranth (Arun)	100.365	83.61
Cowpea (Vellayani local)	204.77	200.8

Bittergourd (Preethi)	92.8	89.065
Pumpkin (Ambili)	28.92	33.365
Ashgourd (local)	17.47	14.535
Tomato (Vellayani Vijay)	1.5	4.01
Water melon (Sugar baby)	0.5	0.36
Bottle gourd (local)	3.3	3.82
Bush cowpea (Pusa Komal)	25.465	26.875
Bhindi (Varsha Upahaar)	99.82	88.68
Snakegourd (Kaumudi)	89.445	74.73
Cluster bean (local)	5.665	6.9
Brinjal (Haritha)	28.45	29.29
Winged bean (Revathy)	22.1	20.29
Cucumber (Vellayani local)	27.985	37.209
Chilli (Jwala Mukhi)	11.895	11.98
Seed packets	40.387	38.267
Mango (gr)	6400	6344
Mango (bp)	150	228
Jack (gr)	3387	3400
Sapota (gr)	1820	1813
Breadfruit	712	677
Breadfruit (b)	65	62
Clove seedling	400	363
Citrus	525	485
Allspice	550	435
Arecanut (Mangala)	2075	1968
Guava(l)	2326	2198
Teak	5110	5028
Pepper	18100	17259
Cherry	820	773
Papaya seedling	1650	1589
Neem	210	171
Cashew graft	450	400
Cinnamon	101	102
Mahagony	585	571
Jamba layer	665	657
Bilimbi	126	126
Coffee seedlings	85	84
Drumstick	100	42
Jack graft	3600	3387
Lovi-lovi	315	302
Garcinia	71	61
Pomegranate	160	157
Zizygium	150	149
Rambuttan	270	267
Mangosteen	32	32
Allamanda	460	455
Anthurium (p)	465	453
Bamboo	120	117
Carpet grass (sq. m)	4106	4088

Crotons (s)	3147	3122
Croton (bp)	551	512
Dracena (b)	40	36
Duranta	986	982
Bogainvilla (bp)	157	152
Ixora (s)	300	296
Kuttimulla	2200	2132
Orchid (ordinary)	45	44
Orchid (gb)	15	13
Palm (s)	420	411
Pichi	1750	1738
Red palm (s)	151	149
Red palm (b)	25	19
Rose (s)	415	375
Rose (bp)	125	110
Water lilly (s)	185	181
Water lilly (b)	90	84
Cut flower	65	60
Coleus cutting	400	366
Bogainvilla (rare big)	40	37
Cactus	7	6
Euphorbia	30	26
Euphorbia (Big pot)	250	235
Euphorbia (Small pot)	1300	1274
Banana suckers	6115	6105
Tapioca stem	998 mt	998 mt
Coconut seedlings (Komadan)	15411	15411
Coconut seedlings (WCT)	7454	5818
Medicinal plants	1514	1514
Mushroom spawn	5607 pkts	5607 pkts
Banana suckers (Ordinary)	3992 nos.	3992 nos.
Banana suckers (Superior)	2389 nos.	2389 nos.
Fodder slips	2260 nos.	2260 nos.
Coconut seedlings (Komadan)	15411	
Coconut seedlings (WCT)	8654	

Production details farm produce during 2008 – 09

Item	Quantity (kg)
Vermicompost	10549
Earth worm	68.53
Dried pepper	10,180
Sweet potato	883
Lesser yam	251
Greater yam	154
Ginger seeds	5
Garcinia	1.9
Nutmeg mace	2.5
Fodder grass	4011

Banana (ordinary)	15861
Banana (Superior)	1357
Banana (Nendran)	10247
Banana (Robusta)	4760
Banana (Red banana)	6918
Coconuts	367012 nos.
Tender nuts	3843 nos.
Arecanut	16280 nos.

i) Thousand village programme

Thousand village programme was launched w.e.f. 18.10.2008 and three Registered self help groups, viz, Harithamitra, Harithasree and Karshakasree were engaged for augmenting vegetable and vegetable seed production programmes. The achievements of the SHGs are furnished below.

Sl No	SHGs	Crops	Revenue (Rs in lakhs)
1	Harithamitra	Bhindi, Cucumber, cowpea, amaranth, bitter gourd, brinjal and pumpkin	1.53000
2	Harithasree	Bhindi, Cucumber, cowpea, amaranth, bitter gourd, brinjal and pumpkin, Cluster beans, chilli, tomato, snakegourd	1.27599
3	Karshakasree	Bhindi, amaranth, cowpea, chilli	0.25710
Total			3.06309

ii) Creche

The programmes implemented through the crèche benefited several families on and off the Campus.

Finance 2008-09

Head	Expenditure	Receipts
Non-plan	244,29,966	
Plan	23,98,323	
ICAR	12,99,940*	46,95,410
Other EAPs	26,26,480	
Revolving fund	6,85,948	23,86,082
Total	314,40,657	70,81,492**

* Includes ICAR Development Grant expenditure of Rs 7,99,997

** Excluding ST

TRAINING SERVICE SCHEME, VELLAYANI

Name of Head of the Station : Professor and Head

Deputation of Scientists for Seminars/Workshops/Symposia

Name & Designation	Name of Seminar	Venue	Date
Dr. A.K. Sherief, Professor	National Seminar on natural resource management	Land Use Board, Trivandrum.	28.04.08
Dr. A.K. Sherief, Professor	16 th IFOAM World congress	Modena, Italy	16/6/08 to 20/06/08

b. Deputation of scientists for training programmes/seminars/summer school/winter school/short course.

Name & Designation	Details			Sponsoring organization
	Topic	Venue	Date	
Dr. A.K. Sherief	Training on Appraisal monitoring and Evaluation of projects of LSG conducted	CDS , Trivandrum	14-05-08 to 21.05.08	CDS , Trivandrum

c. Details of Seminars/Workshops/Symposia conducted at the Station

Particulars	Topic	Venue	Date
Bankers' Meet	Bankable Projects	College of Agriculture, Vellayani	11/02/09

List of publications

Scientific papers

1. A. Sakeer Husain, K.S. Sali and P.J. Boniface (2008). Socio-economic empowerment through fisheries co-operatives. Journal of Extension and Research; Vol. X, Nos.1&2, January 2008, pp 61-63.
2. A.K. Sherief, A.S. Anilkumar, A. Sakeer Husain and J.K.J.P. Jayawardhana (2008). Socio-psychological characteristics of farmers in the adoption of organic farming practices in coconut based homesteads of humid tropics. Proceedings of the Second scientific conference of International Society of Organic Agricultural Research (ISO FAR) 18-20 June 2008, Modena, Italy
3. Sakeer Husain, A. and Ranjit Kumar, E. G. (2008). Empowerment study of Self Help Groups : A model -National Seminar on Self Help Groups for Rural Upliftment – emerging extension issues and strategies held at Thiruchirappally

4. Ranjit Kumar, E. G. and Sakeer Husain (2008). Rural Empowerment : Impact of Self Help Groups - National Seminar on Self Help Groups for Rural Upliftment – emerging extension issues and strategies held at Thiruchirappally
5. A.K. Sherief and A. Sakeer Husain (2008) Organic agriculture in mitigating climate change. National Symposium on climate change and low carbon futures, Trivandrum.
6. A. Sakeer Husain and M. Sundaramari (2008) A scale to measure the attitude of farmers towards indigenous knowledge. Journal of Extension Education.(accepted for publication)

Finance 2008-09

Head	Expenditure	Receipts
Non-Plan	39,14,875	2,19,370
Plan	Nil	Nil
ICAR	Nil	Nil
Other EAPS	Nil	Nil
Revolving Fund	Nil	Nil

CROPPING SYSTEMS RESEARCH CENTRE, KARAMANA, TRIVANDRUM

Name of Head of the Station : Dr. Kuruvilla Varughese

Research Programmes

- a. Major Research Activities (Highlights)
- b. A five year study conducted at CSRC, Karamana conclusively confirmed that a third crop of bhindi, groundnut, green gram is profitable than keeping the field fallow. The maximum profit was obtained from rice-rice-bhindi cropping sequence.
- c. In another study it was observed that *different* types of cowpea in a rice-based cropping system was found to be better with gross returns ranging from Rs.74,273 to Rs.76,125/ha/year. Inclusion of summer legumes had beneficial effect on the system yield as a whole.
- d. Biofertilizer Azospirillum was found substitute nitrogen fertilizers to the extent of 25% in wetland rice.
- e. From a recent study it was also observed that diversification by raising green manure (daincha), bhindi or short duration tapioca in paddy field during summer season resulted in a shift of the obnoxious weed flora, *Echinochloa crusgalli*. Taking a green manure crop of daincha or bhindi positively influenced the subsequent rice crop during the first crop season. By adjusting the cropping period of rice, a short duration crop of tapioca is also possible with slightly bigger mounds or beds. A minimum of 150 days are required for obtaining a profitable crop for which poly bag raised tapioca sets of 2 to 3 weeks are used which established quickly and reduced the length of growing period in the main field. Diversification with bhindi, tapioca and green manure requires 220,175 and 75 mm irrigation respectively during the summer season.
- f. In a recent study of rice-based diversified cropping systems, the highest production potential and net income were obtained from one crop of rice followed by two crops of *Nendran* banana. The diversified cropping of rice-banana requires heavy investment. It is suitable for areas in which rice productivity has declined and become non remunerative due to excess weeds, pests and diseases. The banana crop included in the rotation will break the weed and pest cycles. Provision for irrigation and drainage is also a pre-requisite for such type of successful crop diversification. Such areas may be re-used for rice crop after one cycle (two years) of banana cropping.
- g. Long range effect of continuous cropping and manuring on soil fertility and crop productivity. Skipping of phosphorus fertilizers delays flowering, reduce crop growth and yield and delays maturity of rice; application of P fertilizers a must in wetland rice.
- h. In sequential cropping of rice, applying 50% of the nutrient requirement (on equivalent nitrogen basis) as organics (FYM, rice straw, green manure) and 50% as fertilizers during kharif season and the entire dose of nutrients as fertilizers in rabi season enhances the grain and straw yield. The organics may be incorporated 3 weeks before transplanting.
- i. Applying 25% of the nutrient requirement as organics and 75% as fertilizers during kharif season and reducing the fertilizer dose of rabi by 25% gives comparable yield with full POP recommendation during both seasons. Thus a savings of 50% fertilizers is possible in double cropped rice cultivation.
- j. Under organic farming practices in rice based cropping systems a very high rice equivalent yield of 18t/ha per annum is possible. \

- k. Pepper is incompatible with sapota, *Casuarina*, coffee, rubber, *Gliricidia*, subabul and guava. Just as *Erythrina*, trees like jack, wild jack, mango, cashew, *Bombax*, portia, neem and teak are good standards for trailing pepper.

Vermicompost compost output was significantly reduced on using leaf loppings of *Ailanthus*, cashew, jack, neem and tamarind. Leaf loppings of *Bombax*, guava, *Macaranga* and *Casuarina* when used as substrate, resulted in significantly higher compost output than the control in which banana p

1. Details of research projects:

i. Completed projects during 2008-2009

1. Nutrient budgeting, biomass recycling, microbial dynamic and disease mapping in integrated farming systems of Wynad district.

Extension Programmes

a. Highlights of extension activities:

As part of the Rice Mission classes were handled in farmer's field.

Chingam Onnu, the first day of the Malayalam year, was commemorated by conducting awareness programmes of various aspects of agriculture. Nelkathiru was sold to various temples including Sree Padmanaba Temple and Attukal Devi Temple and individuals.

1. Training for farmers as part of *Integrated Rice Development Programme* at
 - Pullampara and Uzhamalakkal panchayats on 06-10-2009
 - Kizhuvillum and Azhoor panchayats on 22-9-2008
 - 2 trainings in Pulimath panchayat on 23-9-2008
 - Nagaroor and Karavaram panchayats on 25-9-2008
 - Kallambalam (2 nos.) and Madavur (2nos.) panchayats on 27-9-2008
 - Elakamon and Edava panchayats on 17-9-2008
 - Navaikulam panchayat on 20-10-2008
2. Class for farmers on Integrated Farming Systems at Mitraniketan, Vellanadu on 13-11-2008
3. Field Visit as member of Thiruvananthapuram District Award Committee from 22-24 November 2008.
4. Class for Officers of State Agricultural and allied departments on "Agroforestry in Watershed" on 25-11-2008.
5. Thiruvananthapuram District Interphase. Handled a session on Integrated Farming class for Agricultural Officers on 28-11-2008.
6. Training for farmers at Ooruttuambalam in seminar organized by Indian Potash Ltd. on 19-1-2008.

List of publication:

1. Jacob, J., Sreekumar, K.M. and Rekha, P. (2007). Allelopathic effects of leaf leachates of multipurpose trees on vegetables. *Allelopathy Journal* 19 (1): 507- 516
2. Jacob, J. (2007). The Home Gardens of Kerala-Its Biodiversity and Sustainable Utilization. Lead Paper (Invited) in Seminar on Biodiversity Major Challenges for conservation and sustainable utilization organized by Kerala Biodiversity Board at Thiruvananthapuram on 22 May 2007.
3. Jacob, J., Kuruvilla Varughese, Rani, B. and Vijayan, M. (2007). Integrated Nutrient Management For Sustained Soil Health In Rice Based Cropping Systems. In National Workshop on Fertility Evaluation for Soil Health

- Management from 11-13 September at Thiruvananthapuram. Organised by Department of State Soil Survey Organisation, Kerala.
4. Jacob, J., Leela, N.K., Sreekumar, K.M., Anesh, R.Y. and Hema, M. (2007). Phytotoxicity of leaf extracts of multipurpose trees against insect pests in bitter gourd (*Momordica charantia*) and brinjal (*Solanum melongena*). *Allelopathy Journal* 20 (2): 411-418
 5. Jacob, J. (2008). Analysis and development of integrated farming systems-A holistic and farmer participatory approach. In: *Abstracts International Conference on Sustainable Agriculture* (Eds.Mini, C. and Thomas, P.R.), pp.46, Kottayam: CMS College
 6. Jacob, J. (2008). Allelopathic inhibition of polypathogenic fungi by leaf extract of casuarina (*Casuarina equisetifolia*). In: *Abstracts International Conference on Sustainable Agriculture* (Eds.Mini, C. and Thomas, P.R.), pp.47., Kottayam: CMS College
 7. Jacob, J. (2008). Phytochemical based studies to assess allelopathic compatibility of trees and fodder guinea grass in tropical integrated homestead farming systems. In: *Abstracts International Conference on Sustainable Agriculture* (Eds.Mini,C.and Thomas, P.R.), pp.9, Kottayam: CMS College
 8. Jacob, J., Krishnamurthy, K.S., Sreekumar, K.M. and Anesh, R.Y. (2008). Potential of leaf leachates of multipurpose trees for managing insect pests in bitter gourd. In: *Proceedings 20th Kerala Science Congress* (Ed.Yesodharan, E.P.) pp.163-165, Thiruvananthapuram, Kerala: Kerala State Council for Science, Technology and Environment
 9. Jacob, J., Geetha, V. and Anila B.N. (2008). Nutrient return through leaf litter of multipurpose trees in home gardens of Kerala. In: *Proceedings 20th Kerala Science Congress* (Ed.Yesodharan, E.P.) pp.203-205, Thiruvananthapuram, Kerala: Kerala State Council for Science, Technology and Environment
 10. Kuruville Varughese., Jacob, J., Rani, B. and Vijayan, M. (2007). Sustainable management of paddy fields in wetland ecosystem of Kerala. In: *Proceedings Kerala Environment Congress 2007* held at Thiruvananthapuram during 8-10 May 2007 pp.241-248. Organized by Centre for Environment and Development.
 11. Kuruville Varughese, Rani, B., John, J. and Vijayan, M. (2008). Productivity of organic farming practice in cucumber under rice based cropping systems. In: *Proceedings 20th Kerala Science Congress* (Ed.Yesodharan, E.P.) pp.241-242, Thiruvananthapuram, Kerala: Kerala State Council for Science, Technology and Environment
 12. Thomas Mathew and Kuruville Varughese. 2007. Effect of various nutrients on physio- chemical and biological properties of soil in sugar agro ecosystems.

Finance 2008-09

Head	Expenditure	Receipts
Non-Plan	34,76,500	
Plan	72,05,810	
ICAR	28,58,531	
Other EAPs	7,44,521	
Revolving Fund	61,033	1,83,388
GF	-	3,20,904

**FARMING SYSTEMS RESEARCH STATION
SADANANDAPURAM, KOTTARAKKARA**

Name of Head of the Station : Dr. S. Regeena

List of publications

Scientific papers :

1. Binisam, Kathirvel. K (2008). Assessment of postural discomfort during power tiller operation . Agricultural Machanization in Asia, Africa and latin America. 39 (1) 14- 18.
2. Binisam, Kathirval. K (2009).Development and evaluation of vibration isolators for reducing land transmitted vibration of walking and riding type power tillers. Biosystems Engineering. (ELSEVIER). Available on line.
3. Aparna. B and Rajendran. P. (2008). Impact of xenobiotics on the activities of major soil enzymes under rice ecosystem. – Accepted in Soil Biology & Biochemistry

Sale of seeds & planting materials

	Crops/Varieties	Production (No./kg)	Receipt (Rs)
1.	Coconut seedlings	1931	57930
2.	Cashew graft	2383	47660
3.	Jack graft	705	26030
	Jack Graft (Spl)	330	16500
4.	Mango graft	933	27990
5.	Pepper cuttings	2433	4866
	Karimunda	575	1150
6.	Guava & Cherry layer	167	2910
7.	Small ornamental plants(10)	856	8560
8.	Big ornamental plants (100)	14 nos.	1400
9.	Bud rose (20)	44	880
11.	Big Palm(100)	2 nos.	200
12.	Sapota graft	401	14980
13.	Teak seedling	1495	10465
14.	Vegetable seeds		
	Amaranthus (kg)	2.00	1800
	Amaranthus (pkt)	1055	10550
	Cowpea (kg)	1.3 kg	1560
	Cowpea (pkt)	2417	24170
	Snake gourd(kg)	21	31080
	Snake gourd(pkt)	1223	12230
	Bitter gourd(pkt)	3022	30220
	Bitter gourd(kg)	9.85	19600
	Chilli seeds(pkt)	588	5880

	Bhindi seeds(pkt)	891	8910
	Bhindi seeds (kg)	0.8	720
	Brinjal seeds (pkt)	72	720
	Cucumber (pkt)	78	780
15	Kuttimulla	8	64
16	Ixora	13	195
17	Coccinea (Koval)	208	2080
18	Nendran sucker	70	464
	Banana (Ordinary) sucker	15	150
19	Pathimugham	42	420
20	Cinnamon	14	140
22	Luvluvi layer	47	940
	Total		375174

B. Sale of farm produce

II	Sale of farm produce				
1	Jack fruit (kg)			220	110.5
2	Jack fruit (Spl)			425	425.5
3	Guava (kg)			12.5	62.5
4	Ivy gourd (kg)			61.5	308
5	Banana Nendran (kg)			212	2544
6	Banana njalipoovan (kg)			1155.75	16180.5
7	Banana Ordinary(kg)			224	1792
8	Red Banana			155	2170
9	Vermicompost (kg)			88	528
10	Earth worms (No.)			13116	8743
11	Goat (Female) -kg			91.5	7778
12	Goat (male) -kg			51.5	4120
13	Black pepper (kg)			59.5	8092
14	Cashew nut (kg)			261	8483
15	Mango (kg)			13	130
16	Bread fruit (kg)			88	431
17	Coconut- 1 st quality			5045	30534
	Second quality			672	2230
	Barren nuts			198	97
	Tender coconut			23	184
18	Rubber sheet			4978.4	466566
	Scrap rubber			344	25030
19	Amaranthus			206	1236
21	EFY (kg)			52	780.00
22	Dioscorea			26	260.00

23	Colocasia(Kg)			6	120.00
26	Coconut fronds			710	710.00
27	Cucumber (veg)(kg)			12	60.00
28	Snake gourd (Veg)(kg)			15	90.00
29	Tapioca(kg)			145	580.00
30	Enriched vermicompost(kg)				6120.00
	Sub Total				596691
	GRAND TOTAL				971865

14. Other details if any

Extent and quality of interaction

The station is having linkages with organizations like Departments of Agriculture, Animal Husbandry, Social Welfare, Forestry, Soil Conservation, NABARD, Extension Training Centre, PASSS, KHDP, NGOs, Farmer's organisations, Agricultural and Rural Development Banks, etc. by way of trainings, supply of inputs, advisory services, implementation of various schemes, consultancy and various other activities. The scientists of the station participated in the seminars organised by the Department of Agriculture, nationalized banks and NGO's of the districts and effectively disseminated technical know-how to farmers and extension functionaries.

The clientele for training include Assistant Directors and Officers of the Department of Agriculture, Veterinary Officers, Mitrakisans of NWDPR, Volunteers of Nehru Yuvak Kendra and unemployed youths of Kollam district.

Farm Advisory Service is being catered to the agricultural needs of the farmers of Kollam district on matters relating to the fertilizer application, weed control and diseases/pests of various crops like vegetables, banana, coconut, arecanut, pepper etc. The scientists of the station visit farmer's fields periodically and offered technical advice to the farmers.

Other activities

1. Revolving fund scheme

Providing good quality seeds and seedlings is one of the testing and verification functions of the station. Nursery development programme was initiated during 1991 and further strengthened using a revolving fund of Rs 1.5 lakhs provided during the year 1993-94 and is still in operation. The emphasis is on production and distribution of seedlings of coconut, fruit plants and spice trees.

2. Vegetable seed production

A vegetable seed production programme was started during 1994 and is in full swing only from 1996. The seeds are distributed to the farmers through the sales counter. Quality seeds of Bhindi, Bittergourd, Snake gourd, Amaranthus,

3. Production of planting materials and seeds

Sales of seeds, grafts and ornamental plants contribute the major share of farm revenue. Under the vegetable seeds multiplication programme, improved varieties of

amaranthus, okra, cucurbitaceous vegetables, chilli, brinjal etc. were produced and distributed to the farmers. Besides this, the ornamental foliage and flowering plants, cashew grafts, mango grafts, jack grafts, pepper cuttings, banana suckers etc. were produced for sale. In order to supply elite planting materials, a progeny orchard is maintained here.

4. Soil Testing Unit

Steps have been initiated and preliminary works have been carried out for testing the soil samples in the nearby locality on payment basis.

5. Livestock Unit

Livestock components comprising of Goat unit are maintained at the station and the sales of kids is also effected.

6. Vermicompost production unit

A vermicompost production unit is in operation from where earthworms as well as vermicompost in excess are made available to the farmers. Besides sales of enriched compost is also being undertaken here at the station @ Rs 10/kg

7. Rapid propagation unit for pepper

The unit was established during 1999 for producing good quality pepper cuttings. Quality pepper cuttings of varieties of Kerala Agricultural university (Viz. Panniyur 1-7 , Karimunda) are sold in the station.

15. Finance 2008 – 09

Head	Expenditure (Rs)	Receipts (Rs)
Non-Plan	4510019	626456
Plan	122380	-
ICAR	-	-
Other EAPs	2007937	
Revolving Fund	175561	294891

(* Rs.1,46,000 of Revolving fund has been transferred to The Comptroller)
Rs 6,22,000 has been transferred to The Comptroller from Farm revenue (Non plan)

ECF UNIT, SADANANDAPURAM

Name of Head of Station : Dr. Thomas Mathew

Research Programmes

a. Major Research Achievements (highlights)

- 1) Balanced nutrition with major nutrients is highly required for maintaining the productivity of rice and soil health. NPK application at 90:45:45 kg ha⁻¹ is found to be ideal for getting maximum grain & straw yield for medium duration varieties. The indiscriminate use of pesticides can be reduced through balanced nutrition and maintaining the soil health. Also avoiding the misuse and abuse of chemical fertilizers.
- 2) The most important constraint in the productivity of rice was found to be the optimum plant density and it was followed by application of Organic manure.
- 3) The rice fallows in summer season can be diversified and intensified with vegetables where there is assured irrigation. Among the vegetables evaluated Rice-Rice-Yard long bean had recorded maximum gross income and net returns to the tune of five to six times than Rice-Rice-fallow double cropping system.
- 4) Popularization of sesamum varieties released from O.R.A.R.S. through Front Line Demonstration trials in the sesamum growing tracts of Onattukara in summer rice fallows.
- 5) Pilot studies on coconut based integrated farming system has been undertaken for increasing the productivity and net return of the system.

Extension Programme

a) Highlights of extension activities

Date	Place of Visit	Name of Training Imparted
24-4-2008	Gandhi Smaraka Grama Seva Kendram, SL Puram, Alleppy	Problems of Agricultural sector in Kuttanad and Onattukara
6-5-2008	RATTC, Kozha,	Production technology of Banana and tuber crops held at Kanjjirappally block
16-6-2008	RATTC, Kozha, SHM, Kottayam	Recent trends in the production of Banana and other fruit crops
25-7-2008	RATTC, Kozha, SHM, Kottayam	Product diversification and value addition in pepper, ginger and turmeric
17-8-2008	Arattupuzha Krishibhavan	Major constraints in the productivity of coconut in Kerala in connection with Chingam 1
16-9-2008	RATTC, Kozha, SHM, Kottayam	Problems and prospects of tuber cultivation in Kerala
18-10-2008	RATTC, Kozha, SHM, Kottayam	Organic production and management of banana in Kerala

14-11-2008	RATTC, Kozha, SHM, Kottayam	Product diversification and value addition in spices
18-11-2008	RATTC, Kozha, SHM, Kottayam	Integrated pest management in vegetables
11-12-2008	KVK Sadanandapuram	Acted as moderator in the preparation of Agricultural development plan for Chettimala block organized by State Planning Board and KVK Sadanandapuram
15-12-2008	RATTC, Kozha, Kottayam	INM & IPM in vegetable
16-12-2008	Vazhoor Block, Dept. of Agriculture Kottayam,	Organic farming and marketing of organic produce
19-12-2008	Pampady Block, Kottayam	IPM in vegetable production
20-12-2008	CADA, Kottarakkara	Recent trends in Banana cultivation for better returns
21-12-2008	Kottiyam District Planning Board, Kollam	Presented a paper entitled "Technology support for Agriculture" in Kollam District sponsored by State Planning Board
23-1-2009	RATTC, Kozha, Kottayam	Post harvest technology of spice crops in Kerala
24-1-2009	Veliyam Krishi Bhavan	Rice intensification and production technologies
12-2-2009	RATTC, Kozha, Kottayam	Vegetable production
20.2.2009	RATTC, Kozha, Kottayam	Production technologies of Coconut and Cashew in Kerala
11-3-2009	RATTC, Kozha, Kottayam	Organic farming and organic certification
18-3-2009	RATTC, Kozha, Kottayam	Tubercrop production

List of Publications :

Scientific papers :

1. Thomas Mathew and Kuruvila Varughese.2008. Effect of methods of irrigation and trash mulching on biophysico-chemical environs of soils in sugarcane agro eco system. Sugar Tech 10(4): 308-313.
2. Thomas Mathew and Kuruvila Varughese.2008. Technology support for Agriculture in Kollam District. Paper presented in the State Planning Board meeting held at Kollam.

Popular articles :

1. Rajamohan. V.J. 2009. Ellukrishiyum paricharanamurayum. Kesary, Karshikarangam. January-25.
2. Rajamohan. V.J. 2009. Cheerakrishiyum shradhikkenda kaaryangalum. Kesary, Karshikarangam. February-8.
3. Rajamohan. V.J. 2009. Kumbhathile chena kudam pole. Kesary, Karshikarangam. March-1.

4. Rajamohan. V.J. 2009. Vendakkayude oushadhapradhanyavum krishircethium. Kesary, Karshikarangam. March-29.
5. Rajamohan. V.J. 2009. Payarukrishiyyum paricharanamurayum. Kesary, Karshikarangam. April-12.
6. Rajamohan. V.J. 2009. Maracheeni krishiyyum bhakshyasurakshayum. Kesary, Karshikarangam. May-3.
7. Rajamohan. V.J. 2009. Makkale pottatha chembu. Kesary, Karshikarangam. May-10.
8. Rajamohan. V.J. 2009. Sareerate kshayippikkunna kaachil. Kesary, Karshikarangam. May-24.
9. Rajamohan. V.J. 2009. Koon krishiyude praadhaanyam. Kesary, Karshikarangam. June-7.

Finance 2008 -2009

Head	Expenditure	Receipts
Non Plan	-	-
Plan	-	-
ICAR – 318-31-6639	28,00,326	Nil
ICAR – 318-31-7721	10,000	Nil
Revolving Fund	Nil	Nil

SOIL CONSERVATION RESEARCH STATION

KONNI

Name of Head of the Station :Dr. Noble Abraham

Research programmes

a. Major research achievements (highlight)

The River flow details pertaining to Achenkovil River for the period 1978 to 2006 at the river gauging station Thomason were collected. As there is no major flow regulation structures in this river the discharge is mainly dependant upon the rainfall pattern. The annual river discharge from June to May and cumulative rainfall for the corresponding months were analyzed. It was found that the flow was minimum in the year 2002-2003 which was corresponding to the lowest rainfall of the decade. The flow was only 551M m³ corresponding to an annual rainfall of 1822.4mm (June 2002- May 2003). The next lowest flow was observed in 1982-83 and it was 622.5 M m³. The highest discharge during the period 95 to 2006 was observed in 1998-99 (1528Mm³) corresponding to a rainfall of 4000mm.

In 2000-2001 the rain in the months Nov 2000 to Mar 2001 was equally distributed. The lean flow Jan- April was highest during that year ie71Mm³. In the year 2001-2002 during the months Dec, Jan and Feb the rainfall was comparatively less ie below 50mm. Though there was normal rain in March and April the lean flow was only 11.59 Mm³. In the year 2002-2003 lean flow was 10.55Mm³. During that period there were normal rain in February, March and April and no rain in the month December and January.

The water balance study shows that From December onwards the rainfall is not sufficient to meet the potential evapotranspiration and therefore the moisture is drawn from the moisture reserves in the soil or ground water aquifer. In addition to that the domestic water requirement is also met from the ground water reserve. The summer rains are not sufficient to recharge ground water reserves. These factors show that the lean flow in river Achenkovil is decided by the volume of ground water exploited in the midland and highland portion of the catchments.

An amount of 0.5 Mm³ water is being pumped from this river per month under different water supply schemes. When we consider the months Jan to April like the year 2004-2005 the total discharge was 6.04 Mm³ and the pumping requirement was 2Mm³. That is 33% of the total flow was pumped for different water supply schemes.

When we consider the change in land use pattern we find an increase in area under rubber over the years. Though the area under rubber crop in Pathanamthitta district increased from 12080 ha in 1995 to 21000 in 2006, a significant change in discharge is not observed with the increase in rubber cultivated area.

The analysis of river flow, rainfall and cultivation pattern shows that the lean flow and ground water storage in Achenkovil basin is not sufficient to meet the water requirement of the area. Effective measures need to be adopted to maintain the lean flow in Achencovil River by adopting water harvesting methods and constructing storage structures.

Farm Advisory Services

In person	Over telephone	Through letters
7	16	2

List of publications

Scientific papers : Soil and water conservation aspects under zero tillage cultivation practices on hill slopes in humid tropics, International conference on Sustainable Agriculture, CMS College Kottayam, Feb 2008

Finance 2008-09

Head	Expenditure	Receipts
Non- Plan	-	-
Plan	2461094	
ICAR		
Other EAPs	41302	
Revolving Fund	-	-

CENTRAL ZONE

REGIONAL AGRICULTURAL RESEARCH STATION PATTAMBI

Name of Head of the Station : Dr.Pathummal Beevi

Research programmes:

a. Major research achievements (Highlights – Attach photographs of salient findings)

Plant Breeding

- Sixty three accessions of short, medium and long duration group which have been maintained *in situ* were characterized and catalogued during 2008 -09. These were deposited in Long Term Storage at NBPGR, Thrissur during 2009. The accessions include one variety, thirty-three traditional varieties and twelve cultures raised in *kharif*, 2008 and 17 traditional rice varieties raised in *rabi*, 2008 -2009 collected from various parts of Kerala and other states of India
- Selections from TRV 14-1 and photo-period sensitive traditional rice varieties viz., Makaram (Selections 1 to 4), Kochumundon (Selections 1 to 4), Munda (Selection 1 to 4), Mundakakutty (1,3,4,5), Konna (Selections 1 to 4) and Chuvannachettadi Sel -1 are being characterized for further evaluation and development of mutants aiming to evolve non lodging dwarf or semi tall varieties of the important popular tall *indica* varieties of Kerala. Breeder seed and Foundation seed of *Anashwara* (Ptb 58) developed and released under this programme have been distributed from the station for large scale multiplication.
- Varietal combination Swarnaprabha + Makaram followed by C3-2KM + Makaram were identified to be consistent in their performance in Kootumundakan for over five years. Replicated trials with C3-2 KM and Swarnaprabha as the 1st crop component and Makaram Selections 1 to 4 as 2nd crop component have been laid out in *kharif*, 2008. The grain and straw yield realized from the 1st and 2nd crop components showed that the combination C3-2Km – Makaram Sel -1 followed by the combination Swarnaprabha – Makaram Sel -3 out-yielded all other combinations with respect to grain yield.

AICRIP Trials

In the various trials under the co-ordinated programme of AICRIP during *kharif*, 2008 the top ranking entries with desirable attributes suited to our cropping system were identified and selected for incorporation in the future breeding programme in the station. A replicated trial was laid out to evaluate the performance of the best entries selected over different years from various AICRIP trials and the results indicated that IET Entry 16636 followed by entry IET 17844 out-yielded all other entries with respect to grain yield.

APEDA project on aromatic rice : The trial was conducted as a net work programme with 9 entries as test material along with BPT 5204. Pusa Basmahi was the best yielder. The quality parameters will be tested by DRR, Hyderabad.

- Seed multiplication of Culture C3-2KM and characterization of this Culture as per DUS Test was done during *rabi*, 2008-09. The F1s from crosses made between photoperiod sensitive second crop varieties and popular photoperiod insensitive varieties during *rabi*, 2006-2007 have been raised during *rabi*, 2008-09 for further evaluation.

- The F1s from crosses made between photoperiod sensitive second crop varieties and popular photoperiod insensitive varieties in *rabi*, 2006-2007 have been raised during *rabi*, 2008-09 for further evaluation. Pure line selections (PLS 1 to 4) made from Variety Makaram in *rabi*, 2006-07 were evaluated for their performance in the Kootumundakan system. These are being characterized in *rabi*, 2008 -09.
- Promising cultures identified to exhibit relatively high pest and disease tolerance during 2006-07, *kharif*, 2007 and also multiple resistant under AICRIP National testing programme in 2007 -2008 were evaluated along with varieties Kanchana and Aiswarya during *kharif*, 2008 as replicated station trial
- Seed multiplication of Culture Swarnaprabha sln 3-1 and characterization of this Culture as per DUS Test was done during *kharif*, 2008.
- Superior Cultures 9401-2, 9409-12 with medium stature, good, compact, sturdy plant habit and having pest and disease tolerance were identified under this study during 2006 -07. The next best entries Cultures 9401-2, 9409-12, 9409-6 were multiplied and evaluated under mechanized planting and harvesting system during *rabi*, 2007 and *kharif*, 2008. Culture 9409-12 followed by Cultures 9401-2 out-yielded all other entries with respect to grain yield.
- Seed multiplication and characterization of Navara collections as per DUS Test was done during *rabi*, 2008. TRV 2207 followed by TRV 2092 out-yielded all other entries with respect to grain yield. Ear to row purification of entries will be done during 2009.

Seed Technology Unit

- The seed quality of 464 samples submitted by the Dept. of Agriculture and Seed production centres of the University were analysed during 2008 -2009.

National Seed Project

- A trial was carried out with seed samples obtained from State Seed Testing Laboratory (SSTL) operating at the station in order to find out the relationship of ODV identified by Seed Testing Laboratory (STL) personnels with that of off-types in Grow Out Test (GOT). 100 per cent of seeds identified as ODV (Uma) in SSTL were confirmed to be ODV's in the GOT conducted. This confirmed the utility of ODV identification as a pointer towards genetic purity in seed quality testing.

SRI trial was conducted with variety Annapoorna by planting seedlings aged 10, 15 and 20 days old both under SRI at spacing 20 cm x 15 cm, 20 x 20 cm and 25 x 25 cm and at 30 x 30 cm and conventional planting system at spacing (20 x 20 cm) replicated thrice. Results indicate that the performance of variety Annapoorna under SRI with spacing 20 x 15 cm of 20 days old seedlings was superior in grain yield followed by 15 days old seedlings with same spacing to all other treatments under SRI system and conventional method. Results also indicate that SRI with spacing 20 x 15 cm of 20 days old seedlings was superior in straw yield followed by 20 x 20 cm spacing of the same age seedlings of SRI to all other treatments under SRI system and conventional method.

- An experiment was conducted with paddy variety – Jyothy with the objective of determining the effect of ambient conditions on seed quality, subsequent to storage under air-conditioned system with low temperature (18-20° C) and low relative humidity conditions. The trial has been initiated with seeds produced during both *kharif*, 06 and *rabi*, 06-07. Results indicate that paddy seed stored in jute bags under air-conditioned store retain their viability for a period of two months after they are removed from the air-

conditioned environment and then stored under ambient conditions. However seeds stored in Poly –lined jute bags under air-conditioned store retain their viability for a period of four months, after they are removed from the air-conditioned environment and then stored under ambient conditions.

- An experiment was conducted with paddy varieties –Jyothy, Jaya, Kanchana, Varsha, Aiswarya and Annapoorna with the objective of studying the varietal response to storage under air-conditioned system with low temperature (18-20⁰ C) and low relative humidity conditions. Results indicate that paddy seed of varieties Kanchana followed by Annapoorna and Jaya and Jyothi stored in poly-lined jute bags under air-conditioned store retain their viability for a period for a longer period compared to Aiswarya and Varsha. Seeds stored in jute bags exhibited poor viability compared to that in HDPE bags and poly-lined jute bags both under conditioned and ambient environment.
- A total of 90.75 quintals of Breeder seed of various HYV's popular in the state is produced for distribution for multiplication in the seed production chain during 2008 – 2009
- ICAR Mega Seed Project: A total of 70.00 tonnes of quality seed (variety Jyothy, Aiswarya , Aathira, Makaram, Matta Triveni, Uma) was processed and about 40.0 tonnes of seed is going to be processed during 2008-2009 under this programme involving 60 farmers from various parts of Palakkad and Thrissur dts. The rate of seed procurement was enhanced from Rs.13/kg to Rs.14/Kg in October, 2008. A team of 6 was constituted and trained intensively to undertake rouging of seed crop in farmers' field to maintain the purity standards of the seed production programme.

Plant Physiology

AICRIP Trials

- Studies on photothermic indexing was done with 20 entries planted at 28 days interval. By delaying sowings, the number of days taken to attain panicle initiation stage was reduced by 2 to 6 days while the flowering and grain filling (ripening) period were reduced by 2- 14 days and 2-13 days respectively except IET 20312 (2 days less required for panicle initiation stage and 2 days more required for flowering and maturity period)
- Studies on radiation use efficiency was done in 81 entries including Aiswarya as local check . IET 20998, IET 20981, IET 21032 and IET 21005 recorded 3270 kg, 3140 kg 3080 kg and 3010 kg respectively whereas Aiswarya recorded 2690 kg per hectare as local check
- Five entries at four nitrogen levels were evaluated to study the nitrogen use efficiency. The number of secondary branches may be improved by management practices and is largely governed by environment whereas primary branches are determined by genetic back ground of the cultivar. Higher nitrogen level (200kg/ha) effect was either marginal or in most cases a negative response beyond 100 kg/ha level due to other factors involved like pest or disease incidence or tendency towards lodging
- The study conducted in seven aerobic rice entries including hybrids and varieties with local checks Aiswarya and Swarna Prabha Selection -3-1 with alternate weekly wetting and drying cycles, starting from 15 days after planting through maturity whereas normal irrigation served as control. Among the entries tested, PHB 71 recorded fifteen per cent more grain yield followed by swarna Prabha Sel-3-1 and Naveen whereas other entries showed negative response under aerobic conditions. Straw yield was significantly

increased i.e., thirty three per cent more in Aiswarya (control) followed by PA 6201 and PHB 71 and Naveen recorded 10 to 15 % more straw yield under aerobic conditions .

Crop Management

Agronomy

- A trial was conducted with organic sources applied along with inorganic fertilizers. FYM and green manure crops raised along with NPK fertilizers increased rice yield. Residual crops raised during *rabi* recorded higher yield in plots receiving FYM @ 10t/ha than green manure. Trial indicated that the application of organic manures either as FYM or green manure is good for higher yield and restoring soil fertility in acidic sandy loam soils.
- A trial was conducted with different soil ameliorants like lime, silica and FYM along with NPK in acid lateritic rice soils. There was no significant difference in yield among the different treatments. However 14 – 16% increase in yield was recorded in ameliorant applied plots compared to control.
- Five different weed control treatments were tried along with three N levels on rice yield. The yield was significantly influenced by weed control treatment when compared to control. Similarly N levels increased yield of upland rice. Application of Pendimethalin as pre emergent herbicide with either daincha or cowpea or mechanical weeding was found to be the best. More than 65% yield reduction was noticed in unweeded control plots.
- In order to find out the production potential of different elite cultures of rice obtained from Advanced Varietal Trial – at various levels of N, experiments were conducted during *kharif*, season. The trials revealed that cultures IET 19569, PR 113 NWR, IET – 19140, IET – 19746, IET – 19749 and IET 19766 yielded the best. Graded levels of N showed better growth and establishment but did not influence the grain yield significantly.

Soil Science & Agrl. Chemistry

- PMT (Tall indica) has completed 48 years and PMT (Dwarf indica) has completed 36 years of experimentation. In permanent manurial trial, during last year, irrespective of the season, maximum grain and straw yield were obtained for the integrated use of fertilizers and cattle manure. Continuous application of nitrogenous fertilizer alone or inorganic fertilizers alone were found to have detrimental effect on the growth and yield of rice. Lowest yield was obtained for Ammonium sulphate alone (N alone) treatment.
- The long term fertiliser evaluation completed 12 years. The effect of treatment on yield and soil fertility parameters showed that in both the seasons, highest grain and straw yield were recorded by the treatment which received 100%NPK (as per POP of KAU) along with FYM @5t/ha. However this was on par with treatment receiving (100% NPK *+in situ* growing of *Sesbania aculeate* green manure crop.) Lowest yield was recorded by absolute control. The effect on nutrient uptake followed the same trend as in yield .The uptake of N,P,Ca & Mg was higher for treatment 100%NPK (as per POP of KAU) along with FYM @5t/h. With respect to the soil pH, no significant variation was made by the treatments after *kharif*. In the treatment where continuous addition of inorganic fertilizers alone were there, a slight decline in organic carbon content compared to other treatments were observed. Generally the soil organic carbon content is in the high range. The high organic matter content may be due to the degeneration of roots and incorporation of stubbles after each harvest. The status of P and K after *kharif* season was almost in the medium and low range respectively.

Crop Protection

Entomology

Screening experiments

- *National screening nursery*: During the period 622 entries were screened for resistance for major rice pests. Among them 11 entries exhibited complete resistance to thrips with a score of '0' while 129 entries exhibited moderate resistance with a score of '1'. Against stem borer four entries IET20693, 20341, 20479, 21059, 21060 exhibited complete resistance. Eleven entries showed complete resistance while two entries showed moderate resistance to gallmidge. Entries IET 19462, 26062, 21136 and IET20686, 20688 showed moderate resistance to whorlmaggot and blue beetle.
- *Gallmidge screening nursery*: 80 entries were screened for resistance against gallmidge. Among them three entries JGL 16267, RP 4683-32-1-684 and SKC 23-52-03 exhibited complete resistance.
- *Gallmidge biotype studies*: In the study 17 entries were tested under six sets of differentials which showed 2.61, 2.56, 0.00, 16.40, 13.54 & 28.95 per cent damage giving R-R-R-S-S-S pattern indicating the presence of biotype 5.

Insecticides Evaluation trial:

- *Rabi'08*: During the period three new chemicals, Bifenthrin 10 EC @ 50 g a.i./ha, Rynaxypr+ Thiomethoxam and Pymetrozine 50WG at three different doses viz., 40, 50, 60 g a.i./ha and 100,125, 150 g a.i./ha were tested with monocrotophos @ 500 g a.i./ha as check with an untreated control. The results showed that all the new insecticides tested were equally effective with check insecticide against dead heart and white ear caused by stem borer as well as whorlmaggot. For blue beetle, Rynaxypr+ Thiomethoxam @ 50 g a.i./ha treated plots showed least damage. In case of grain yield there was no significant difference in treatments.
- *Kharif'08*: During the period three new chemicals, Flubendiamide 36% + Fipronil 30% @ 33 a.i./ha, Flubendiamide 39.35% SC @ 25 a.i./ha and Fipronil 5% SC @ 50 a.i./ha were tested with monocrotophos @ 500 g a.i./ha as check with an untreated control. The results showed that among the new insecticides tested, Flubendiamide 39.35% SC @ 25 a.i./ha were effective and superior over check insecticide against dead heart caused by stem borer. In early stages the other two insecticides were effective against dead heart caused by stem borer. None of the insecticides were effective against white ear caused by stem borer and blue beetle. For whorlmaggot all the treated insecticides were equally effective with check insecticides. In case of grain yield, all the insecticides treated plots showed higher grain yield in comparison to untreated plots.

Pesticides compatibility trial

- In this trial, new insecticides flubendiamide 20 WDG @ 0.25 g /litre, spinosad 45 SC @ 0.25 g /litre and two fungicides Isoprothiolane @ 1.5 ml/litre and carpropamid @ 1ml/litre alone as well as in combination were evaluated against major rice pests and blast of rice.
- *Rabi'08*: During the period, insecticides alone as well as in combination were effective against dead heart caused by the stem borer. For white ear damage flubendiamide alone as well as in combination with isoprothiolane were effective. For whorlmaggot all the treatments were effective over untreated control. For caseworm the two insecticides and two fungicides combinations were effective than insecticides alone. There was no significant difference among the treatments in grain yield per plots. The scoring of blast was not done due to its low pressure.

- *Kharif'08*: During the period, insecticides alone as well as in combination were effective against dead heart caused by the stem borer while for white ear damage none of the treatments effective. For whorlmaggot and blue beetle all the insecticides treatments alone as well as in combinations were effective. There was no significant difference among the treatments in grain yield per plots. The scoring of blast was not done due to its low pressure.
- A new trial involving both normal system of cultivation (NSC) and SRI involving a normal rice variety (Jyothi) and a hybrid (CORH 2) were evaluated for occurrence of insect pests in both the systems during *rabi*, '2008. The results showed that the pink stem borer incidence was significantly higher in SRI plots (9.12 and 8.52 % DH in Jyothi and hybrid) compared to NSC (3.80 and 4.84 % DH in Jyothi and hybrid) while white ear was less in jyothi under both NSC and SRI and hybrid under SRI. Leaf folder incidence was low under NSC than SRI. There were no significant difference in blue beetle and whorlmaggot infestation in SRI and NSC. Higher grain yield was obtained from Jyothi under both SRI and NSC as well as in hybrid under SRI while yield was low in hybrid under NSC.

On-farm integrated pest management (OIPM)

- In this trial four modules viz., IPM (1): Need based application of chemical insecticides, IPM (2): Spraying with eco-neem 1% at 15, 30, 45, 60 & 75 DAT with six release of *Tricogramma japonicum* against stem borer and *T. chilonis* against leaf folder, IPM (3) : Spraying with Eco-neem 1% at 15, 45 & 75 DAT and chemical insecticides viz., cartaphydrochloride @ 500 g a.i./ha at 25 DAT & Spinosad at 60 DAT with three releases of *T. chilonis* against leaf folder and IPM (4): farmers practice was evaluated in local variety Kanchana at farmers field at Karakkad, ongallur during *rabi*'2007. The results showed that all the tested IPM modules viz., IPM (1), (2) and (3) showed less incidence of dead heart caused by stem borer while in case of white ear as well as leaf folder incidence there was no significant difference between the treatments. The blue beetle incidence was less in IPM (2), (3) and FP but high in module (1). Case worm incidence was low in module IPM (2) and IPM (3). The IPM modules (2) and (3) showed a higher grain yield of 2500 and 2567 kg/ha while yield was low in farmers plot with 1933 kg/ha. The IPM modules also showed superior cost benefit ratios (1:2.62 to 2.85) than farmers practices (1:1.94).
- The light trap data were recorded from the period of January, 2008 to December, 2008. The results showed that mean yellow stem borers catches were highest in January with 11.64 while white stem borer catches were 2.51 no's in March. Green leaf hoppers both *N. virescens* (147.90) and *N. nigropictus* (40.95) and BPH (8.86) were recorded during the month of January. Low population of gallmidge (3.43) and caseworm (5.25) were registered during the month of September while green mired bug catches (601.40), a potential predator of BPH was recorded during the month of January.

Monitoring of stem borer composition trial:

- The trial was conducted in *rabi*'2008 and it was noticed that the major species, yellow stem borer, *Scirphophaga incertulas* was dominating during the early tillering and maximum tillering phase while pink borer, *Sesamia inferens* was dominating in reproductive phase of the crop. The white stem borer, *Scirphophaga innotata* was maintaining a low status during all the stages of crop growth.
- The trial was conducted during *rabi*'2008 to find out dominance of different species of leaf folder during the different stages of crop growth. The results showed the common species, *Cnaphalocrocis medinalis* was dominating the early tillering and maximum

tillering phase while another species *Marasmia patnalis* was dominating during the reproductive stage of the crop.

- The trial was conducted during *rabi*'2008 to find out the dominance of rice bug species in rice fields of Pattambi. The results showed that the major species dominating is *Leptocorisa oratorius* and other species found were *L. acuta* and a small sized bug (Identity yet to be established).

Plant Pathology

All India Coordinated Rice Improvement Programme

- In National Screening Nursery I for sheath blight resistance (NSN1), 193 entries were screened. 13 entries showed resistance reaction to sheath blight. The National Screening Nursery II consisted of 622 entries of which 152 entries showed resistance reaction. Out of the 76 entries tested in National Hybrid Screening Nursery, 9 entries showed resistance reaction. In the Donor screening nursery, out of the 43 entries tested, 8 entries showed resistance reaction.

The reaction of ptb cultures against sheath blight: 58 rice cultures including pre release cultures and traditional varieties and 57 ptb varieties were screened for sheath blight resistance. Among these 7 cultures and 8 traditional rice varieties showed resistance reaction to sheath blight.

- In National Screening Nursery 1 for blast resistance (NSN1), 193 entries were screened. Among these 69 entries showed resistance reaction to leaf blast. The National Screening Nursery II consisted of 622 entries of which 228 entries showed resistance reaction. Out of the 76 entries tested in National Hybrid Screening Nursery, 59 entries showed resistance reaction. In the Donor screening nursery, out of the 43 entries tested 30 entries showed resistance reaction.

The reaction of ptb cultures against leaf blast : 58 rice cultures including pre release cultures and traditional varieties and 57 ptb varieties were screened. Among these 8 cultures and 4 traditional rice varieties showed resistance reaction to leaf blast

- In National Screening Nursery 1 for bacterial blight resistance (NSN1), 193 entries were screened. 52 entries showed resistance reaction. The National Screening Nursery II consisted of 622 entries of which 228 entries showed resistance reaction. Out of the 76 entries tested in National Hybrid Screening Nursery, 20 entries showed resistance reaction. In the Donor screening nursery, out of the 43 entries tested 9 entries showed resistance reaction.

The reaction of ptb cultures against bacterial leaf blight : 58 rice cultures including pre release cultures and traditional varieties and 57 ptb varieties were screened. Among these cultures, 4 traditional rice varieties showed resistance.

- As part of the AICRIP a production oriented survey was carried out to know the major production constraints in rice. The survey was conducted in Palakkad, Malappuram and Thrissur districts.
- Farm trials were conducted at Malappuram and Palakkad districts to test the effectiveness of Isoprothiolane (Fuji-one – 40E) against blast. The disease severity was significantly less in plots treated with isoprthiolane (20.6 %) compared to control (57.34%). Isoprothiolane was significantly superior to carbendazim and was statistically on par with tricyclazole (beam @ 0.6g/l) in controlling the disease. The yield recorded in plots treated with beam was the highest. The yield recorded in plots treated with isoprothiolane was statistically on par with the yield recorded in plots treated with beam

and were significantly superior to control and check fungicide carbendazim. The results showed that Fuji-one 40E @ 1.5ml / l was effective for controlling the disease and can be recommended for the management of blast.

- Development of eco friendly strategies for the management of major diseases and pests of rice : Among the different treatments, the plant oils lemon grass oil and cinnamon oil, the biocontrol agents *T.viride* and *P. fluorescens* were found to be effective in reducing the sheath blight severity significantly and were statistically on par with the check fungicide propiconazole.
- Bioinoculant production unit : In this unit biocontrol agents, *Pseudomonas fluorescens*, Trichoderma, Trichogramma, vermicompost and earthworms are being produced . During the year 2008-09, 1352 kg of pseudomonas 85 kg of trichoderma and 3528 cc trichocards were produced and distributed to farmers.

PULSES

- Cowpea CIVT : Fourteen entries of cowpea were tested for the yield and disease reaction during *rabi*, 08. Among them, CP-25 recorded significantly higher yield (928.55 kg/ha) with average infection to anthracnose. CP-21 recorded 868.83kg/ha and showed moderate resistance to anthracnose disease.
- Cowpea CAVT : Seven entries of cowpea were tested for the yield and disease reaction during *rabi*, 08. Among them, CP-11 recorded significantly higher yield (742.31 kg/ha) with moderate reaction to anthracnose followed by CP-12 (622.50kg/ha) and showed moderate resistance to anthracnose disease.
- Horsegram HIVT: Seven entries of horse gram were tested for the yield and disease reaction during *rabi*, 08. Among them, HG-41 recorded significantly higher yield (842.99 kg/ha) followed by HG-40 (741.04kg/ha) with no disease incidence.
- Horsegram HAVT-I : Ten entries of horse gram were tested for the yield and disease reaction during *rabi*, 08. Among them, HG-30 recorded significantly higher yield (609.18 kg/ha) followed by HG-32 (542.10 kg/ha) with no disease incidence.
- Horsegram HAVT- II : Seven entries of horse gram were tested for the yield and disease reaction during *rabi*, 08. Among them, HG-14 recorded significantly higher yield (631.53 kg/ha) followed by HG-9 (531.67kg/ha) with no disease incidence.
- Survey for the incidence of diseases in pulse crops was conducted during *rabi*, 08 in Palakkad district. The incidence of collar rot caused by *Rhizactonia solani*, mosaic caused by cowpea mosaic virus and rust caused by *Uromyces vignae* were noticed in cowpea.
- Nine varieties of cowpea viz., PC-1, PC-2, PC-3, PC-4, PC-5, PC-6, PC-7, PC-8 received from Hissar and Kanakamony from Pattambi were screened artificially in net house during *kharif*, 2008 and found that all the varieties were susceptible to anthracnose disease.
- Integrated Nutrient management in cowpea : The experiment was started during 2006 to know the response of biofertilizers under different fertility levels. Results of the study conducted during *rabi*, 08 showed that combined application of *Rhizobium* and Phosphorus solubilizing bacteria could produce a higher yield of cowpea when chemical fertilizers were not supplied and this was on par with the yield obtained at 100% recommended dose of chemical fertilizers.

- Effect of organic manure and PSB on the productivity of cowpea ; The experiment was started during 2006 to know the response of organic manure and phosphorus solubilizing bacteria (PSB) on the yield of cowpea. Results of the study conducted during *rabi*, 08 showed that effectiveness of PSB was higher when it was integrated with higher quantities of organic manure under lower levels of chemical N and this was significantly superior to the treatment with 100% recommended dose of fertilizers. Application of PSB alone as well as PSB with lower quantities of organic manure could not make any improvement in yield.
- Effect of micronutrients on cowpea : The experiment was started during 2004 to know the micronutrient requirement of cowpea. The study conducted during *rabi*, 08 showed that foliar application of micronutrients Fe and Zn could increase the yield of cowpea. The highest yield in the trial was obtained when 0.5 % ZnSO₄ was foliar sprayed at 25 DAS and this was found on par with the foliar spray of 0.5 % FeSO₄ at 25 DAS. The study also showed that soil application of ZnSO₄ @ 25 kg/ha could not improve the yield of cowpea.

HORTICULTURE

KAU projects

- Germplasm of var. Sreedhara, pre-release culture CP 74 were maintained. 600kg seed tubers of coleus variety *Nidhi* was produced.
- Five treatments with varying doses of NPK and time of application are being evaluated in coleus. One season's trial completed. There was no significant difference between the different treatments. The trial will be repeated for two more seasons.
- Tip cuttings, inter nodal cuttings and entire vine were used as planting materials at different spacing (30x15cm, 30x10cm, 15x15cm and 15x10cm) in coleus. One season's trial completed. The trial will be continued for two more seasons. Yield reduction was noticed when inter nodal cuttings were used.
- Fifteen kg seeds of ash gourd variety Indu was produced. CYT I was conducted with 20 accessions of ash gourd with three replications. Check variety used was *Indu*. Highest yield was recorded from AP 7 followed by AP 3, AP 10, AP 4 and AP 5. These accessions were tolerant to mosaic.
- CYT I with 8 selections from cross between resistant/ tolerant chilli and commercial varieties is being conducted with Anugraha and Ujwala as check varieties. Maximum yield was recorded from IRx Manjari xIR
- Tomato, chilli and amaranth were raised under rain shelter and open conditions during July-October, 2008. Results indicated that the yield of chilli and amaranth improved under rain shelter. Yield of determinate variety of tomato var. Mukthi was better under open situations.
- 74 types of pickling mangoes were planted in 2004 and performance evaluated. Two accessions flowered in the year but there was no fruit set. Four accessions were added during the year
- Participatory seed production of cowpea, ash gourd and okra being undertaken in 1.5 ha in Pattambi, Ongallur, Trithala and Vilayur.

Externally aided projects:

- Establishment of Model Unit For Production of Pineapple Planting Materials (SHM)
The objective of the project is to establish a production unit for quality planting

materials of Pineapple varieties for the region through conventional methods and Tissue culture. 10000 suckers distributed. TC plants of variety Amrutha in secondary nursery.

- Rehabilitation of Tissue culture lab for banana (SHM) : Objective of the project was to upgrade the existing facility for large scale production and distribution and distribution of virus indexed tissue culture plantlets of banana varieties. Banana varieties being produced include Attunendran, NeduNendran, Kadali and GrandNaine. Other plants under production are Anthurium and pine apple. Trainings are also being offered on “Techniques and Applications of plant tissue culture”.
- Tissue Analysis and Crop Management Advisory Facility for Horticultural Crops at Regional Agricultural Research Station, Pattambi (SHM): Objective of the project is to establish facility for analysis of soil/tissue samples and to provide nutrient management recommendations for horticultural crops based on the analysis and documentation of soil resource data for effective micro level land use planning. Civil works and procurement of equipments under the project was completed. Project was launched during July, 2008. Services offered include analysis of plant and soil samples for macro and micro nutrients and recommendations for crop management.

SOCIAL SCIENCES

Farmer Participatory Action Research Programme

The Project on Farmer Participatory Action Research Programme (FPARP) is funded by Ministry of Water Resources, Government of India. The objective of the project is to demonstrate the water use efficiency of the selected technologies in the farmer’s field covering five districts of the state. The technologies selected are 1. SRI – System of Rice Intensification 2. Micro irrigation in Coconut, Areca nut, Banana and 3. Mulching in horticultural crops. The technologies selected are demonstrated in the farmer’s field covering 5 districts namely – Palakkad, Malappuram, Thrissur, Ernakulam, and Kasargod. The project is in progress.

Extension programmes

a) Highlights of extension activities (Attach photographs of important activities)

RARS celebrated the National Science Day 2009 through conduct of Students Participatory Vegetable Production Programme with Dr.B.shanmugasundaram as Programme Co-ordinator. Five schools from Palakkad district were selected. It was planned to have a lecture followed by a demonstration on vegetable cultivation for the students and teachers of the school. Considering the vacation period and difficulty in availability of water during the summer months from March to May. It was planned to take up demonstration plots from June 2009 onwards. In order to facilitate the demonstration a small kit has been identified procured and distributed to the selected five schools. The items included in the demonstration kit are Sprayer(1.5 L), Rose can, Neem Oil, Psuedomonas, Trichoderma, Hand fork, Vegetable seed, Vermicompost, Earth worm, Demonstration board. The lecture on vegetable cultivation were given by experts From Regional Agricultural Research Station and Krishi Vigyan Kendra Pattambi. The detail of programme conducted is below

SL NO	SCHOOL SELECTED	DATE OF PROGRAMME	RESOURCE PERSON
1	L.P. School Kodallur	9/03/09	Mrs. Premalatha KVK Pattambi
2	U.P School Kilayoor	11/03/09	Mr. Rajasekhar
3	Chinmaya Vidhyalaya Anakkara	12/03/09	Dr. Raji

4	Carmel School, Kulappully.	13/03/09	Dr.Elangovan
5	Narayana Vidhyalayam, Panamanna	16/03/09	Dr. Jyothi

Publicity of National Science Day programme was given through local cable television and local dailies. A booklet covering the package of practices on vegetable cultivation was prepared and distributed to the students which will serve as a guide for the students and teachers.

List of Publications

Scientific papers

- 1.) **Karthikeyan, K** and Sosamma Jacob. 2008. Granular Insecticides Against the Incidence of Rice Blue Beetle, *Leptispa pygmaea* Baly *Indian . J. Pl. Protec .* 36(1) P : 85-88
- 2.) Pavunraj, M., Ignacimuthu, S., **Karthikeyan, K.** and Purushothaman. S.M. 2008. Antifeedant Activity of *Lippia javanica* Against Asian Army worm, *Spodoptera litura*. *Indian . J. Pl. Protec .* 36(1) P : 65-68
- 3.) **Karthikeyan, K.**, Sosamma Jacob., Purushothaman. S.M. and Smitha Revi. 2008. Bioefficacy of Phosphamidon Granules in the Management of Major Rice Pests. *Indian . J. Pl. Protec .* 36(1) P : 128-129
- 4.) **Karthikeyan, K** and Sosamma Jacob. 2008. Influence of spacing and non-edible oil cakes on the incidence of rice blue beetle (*Leptispa pygmaea* Baly) (Coleoptera : Chrysomelidae). *Indian J, Agric. Sci .* 78 (12): 1095-1098
- 5.) **Karthikeyan, K.**, Sosamma Jacob., Purushothaman. S.M. and Smitha Revi. 2008. Spinosad against major insect pests and natural enemies in rice ecosystem. *J . Biol .Control .* 22 (2) :315-320
- 6.) **Karthikeyan, K** and Sosamma Jacob. 2008. Facundity and developmental stages of Rice Blue Beetle, (*Leptispa pygmaea* Baly) (Coleoptera : Chrysomelidae) on rice varieties. *Entomon.* 33 (1): 35-40
- 7.) S.M.Purushothaman, Anitha, S, Beena, C., **Karthikeyan, K** and Balachandran, P.V. 2008. Effect of various manurial application on the incidence of brown spot of Rice , The Andhra agricultural Journal 55 (3) : 413-414
- 8.) **Karthikeyan, K** and Sosamma Jacob. 2008. Time of adult emergence and sex ratio of rice blue beetle, *Leptispa pygmaea* Baly (Coleoptera: Chrysomelidae) and extent of damage caused to two rice varieties. *Entomon.* 33 (2): 101-105
- 9.) **Karthikeyan, K** and Sosamma Jacob. 2009. Bioefficacy of white muscardine fungus, *Beauveria bassiana* (Bals.) Vuill. and entomo pathogenic nematode, *Heterorhabditis indica* (Poinar) against rice blue beetle, *Leptispa pygmaea* Baly *J . Biol .Control .* 23 (1) : 79-81
- 10.) **Karthikeyan, K.**, Sosamma Jacob and Pavunraj. M. 2007. Incidence of insect pests in the SRI and normal system of cultivation. Paper presented in the 3rd symposium on System of Rice Intensification in India held at TNAU, Coimbatore from Dec. 1- 3, 2008. p 90-91
- 11.) **Shanmugasundaram, B.** Ilangovan R., Maya, M.R. Rajitha .P.V. and Salini. P.P. 2008. UP-Scaling of SRI in Palakkad District of Kerala-Through Padasekhara Samithies. Third National Symposium on System of Rice Intensification, Tamil Nadu Agricultural University, Coimbatore, Coimbatore, Dec 1-3, 2008. p57-58
- 12.) **Shanmugasundaram, B.** and Balachandran, P.V. 2008. Geographical Indications –A new Dimension for value Addition. National Seminar on Empowering Grain Processing Sector Through Recent Technological Interventions, Chennai Trade Centre, 25-26, January 2008.

- 13.) **Purushothaman, S.M,** S.Anitha, C.Beena, and P.V. Balachandran. 2008. Effect of various manurial application on the incidence of brown spot of rice. The Andhra Agricultural Journal. 55 (3): 267 – 416
- 14.) **Purushothaman, Musthafa Kunnathadi, T.J. Rehumath Niza and K.Karthikeyan.** 2008. Management of yellow mosaic in horse gram. Abstract presented in National seminar on Advances in Plant Pathology for sustainable Agriculture held at TNAU, Coimbatore.
- 15.) **Purushothaman, S.M, Musthafa Kunnathadi, T.J. Rehumath Niza and K.Karthikeyan.** 2008. Evaluation for the performance of horsegram genotypes to powdery mildew and its effect on yield. Abstract presented in National seminar on Advances in Plant Pathology for sustainable Agriculture held at TNAU, Coimbatore.
- 16.) **Purushothaman, S.M., Musthafa Kunnathadi, T.J. Rehumath Niza and K.Karthikeyan.** 2008. Evaluation of greengram genotypes against yellow mosaic disease and its influence on yield. Abstract presented in National seminar on Advances in Plant Pathology for sustainable Agriculture held at TNAU, Coimbatore.
- 17.) **Purushothaman, S.M., Musthafa Kunnathadi, T.J. Rehumath Niza and K.Karthikeyan.** 2008. Evaluation of blackgram genotypes against rust disease and its influence on yield. Abstract presented in National seminar on Advances in Plant Pathology for sustainable Agriculture held at TNAU, Coimbatore.
- 18.) **Purushothaman, S.M., Musthafa Kunnathadi, T.J. Rehumath Niza and K.Karthikeyan.** 2008. Genotypic reaction of cowpea to powdery mildew and their effect on the yield. Abstract presented in National seminar on Advances in Plant Pathology for sustainable Agriculture held at TNAU, Coimbatore.

Technical bulletins

- 1.) A booklet on Patcha Karri Krishi was published and distributed to the School Students
- 2.) **Shanmugasundaram, B.** 2008. Farmers experiences in System of Rice Intensification- Experiences of Farmers in India (eds Biksham Gujja, Loganandhan, N. and Vinod Goud .V.) JWWF-ICRISAT Project, ICRISAT –Communication Office, Patancheru, pp 39-42
3. Ilangovan, R. Agroclimatology of Palakkad – A write up prepared and submitted to the Soil and Water Conservation Department, Palakkad

Item	Quantity	Revenue
Paddy (Jyothi) Breeder seed	30 Q	
Jyothi TLS	38 tonnes	
Aiwsarya	2565 kg	
Annapoorna	1000 kg	
Uma	15 tonnes	
Kanchana	12.6 tonnes	486465.00
Banana TC Plants	2200 Grand Naine	
Anthurium	400 plants	14880.00
Pineapple suckers	2840 Nos.	7115.00
Coleus seed tubers	800 kg.	16000.00
Tomato	700 gm.	1540.00
Croton PB	130 Nos.	1080.00
Croton Layer (SP)	40 Nos.	555.00

Clove Seedlings	50 Nos.	950.00
Chamba layer	50 Nos.	750.00
W.I Cherry layer	28 Nos.	300.00
Mango grafts	360 Nos.	9480.00
Arinelli	50 Nos.	750.00
Karimunda pepper	100 Nos.	200.00
Panniyoor 1	442 Nos.	768.00
Panniyoor 2	254 Nos.	635.00
Panniyoor 3	100 Nos.	250.00
Panniyoor 4	30 Nos.	23.00
Panniyoor 5	925 Nos.	2303.00
Bush Pepper (PB)	14 Nos.	700.00
Bush Pepper (BP)	2 Nos.	100.00
Bush Jasmin	20 Nos.	75.00
Anthurium (SP)	16 Nos.	500.00
Anthurium (BP)	22 Nos.	210.00
Anthurium	45 Nos.	200.00
Lantana (PB)	100 Nos.	500.00
Sappota graft	25 Nos.	750.00
Coleus cuttings	2870 Nos.	1435.00
Pathimugam	40 Nos.	155.00
Ixora (Lilliput)	15 Nos.	60.00
Ixora P.B.	50 Nos.	155.00
Neem	50 Nos.	200.00
Rambootan	75 Nos.	530.00
Acid lime	50 Nos.	760.00
Nelli	50 Nos.	500.00
Chempakan graft	5 Nos.	0.00
Chinese orange	25 Nos.	500.00
Sappota graft	25 Nos.	750.00
Pomegranate	75 Nos.	750.00
Plum	25 Nos.	250.00
Curry leaf	25 Nos.	120.00
Caladium	200 Nos.	935.00
Papaya	50 Nos.	235.00
Chilly (manjari)	85 Nos.	335.00
Ornamental palm	50 Nos.	280.00
Citrus layer	10 Nos.	135.00
Lantana SP	10 Nos.	80.00

Hydrangea	10 Nos.	60.00
Guava seedlings	50 Nos.	460.00
Guava layer	10 Nos.	135.00
Amaranthus (Arun)	8 kg	8000.00
Ashgourd (Indu)	0	0.00
Bitter gourd (Priya)	3 kg	5400.00
Cucumber (ML)	4 kg	6000.00
Brinjal (Haritha)	0.300 kg	360.00
Bhindi (arka)	11 kg	9900.00
Cowpea (Kanakamani)	100 kg	20000.00
Cowpea – lola	10 kg	12000.00
Seasamum (thilak)	175 kg	13125.00
Pumpkin (Ambili)	0	0.00
Pseudomonas fluorescens	1352 kg	108160
Trichoderma virde	85 kg	5950
Trichogramma sp.egg cards	3528 cc	105840
		850634.00

Finance 2008-09

Head	Expenditure (Rs)	Receipts (Rs)
Non-plan	1,99,575,32	1288642
Plan	9,26,641	0.000
ICAR	7,94,3256	108887
Other EAPs (ICAR Seed)	1,67,0436	1115021
Revolving Fund		
1. Tissue Culture	80440	94150
2. Bio-Control	177924	199592
3. NSP	646516	605827
4. Farm machinery	142538	20900
5. ICAR – Seed program	1285926	1115021

CASHEW RESEARCH STATION, ANAKKAYAM

Name of Head of the Station : Dr. P. Rajendran

Research Programmes:

Major Research achievements

1. One new variety of Cashew (Selection 990) evolved at this station has been approved for release by the Zonal Work shop of the Central Zone and the formalities for release of the variety is underway. This is a clonal variant of the released variety Anakkayam1. Unlike Anakkayam 1, raw nuts of this clone are bold and bigger with high kernel content. The clone is quite early and harvest can be completed before April. The clone shows field resistance to tea mosquito attack Average yield is 23.78 kg per tree per year Average weight of nuts is 10.8 gm and that of kernel is 3.3 gm

2. Sri. M.P. Abdurazack, Assoc. Professor (Stati) of this Station has developed a software which is useful in the monitoring of production and sale of farm produce. Up-to-date stock position can be instantly made available by using the software. The software has been accepted by the KAU for its application in the establishment of a network for computerization of sales and farm stock maintenance.

2. Cashew Research Station, Anakkayam has developed a novel technique for rapid production of jack grafts. The method can ensure large scale production of grafts in a short period of time. The technique is simple and inexpensive and the success is 100 percent. The whole process of production of a finished graft (seed to field) will take only 60 days. A write up based on this has been accepted for publication in the Proceedings of the Second International e-Conference on Agricultural Biosciences 2009. (A novel technique for grafting Jack fruit (*Artocarpus heterophyllus*) authored by P. Rajendran).

Extension Programmes

1. Six month's Stipendiary Training in seed and nursery programme for VHSE (Agri) passouts which was sanctioned vide order number Trg (1) 392/07 dated 27-9-07 of the Hon. Vice Chancellor, KAU is being conducted at this station. The training to the second batch commenced on 1-8-2008 and completed on 31-1-09.

2. Graduate Training Programme – A two months Graduate Training Programme on Integrated Pest Management in Cashew was conducted at this station from 1-7-08 to 30-9-08

List of Publications

1. Scientific papers

1. Rajendran, P. & Ajitkumar, K. 2008 "The unknown orchids of western ghats of Kerala" Proceedings of the National Conference on ORCHIDS: SCIENCE AND SOCIETY at Bangalore on 10-12, -4-2008 and the paper was also accepted for publication in the Journal of Orchid Society, India

. Books

1. Text Book series (3 books) entitled "Flora of Western Ghats" comprising three volumes (under preparation) – sanction for publication has been accorded vide references No.269/WGC1/05/Plg dated 31 - 05 - 06 from the Western Ghat Cell and Extn(4) 86909/07 dated 10-9-07 of the Director of Extension, Kerala Agricultural University.

2. Training manual "Plant Propagation and Nursery Management"(in English as well as in Malayalam) sanctioned vide references No. Extn (4)85459 dated 8-5-08 of the Director of Extension and the process is underway.

3. Chapters in book - Useful genes for plant genetic engineering (2007) in "Plant Biotechnology" edited by K.V. Peter and R. Kesavachandran; pp189 -200, Sigma Publishers, Universities Press, N. Delhi

1. No. of visitors to the Institution (farmer group/ students): 2000 (mainly farmer groups, school and college students)

Other details if any

The internal revenue of the station was showing a declining trend during the past as shown in the table below;

Comparison of income generated at CRS, Anakkayam during the past FIVE years

Year	Revolving funds (Rs. in lakhs)	Station revenue (Rs. in lakhs)	Grand total (Rs. in lakhs)
2004-05	481529	184230	665759
2005-06	308076	226012	534088
2006-07	523079	308750	831829
2007-08	864778	499776	1364554
2008-09	2101666	486290	2587956

It is evident that this station has made all efforts to increase its revenue and excel its research and development activities in spite of the limitations and problems like lack of scientific and supporting staff and work force, and poor primary infrastructure including residential facility, conveyance and transportation. It may kindly be noted that;

1. This achievement was the result of a team work. This may be appropriately rewarded and appreciated so as to ensure this achievement in coming years to continue.
2. The station may kindly be allocated more funds for purchasing a new vehicle (the jeep attached to the station is 1980 model and is insufficient to support our efforts for transportation of inputs and travel in connection with the planting materials production programmes), strengthening its primary facilities like quarters, a training hall and recreation room, tarring of main road, and a proper entrance with a security room.

Finance 2008 - 09

Head	Expenditure	Receipts
Non-Plan	3685244	486,290
Plan	333082	Nil
ICAR	Nil	Nil
Other EAPs	2078322	4465000
Revolving Fund	1128970	1285716

AGRICULTURAL RESEARCH STATION, MANNUTHY

Name of the Head of the Station : Dr. U. Jaikumar

Faculty improvement programme :

a. Deputation of Scientists for Seminars/ Workshops/ Symposia

Name & Destination	Name of Seminar	Venue	Date
Dr. M.T. Kanakamany Professor (Plant Breeding Genetics)	International Symposium on Induced Mutations in Plants	Vienna, Austria	12-15 August 2008

Awards/ Scholarship to staff.

Name & Destination	Other details
Dr.P.A.Joseph,Professor	Karshakabharathi Award for best farm journalist

Thesis submitted during 2008-09 (discipline-wise)

Discipline	Name of the student	Major Adviser	Title of the thesis
Agronomy	Anoop,N.C.	Dr.P.A.Joseph	Micro irrigation and polythene mulching in oriental pickling melon (<i>Cucumis melo</i> var.conomon(L.)Makino

Research programmes

a. Major research achievements

- 1) Three extra short duration rice cultures were developed through re-selection in Hraswa. These were found promising in station trails and were recommended for farm trails in kole lands.
- 2) Rice culture C26T(b) developed by hybridization and selection between Mahsuri x Vytilla 3, was recommended for farm trial in kole lands for salinity tolerance.
- 3) Pre-emergent spray of pretilachlor @ 0.45 kg ai/ha 3-4 DAS and one light hand weeding 28 DAS contributed the highest net income in the wet sown rice fields of kole land.
- 4) Technology for cultivation of cool season vegetables like cauliflower and cabbage in the plains of Kerala standardized.
- 5) F1 Hybrids developed in Bitter gourd.

- 6) As a part of developing technology for protected cultivation of vegetables “Standardization of Fertigation schedule for polyhouse production of bittergourd” was studied.
- 7) Under “Seed and Nursery programme” infrastructure facilities, for augmenting planting material production and planting new progeny orchards developed.
- 8) Conceptualization of “Food Security Army” Agro Machinery Operations Service Executives (AMOSE), Agro Machinery Operations Service Centre (AMOSC), Mobile Agro Machinery Training Unit (MAMTU), Mobile Agro Machinery Repair and Service Unit (MAMRSU), Farm Machinery Facilitation Centre (FMFC)

Details of research projects

1. Completed projects during 2008-09.

Name of the project	Funding Agency	Name of PI	Name of Co- PI	Outlay (lakhs)
1. Weed management in the wet seeded rice fields of kole land	KAU Plan	Dr.P.A.Joseph	Dr.U.Jaikumaran	Rs 0.90
2. Breeding for value addition in rice	KSCSTE	Dr. C.A. Rosamma	Dr. U. Jaikumaran Dr. P.V. Nandini	Rs. 7.48

Extension programmes

a) Highlights of extension activities

Dr. U. Jaikumaran

1. Establishment of Farm Machinery Facilitation Centre, where the farmers can meet all their agro machinery requirements. The Centre offers machinery for hire to farmers and caters to their needs of repair & service through the Agro Machinery Operation Service Centre (AMOSC). It also undertakes, repair & service of agro machinery at farmers fields through the Mobile Agro Machinery Repair & Service Units (MAMRSU). Trainings both in hours and on-site in different agro machinery such as power tillers, transplanters, paddy harvesters, threshers, winnowers, sprayers etc. are being organized by the station, with the on-site trainings being conducted through the Mobile Agro Machinery Training Unit (MAMTU). It is envisaged to develop a Food Security Army for the State and the Country, an Army ready to meet all Agricultural contingencies. The manpower trained by this station form the corps of the army and this nascent army is already about 400 members strong with specialized battalions for paddy, coconut and other corps.
2. Two women SHGs of eight members each; Konnappoo and Kerasree Agri horti Societies are trained in the Station. Konnappoo is entrusted with eco tourism activities and Kerasree in the maintenance of coconut garden and its product diversification on profit sharing basis through MOU.
3. Two women SHG groups established after training 1) Avarampoo Agri Horti Society comprising members to run vegetable seed products and 2) Avanippoo Agri Horti Society to run model organic farm on profit sharing basis through MOU.
4. Member ATMA Governing Committee and the District and Team Member of SREP Preparation of kole land AEZ and its execution.

5. Course Director of the training programme conducted during the period from 20.05.2008 – 13.06.2008, at Agricultural Research Station Mannuthy on Mechanised Paddy Transplanter
6. Course Director of the training programme conducted during the period from 30.05.2008 – 28.06.2008, at Agricultural Research Station Mannuthy on Mechanised Paddy Transplanter
7. Course Director of the training programme conducted during the period from 10.06.2008 – 08.07.2008, at Agricultural Research Station Mannuthy on Mechanised Paddy Transplanter
8. Course Director of the training programme conducted during the period from 01.09.2008 – 27.09.2008, at Parlikkad on Mechanised Paddy Transplanter
9. Course Director of the training programme conducted during the period from 10.12.2008 – 31.12.2008, at Elamuda kole padavu, Mullassery on Mechanised Paddy Transplanter
10. Course Director of the training programme conducted during the period from 05.03.2009 – 18.03.2009, at Agricultural Research Station Mannuthy on Mechanised Paddy Transplanter
11. Course Director of the training programme conducted during the period from 12.05.2008 – 16.05.2008, at Agricultural Research Station Mannuthy on Operation and basic maintenance of Power Tillers and Power Reapers
12. Course Director of the training programme conducted during the period from 12.05.2008 – 22.05.2008, at Agricultural Research Station Mannuthy on Operation and maintenance of Power Tillers
13. Course Director of the training programme conducted during the period from 15.12.2008 – 17.12.2008, at Agricultural Research Station Mannuthy on Use of Mechanised Coconut Climbers
14. Course Director of the training programme conducted during the period from 27.01.2009 – 31.01.2009, at Agricultural Research Station Mannuthy on Operations of Paddy Reaper, Thresher, Winnowing and Weeder
15. Course Director of the training programme conducted during the period from 27.11.2008, at KVK CMFRI Eranamkulam on Farm Mechanisation
16. Course Director of the training programme conducted during the period from 16.02.2009 – 02.03.2009, at Agricultural Research Station Mannuthy on Mechanised Paddy Transplanter
17. Resource person of the training programme conducted during the period from 17.02.2009 at ARS Chalakudy on Farm Mechanisation
18. Resource person of the training programme conducted during the period from 27.03.2009 at CADA office on Farm Mechanisation

Dr. T.R. Gopalakrishnan

1. Conducted Motivation speech to students on 22.11.2008, at SOS Mulayam
2. Resource person of the Extension interface at Ponnukkara conducted on 02.12.2008 on Technological advancement in vegetable cultivation
3. Resource person of the training programme conducted during 20.12.2008 at Thrissur on Vegetable cultivation for homestead

Dr.P.A.Joseph

1. Took class on 12.9.08 at Communication Centre, Mannuthy on Agronomy of vegetable farming to teachers under SarvaSiksha Abhiyan programme
2. Took class on 18.9.08 at Communication Centre, Mannuthy on Agronomy of vegetable farming to teachers under SarvaSiksha Abhiyan programme
3. Took class on 22.11.08 at Ettumana Public Library on Advances in rice and coconut cultivation
4. Took class on 28.11.08 at Communication centre, Mannuthy on Intercrops in Coconut and advances in vegetable production
5. Took class on 19.3.09 at Peringode on Coconut based farming system
6. Took class on 19.3.09 at Pallikurup on Coconut based farming system

Dr. C. Narayanankutty

- 1) Two batches of farmers VFPC Malappuram District visited ARS as part of exposure visit to farmers on cool season vegetable cultivation the farmers were explained about the research activities of cool season vegetables at ARS Mannuthy
- 2) Member ATMA Block Technology Team and District Team Member of SREP Preparation and its execution.

Field visit

No. of visits	Problem identified	Recommendations
More than 100	Several field problems in rice like deficiency symptoms, incidence of pests like leaf roller, leaf folder, stem borer and diseases like blast. In coconut, vegetables, ornamentals and fruit plants deficiency and incidence of pest and disease attack was noticed.	Recommendations were given as per Package of Practices recommendations of Kerala Agricultural University

Radio talks/TV programmes/ Audio-video cassettes

Topic	Date	Name of scientist
കുഷ്യ സുരക്ഷാസേന	Dooradarsan	Dr. U. Jaikumaran
തെങ്ങോലയിൽ നിന്നും മണ്ണിര കമ്പോസ്റ്റ്	Dooradarsan	Dr. U. Jaikumaran Dr. C. Narayanankutty
മലയിറങ്ങി വന്ന കോളിഫ്ളവർ	Jeevan	Dr. C. Narayanankutty
Rice varieties suitable for dry sowing	04-03-09 AIR	Dr. C.A. Rosamma

List of publications

a) Scientific papers

- 1) Kanakamany.M.T. 2008 Induction of Genetic variability in kacholam, (*Kaempferia galanga* L.)_ Plant Mutuation Reports Vol.2, No:1. December 2008 *Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture and FAO/IAEA Agriculture and Bio technology Laboratory, Seibers dorf.*
- 2) P.B. Pushpalatha, C. Narayanankutty and Soumya M.T 2009 Physico.– Chemical attributes of snapmelon (*Cucumis melo* var momordica) Flavour and consumer acceptance of its beverages. Proc. 21st Kerala Science congress, Kollam 28-31st January 2009. pp 20-22

Technical Bulletins

1. Vocational training on Mechanical Paddy Transplanting – a Hand book – Dr. U. Jaikumaran & Suma Nair
2. പമ്പൂർ ടില്ലറുകളുടെയും പമ്പൂർ റീപ്പറുകളുടെയും ഉപയോഗവും പരിപാലനവും - കൈ പുസ്തകം
3. നെൽകൃഷിയിൽ യന്ത്ര വൽകൃത കോയ്ത്ത്, മെതി, പാററൽ, കള പരിക്കൽ തൊഴിലധിഷ്ഠിത പരിശീലനം - കൈ പുസ്തകം.
4. നെൽകൃഷിയിൽ യന്ത്രവൽകൃത നടീൽ - തൊഴിലധിഷ്ഠിത പരിശീലനം.

Popular Articles

1. കാബേജും, കോളിഫ്ളവറും - പച്ചക്കറി കൃഷിയിലെ പുതിയ സാധ്യതകൾ - സി. നാരായണൻ
□ട്ടി, സീന മോഹൻ, മുഹമ്മദ് നിസാർ കൃഷിയങ്കണം. ജൂൺ - ആഗസ്റ്റ് 2008, pp 5-7
2. Monthly Agri. Practices in Karshakasree: 12 Nos Dr. P.A. Joseph
3. Home garden in Karshakasree : 12 Nos Dr. P.A. Joseph
4. Ornamental gardening in Karshakasree : 12 Nos Dr. P.A. Joseph

Books

1. Coconut in Kerala by Dr.P.A.Joseph

No. of visitors to the Institution (farmer group/students) More than 50

Important visitors

Date	Name & destination	Purpose
17.03.09	1. Sri. K.R. Viswambharan Hon. Vice Chancellor, Kerala Agricultural University	Inauguration of AMOSC Meet 2009
17.03.09	Dr. D. Alexander, Director of Research, Kerala Agricultural University, Vellanikkara	To give a special speech on AMOSC Meet 2009

17.03.09	Dr. Joby V.Paul, Registrar, Kerala Agricultural University, Vellanikkara	Felicitation on AMOSC Meet 2009
17.03.09	Dr. M.K. Sheela, Director Extension, Kerala Agricultural University, Mannuthy	Presidential address on AMOSC Meet 2009
16.02.09	1. Dr. P. Rajendran Director, PPM Cell, Dept. of Agri. Kerala 2. Dr. P.S. Geethakutty Director, NIRD, Hyderabad	Monitoring & evaluation of the RKVY project on field testing, training & service centre for Agro Machinery
15 th & 17 th -12-08	Dr. Manikyam Deputy Director, ISRO	Valedictory function of the training for 40 SC-ST youth on Mechanical Coconut Climbing
02.03.09	Sri. Salahudeen Bureau Chief, Thrissur, Mathrubhumi	Valedictory function of the training on Mechanical Paddy Transplanting for trainees from Andaman & Nicobar Islands & Andhra Pradesh
17.03.09	Sri. Prabhakaran Vice Chairman, RAIDCO, RAIDCO FQ Kannur	Felicitation on AMOSC Meet 2009

Finance

Head	Expenditure	Receipts
Non-Plan	7365008	14939000
Plan	1268006	
ICAR	3408061	
Other EAPs	4472669	
Revolving Fund	2348268 (Included Rs. 12,00,000/- to Comptroller)	2302735

CASHEW RESEARCH STATION, MADAKKATHARA

Name of Head of station : Dr. Jose Mathew

Research programmes

Major research achievements

Crop improvement

- A total of 128 accessions, including exotic and indigenous collections, are being maintained and evaluated in the clonal germplasm conservation block.
- There was significant difference among genotypes for annual nut yield during 2008-09. Highest yield in the MLT II was recorded by Hy 303 (10.25 kg/tree/year) followed by Hy 320 (9.10 kg).
- During 1993-2008, 1557 hybrid plants were produced at the station and are being evaluated.

Crop management

- Application of graded levels of N, P or K or their 2-way or 3-way interactions did not significantly influence the growth and yield characters as well as annual and 8- year cumulative yield of cashew.
- Data on annual nut yield per tree under high density planting system indicated increase in nut yield with progressive increase in tree density though the effect was not significant. There was steep increase in per hectare nut yield with increasing tree density from 200 to 500 tree/ha. The per hectare nut yield from 500 trees/ha was higher by 836 kg (227%) as compared to 200 trees/ha.
- Trees under high and normal density planting systems did not vary appreciably in their per tree annual and 8- year cumulative nut yield during the eleventh year of planting. In terms of per hectare nut yield (both annual and 8-year cumulative) high density planting systems was significantly superior to normal density systems.
- The study on intercropping indicates that all the tested tuber crops (tapioca, amorphophallus, colocasia, sweet potato and coleus) can be profitably cultivated as intercrop in 4 year old young cashew plantations. However, tapioca was found to be the most profitable tuber crop for intercropping. It recorded the highest net returns of Rs. 48766/ha and C: B ratio of 2.75 followed by colocasia with a net returns of Rs. 35711/- and C: B ratio of 2.22.

Extension programmes

- a. Highlights of extension activities

Launched four commercial cashew apple products viz., Cashew Apple Drink, Cashew Apple Pickle, Cashew Apple Candy and Cashewman (Cashew Apple – Mango) Mixed Fruit Jam and started its production on commercial basis.

Established state level Model Cashew Apple Processing Unit, Product Refinement and Testing Unit and state level training centre for cashew apple processing at Madakkathara under the NHM-funded project on cashew apple processing.

Established three model cashew apple processing demonstration units under the NHM project by extending technical and financial assistance to SHGs at Payyavoor (Kannur District), Kelakam (Kannur District) and Neendakara (Kollan District). An MOU was signed between KAU and selected SHOGs on 25.9.08. Processing equipments worth Rs.1.5 lakhs each were distributed to the units at the function held on the same day at Madakkathara. Dr. D. Alexander, Director of Research, Dr. M.K. Sheela, Director of Extension, Dr. Joby V. Paul, Registrar, Mr. Jaikumar, Joint Director, State Horticulture Mission, Trivandrum participated.

In response to the request from PCK Ltd and ordered by Director of Reseach, KAU, an expert team headed by Dr. Jose Mathew visited different blocks of Mannarghat Cashew Estate on 24.3.09 and submitted a detailed report on the reason for low fruit set and large scale flower drying and measures for its management.

Put up a stall in Thrissur Flower show wherein display of research findings on cashew and sale of planting material and cashew apple products was undertaken, organized by Agri Hort. Society, Thrissur

Upgraded the cashew nursery to model cashew nursery with funding from State Horticulture Mission with improved facilities for production of planting material and better amenities for farmers.

Constructed a sales counter for sale of planting material and cashew apple products under the State Horticulture Mission funded project.

Dr. Jose Mathew has participated as an expert in the interaction on “Water” by all stake holders including farmers, NGOs and representatives of public institutions organized in connection with the golden jubilee celebration of “ Peechi irrigation project” on 4.10.07 at Peechi Dam.

Dr. Mini. C prepared Package of Practices Recommendations prepared for organic cashew apple processing.

Dr. Jose Mathew took up an assignment with UNIDO, at Republic of Tanzania for 48 days w.e.f 19.11.07

Station has participated in Agricultural exhibition held at Edappal, organised by final year students of College of Horticulture, Vellanikkara under RAWWE programme, Agricultural Fair at Neyyattinkara, Trivandrum and in South Indian Agricultural Fair at Mannuthy. Stalls were put up during the exhibition and cashew apple products and grafts were sold during the programme.

The station has put up a stall during the “Flower show” at Thrissur during January 23-28 for the display of cashew technologies and sale of cashew grafts and cashew apple products.

Organised two one- day training programme (1.2.08 and 8.2.08) and one three day training programme (27-29 February 2008) on cashew apple processing to various stake holders.

Organised "Cashew day" on February 23, 2008 with the financial support of DCCD, Kochi, wherein a state level farmers seminar was organised which was attended by 200 farmers. The seminar was inaugurated by Sri. Rajaji Mathew Thomas, MLA

First sale and commercial launching of three new cashew apple products viz. *cashewman* mixed jam, cashew apple pickle and cashew apple candy was done on 23.2.08.

Inauguration of the state level training series on cashew apple processing, where in 30 trainings of 1, 3 and 7 days duration are planned during the year, was done by Hon. Vice Chancellor on 23.2.008

A new Rs. 22 lakhs project on "Upgradation of cashew apple processing unit at Madakkathara" was sanctioned under RKVY.

Put up a stall for display of technologies for cashew apple processing and sale of cashew apple products during the Business Technology Meet organised by District Industries Centre at Kottayam during 6-7 February 2008 and Dr. Mini.C attended the meet

List of publications

Scientific papers

- i. Jose Mathew. 2008. Nutrient management for cashew. P.G. Diploma in Plantation Management, IGNOU, New Delhi
- ii. Mini.C 2008. Cultural practices – cashew. P.G. Diploma in Plantation Management, IGNOU, New Delhi.
- iii. Mini.C and Jose Mathew,2008. Effect of priming on seed viability and seedling vigour in cashew. Seed Research. 36 (1) : 37-41

Technical Bulletin

Popular articles

- i. Mini. C. and Jose Mathew 2008. Cashew apple products (In Malayalam), Cashew Reseach Station, Madakkathar, 14 p.
- ii. Jose Mathew and Gregory Zacharia. 2008. Poornima – New cashew hybrid from Madakkathara (In Malayalam). Karshakan (April 2008) 18 (4) : 15
- iii. Mini,C. Jose Mathew and Augustine .A. 2009 Vinegar from cashew apple (In Malayalam) Karshakasree 14 (7) : 56
- iv. Jose Mathew 2009. New varieties and scientific cultivation of cashew (Interview in Malayalam), Karshakasree 14(7) :8

Important visitors

- Adv. Sudi. S. Marathe, Chairman, Co-operative Society for market of horticultural products, Panda, Goa.
- The ICAR QRT team of NABARD comprising of Dr. S.K.Vasal, Dr. R.g. Saini, Dr. D.S. Rathore and Dr. P. Pushpagathan
- Dr. H.P.Singh, DDG (Hort), ICAR
- Dr. Mohandas, Chairman, Kerala State Agency for Cashew cultivation
- Dr. Karim M Maredia, Professor and Director, World Technology Access Programme, Michigam State University, Lousing, USA
- Professor Kadambot Siddique, Chair in Agriculture and Director, Institute of Agriculture, University of Western Australia, Crawley, Australia
- Dr. V. Ambethgar, Associate Professor (Entomology), AICRP on cashew.

Details of sale of seeds planting materials/ bio control agents etc

Item	Quantity	Revenue
Cashew grafts	6276	156900
Syrup bottles	2605	117225
Cashew apple drink	2192	10960
Cashew apple jam	283	9905
Cashew apple pickle	219	6570
Cashew apple candy	360	4320
		305880

Finance 2007-08

Head	Expenditure	Receipts
Non- plan	1843793	869337
Plan	432232	
ICAR	2201468	
Other EAPs	5907133	186324
Revolving fund		52524
Total	10384626	1108185

AICRP ON WEED CONTROL, COLLEGE OF HORTICULTURE, VELLANIKKARA

Name of Head of Station : Dr. C. T. Abraham

Research programmes

Weed Survey/ surveillance

The Ministry of Food, Govt. of India had imported 6.2 million tons of wheat during the year 2006 – 07 from various countries like Australia, Russia, Canada, Ukraine, Hungary, France, Kazakhstan, Romania, Bulgaria, Netherlands and Argentina. In the phytosanitary inspection of the consignments of Chennai, Cochin, Tuticorin, Mumbai, Visakhapatnam, Kakinada, Kandla, Mundra and Mangalore plant quarantine officers have interrupted seeds of quarantine weeds. However to meet the food scarcity in the country Govt. of India relaxed the phytosanitary regulations of the plant quarantine order 2003 and allowed import of the wheat for distribution through the Public Distribution System in ten non wheat growing states.

The Dept of Agriculture and Co – operation, Govt of India has accorded administrative approval for the project of National Invasive Weed surveillance Programme for a period of two years to launch a surveillance programme at district level in ten states. The project is to be implemented through National Research Centre for Weed Science, Jabalpur. The project aims to the early detection of various regulated weeds which would have entered the country through imported wheat, to create data base in respect of weed flora of India under system of weed surveillance for early detection, creating public awareness and suggesting management strategies for quarantine of these invasive weeds.

The Kerala centre of National Invasive Weed surveillance Programme was started at the College of Horticulture on 08.08.08. The staff of the project had collected the samples of imported wheat from the various FCI godowns and separated the weed seeds and noted the count of each species. Attempts are made to germinate the seeds and to identify the weed seeds. The surveillance inspectors of the project (5 nos.) are conducting detailed survey on weed flora covering all panchayaths in the state. Data collected are tabulated and documented to understand the dominance of different weeds in different agro climatic zones as well as the association of different weeds to various crops of the state.

Nine species of mistletoes belonging to Loranthaceae family and 6 species belonging to Viscaceae family have been obtained from a survey conducted in the state.

Severe incidence of wild rice is reported from almost all the rice growing tracts of Kerala. Currently no viable management technology is available to manage this menace.

Propagation potential of perennial weeds- *Cyperus rotundus*

The trial has been proposed as a three year trial. During the current year, seeds were collected and planted in 27 plots of size 2x2m at a distance of 30 cm and the rate of multiplication has been studied by counting the number of new shoots arising. Laboratory studies have also been initiated to find out the number of dormant tubers arising. Since the number obtained is very low it has not been included in the report.

Weed seed longevity associated with major cropping systems under arable condition.

The trial was started during kharif 2008. Under this trial, two major cropping systems of the state, arecanut and coconut plantations were chosen for the study. Five cents of the plantations were demarcated and weeds were uprooted and counts were taken from five locations at 15 days interval from pegmarked areas so that no new weed were allowed to shed seeds in this peg marked locations. Earthen bunds were made to prevent the entry of weed seeds through run off water from the adjacent area. Observations on weed count were taken at 15 days interval. The results are the following.

In the ecosystem a total of 33 weed species was noticed. Comparison of resurgence potential of weeds indicate that *Ischeamum* has the maximum potential, which far exceeds the resurgence potential of all other weeds put together. This can be correlated with propagation potential of the weeds both by seeds. In general grasses have higher resurgence potential than dicots and sedges.

Physiological studies in long term net work trials

(Seed bank studies from Long Term Herbicide Trial)

Soil was collected from 5-15 cm depth during March 2006 from 6 different treatments of the long-term herbicide trial (as given in experiment no. 7) laid out at ARS Mannuthy. Soil collected from the different treatments was filled (500g) in separate plastic containers. They were kept in glasshouse and irrigated on alternate days. The seedlings that germinated from the soil were counted periodically and when there was a lull in the seedling emergence, 20ml of 100 ppm GA solution was added to each plot along with in the irrigation water to enhance the germination. The count of seedlings of rice, monocot, dicot and sedges were recorded.

Inference

Hand weeding recorded the lowest number of weeds and it was on par with continuous application of Butachlor and 2,4-D.

List of publications

Scientific paper

1. C. T. Abraham, A. S. Vidya, K. M. Durga Devi and T. Girija.2008.Current Status and Future Prospects of Aquatic Weed Management. Biennial conference on Weed Management in Modern Agriculture: Emerging challenges and opportunities, February 27-28, 2008. Jointly organised by Indian Society of Weed Science, National Research Centre for Weed Science, Jabalpur, and Rajendra Agricultural University, Bihar. p.121
- 2.T. Girija, C. T. Abraham and P. O. Bijoy.2008. Mistletoes on the tree crops of Kerala Abstracts: Biennial conference on Weed Management in Modern Agriculture: Emerging challenges and opportunities, February 27-28, 2008. Jointly organised by Indian Society of Weed Science, National Research Centre for Weed Science, Jabalpur, and Rajendra Agricultural University, Bihar. p.121
3. T. Girija, Rosemary Francis, S. Leenakumari, S. Krishnan and C.T.Abraham.2008. Weed Supression Index- Method to Estimate Competitiveness of Rice cultivars. Proceedings of the 20th Kerala Science Congress 28-31, Jan.2008, Jointly organised by University of Kerala and National Transportation Planning and Research Centre, Thiruvananthapuram,
- 4.K.M.Durga Devi, S. Beena and C.T. Abraham. 2008 Effect of 2,4-D residues on soil microflora. Journal of Tropical Agriculture. 46 (1-2): 64-66
- 5.K.M.Durga Devi., Samuel Mathew, C. T. Abraham and K. Sajnanath. 2008. Paraquat residues in aquatic system. Proceedings of the 20th Kerala Science Congress 28-31, Jan.2008, Jointly organised by University of Kerala and National Transportation Planning and Research Centre, Thiruvananthapuram, 43-45
6. K.M.Durga Devi., Samuel Mathew and C. T. Abraham 2008. Leaching pattern of 2,4-D in wet land soils. Abstracts: Biennial conference on Weed Management in Modern Agriculture: Emerging challenges and opportunities, February 27-28, 2008. Jointly organised by Indian Society of Weed Science, National Research Centre for Weed Science, Jabalpur, and Rajendra Agricultural University, Bihar. p.189
7. Durga Devi. K.M. and Abraham , C.T.2008 Movement of pre emergence herbicides through intact soil columns. National Seminar on "Developments in Soil Science" November, 27- 30, 2008. Organised by Indian Society of Soil Science at University of Agricultural Sciences, Bangalore

Finance 2008-2009

Head	Expenditure(Rs.)	Receipts (Rs.)
ICAR	3697331	9490
Other EAP s		
1. KSCSTE	334255	-
2.Department of Agriculture and Co- operation, Govt. of India	757738	-
Revolving Fund	-	-

**ALL INDIA CO-ORDINATED RESEARCH PROJECT ON
BIOLOGICAL CONTROL OF CROP PESTS AND WEEDS
COLLEGE OF HORTICULTURE, VELLANIKKARA**

Name of Head of the Station : Dr. Babu M. Philip

A. RICE

I. Large scale demonstration of IPM for rice pests and diseases in the farmer's field

Significantly high incidences of dead heart, white earhead and leaf folder were recorded in conventional farming when compared to BIPM cultivation. The grain yield and the population of spiders and coccinellids were significantly high in BIPM.

II. Validation of biointensive pest management practices in organic rice production

The mean of two season's data revealed that coccinellid and spider counts were significantly high in organic farming. There was no significant difference in grain yield.

B. COCONUT

1. Large scale demonstration on biocontrol of coconut leaf caterpillar *Opisina arenosella* in Kerala

The pest population came down significantly after release of the natural enemies when compared to control. Lowest pest count was recorded in *Goniozus nephantidis* released palms.

2. Large area demonstration of *Oryctes rhinoceros* management using *Metarhizium anisopliae* var. *major* and baculovirus in Kerala

All the grubs and pupae were found diseased 15 days after treatment of *M. anisopliae* var. *major* and the fresh incidence of attack was very low in palms.

C. VEGETABLES

1. Biocontrol of *Aphis craccivora* in cowpea using entomofungal pathogens

There is reduction in aphid population after treatment application and the lowest aphid count was recorded in *Verticillium lecanii* treated plot and it is on par with *Fusarium pallidoseum*, *Beauveria bassiana*, *Metarhizium anisopliae* and chemical treated plots. Pod yield was on par in the treatment plots when compared to control.

2. Evaluation of anthocorid predator, *Blaptostethus pallescens* against spider mites in Bhindi.

The treatment1 (10 anthocorids / plant) and treatment 2 (20 anthocorids / plant) were on par and there is significant reduction in mite population after release of anthocorids when compared to control. Lowest mite population was recorded in chemical control. Yield was on par in all the treatments.

E. CASHEW

Survey for the natural enemies of Tea mosquito bug in cashew

Conducted surveys in Thrissur (dt.) mainly in Madakkathara area for collecting natural enemies of Tea mosquito bug. The ants collected as predators of tea mosquito bug are *Oecophylla smaragdina* Fabr., *Camponotus compressus*, *Crematogaster* sp. and *Tetraoponera* sp., belonging to the family Formicidae. Spiders preying on cashew mirid bug were also collected and identified. The common spiders collected are *Hyllus diacanthus* (Salticidae), *Telamonia elagans* (Salticidae), *Oxyopes sunandae* (Oxyopidae) and *Oxyopes swetha* (Oxyopidae).

F. WEEDS

1. Survey for the natural enemies of *Cyprus rotundus*

Conducted surveys to collect the natural enemies of *C. rotundus*. A mealy bug was collected from the roots of the weed and it was identified as *Geococcus citrinus*. But it has been reported as a pest of banana in Kerala. A caterpillar causing dead heart symptoms on the weed was collected and it was identified as *Nephopteryx* sp.

2. Biocontrol of *Chromolaena odorata* using *Cecidochares connexa*

There was significant reduction in plant height on 30th and 60th days after release of the gall fly and all the other growth parameters were on par.

3. Investigation on the differential performance of *Cyrtobagous salviniae* against *Salvinia*

A survey was conducted in Thrissur district to collect water samples from areas without *Cyrtobagous* on *Salvinia*. But the weevils were present in all the areas. Water and plant samples were drawn from two locations where *Salvinia* is controlled successfully and analysed. There is no significant difference between the two samples.

G. ESTABLISHMENT OF MASS PRODUCTION UNITS

Started the mass production of the following biocontrol agents and antagonists for revenue generation and experimental purpose.

Trichogramma japonicum, *Beauveria bassiana*, *Verticillium lecanii*, *Fusarium pallidoroseum*, *Metarhizium anisopliae*, *Pseudomonas fluorescens* and *Trichoderma viride*.

Farm Advisory Services

Suggested remedial measures for weed and pest problems to the farmers

Field visit

The Scientists of this centre visited farmer's fields in Koorkkenchery and Adat panchayaths of Thrissur district and gave necessary instructions on BIPM practices in paddy.

List of publications

Scientific papers

Lyla K.R. and Philip. B. M. Mass multiplication of Green Mascaridine fungus *Metarhizium anisopliae* var *major* for the biocontrol of Rhinoceros beetle. 3rd Indian Horticulture Congress November 6-9, 2008, Bhubaneswar Orissa. P. 186.

Popular Articles:

K.R. Lyla and Babu M. Philip. Keedalothe Aapalbandhavar, Karshakasree Mar. 2009, p. 50-53.

No. of visitors to the Institution (farmer group/students)

Farmers of Koorkkenchery Krishi bhavan visited the centre to study about tricho card release.

Important visitors

- Dr. R.J. Rabindra, Project Director, PDDB, Bangalore visited the lab and field experiments for reviewing the works on 19/1/09.
- Dr. D. Alexander, Director of Research, KAU visited the lab for reviewing the works of ongoing projects.

Details of sale of seeds/ planting materials/ biocontrol agents etc.

Biocontrol agent	Quantity produced	Quantity sold	Rate/ kg (Rs.)	Receipts*
<i>Pseudomonas fluorescens</i>				
Talc formulation	660 kg	660 kg	80	52800
Enriched with cowdung	1172 kg	1172 kg	25	29300
<i>Trichoderma viride.</i>				
Talc formulation	299 kg	299kg	70	20930
Enriched with cowdung	100 kg	100 kg	25	2500
<i>Trichogramma japonicum</i>	665 cc.	437cc.	50	21850
<i>B. bassiana</i>	20 kg	12 kg	50	600
<i>V. lecanii</i>	112 kg	112 kg	50	5600
<i>F. pallidoroseum</i>	5 kg	5 kg	50	250
<i>M. anisopliae</i>	50 kg	10 kg	50	500
Total				134330

- 5% commission to sales counter

Finance

Head	Expenditure	Receipts
ICAR	3618215	55169
SHM Project	1063367	
Revolving Fund	60740	50572

AICIP COLLEGE OF HORTICULTURE, VELLANIKKARA

Name and address of head of institution : Dr.Sadhankumar, P.G. Professor &PI

Research programme

a) Major research achievement (highlights)

In ash gourd varietal trial AVT I, KAG-1 yielded maximum. In ash gourd varietal trial AVT II, maximum yield was in Indu and in cowpea varietal trial Ankur Gomati yielded maximum. In Okra yellow vein mosaic virus resistant trial, JOL-2K-19 recorded the lowest disease incidence and highest yield. In tomato bacterial wilt resistant trial LE 626 recorded lowest disease incidence and highest yield.

In Organic farming trial poultry manure@5t/ha gave highest yield in okra. Studies on effect of fruit load on seed yield and quality in okra showed that maximum seed yield was obtained when all the fruits were retained on the plant. 100 seed weight, seed germination, vigour index I and vigour index II were maximum when only six fruits were retained on the plant.

Seed treatment with *T. viride* @ 6 g/kg seed + captan @ 1g/kg seed) was found to be the best for seed treatment of tomato seeds for better germination. Seed treatment with Ridomil @ 0.025% +Three times removal of infected leaves and Mancozeb spray is the best treatment for management of downy Mildew in bitter gourd.

b) Details of research projects.

1) Completed projects during 2008-2009

1. Effect of seed dressing chemicals, bioagents on seed mycoflora, compatibility and seed germination .
2. Integrated management of downy mildew of cucurbits .
3. Integrated management of bacterial wilt in solanaceous vegetables.

Varietal trials

- i) Varietal trial in Ash gourd AVT I
- ii) Varietal trial in Ash gourd AVT II
- iii) Varietal trial in cowpea AVT I
- iv) Varietal trial in bottle gourd AVT II
- v) Varietal trial in pumpkin AVT II
- vi) Varietal trial in bitter gourd AVT I

Heterosis breeding trials

- i) Bitter gourd AVT I
- ii) Pumpkin AVT I

Resistant breeding trials

- i) Screening bhindi varieties resistant to yellow vein mosaic virus AVT I
- ii) Screening tomato lines resistant to bacterial wilt AVT I
- iii) Screening tomato lines resistant to bacterial wilt AVT II

- vi) Screening brinjal lines to bacterial wilt AVT II)

Vegetable production

- i) Studies on vegetable based cropping sequence
- ii) Integrated nutrient management in cow pea
- iii) Trial on use of vermi wash in okra
- iv) Organic farming in okra/tomato/cowpea
- v) Integrated nutrient management in cucumber

Seed production

- i) Standardisation of vigour tests in vegetable crops-chilli
- ii) Effect of seed coatings on germinability, vigour, field emergence and storability of vegetable seeds-okra
- iii) Effect of fruit load in seed yield and quality in okra
- iv) Enhancement of seed yield and quality by using biofertilizers in brinjal

Disease management

- i) Survey and surveillance of diseases in vegetable crops in farmers field at periodical intervals
- ii) Integrated management of Rhizoctonia root rot of legume
- iii) Testing of resistant cultivars for bacterial wilt across the problematic areas for identification of biovars
- iv) Integrated management of Fusarium wilt of cucurbits/ solanaceous /legume vegetable crops
- v) Management of blight diseases of (early& late) Tomato
- vi) Management of Foliar diseases (Cercospora and rust) of cowpea

Extension

a) Highlights of extension activities

Remedial measures were suggested for field problems of farmers as and when required.

Farm advisory service

In Person
Over phone
Through letter

Field visit

Field visits were conducted to farmers' fields in the near by locality as a part of the Survey and Disease surveillance programme and germplasm collection.

Problems identified

Disease and pest problems were identified in vegetable crops grown in the farmers' fields

Recommendations

Periodical incidence of diseases were recorded as part of the survey and suitable recommendations were given to the farmers as and when required.

iv)Radio talk/TV programme/Audio - video cassette

List of publications

Sameera Karumanni, P.G. Sadhan Kumar, P.A. Nazeem, D. Girija and R. Keshavachandran .2008. DNA fingerprinting of bacterial wilt resistant tomato (*Solanum lycopersicu L.*) cultivars. *Veg.Sci.* 35(1): 105-108

K.V.Peter, P.G.Sadhan Kumar and S.Nirmaladevi.2008.Diversification is important. *The Hindu Survey of Indian Agriculture.*69-70

K.V.Peter, S.Nirmaladevi and P.G.Sadhan Kumar.2008. Advances in improvement of leaf vegetables. *Leaf vegetable research in India. Tamil Nadu Agricultural University.*pp52-66.

P.G.Sadhan Kumar and S.Nirmaladevi.2008. Leafy vegetable research in Kerala Agricultural University, Thrissur. *Leaf vegetable research in India. Tamil Nadu Agricultural University.*pp 98-105

P.G.Sadhan Kumar , S.Nirmaladevi and K.V.Peter .2009. Recent advances in vegetable crops. *Proceedings of National workshop on status and future strategies of Horticulture development in Andaman and Nicobar islands held at Central Agricultural Research Institute, Port Blair, 23-25 January, 2009.*

P.G.Sadhan Kumar and S.Nirmaladevi.2008. Glossary of selected horticultural terms. In K.V.Peter(Ed). *Basics of horticulture. New India Publishing Agency, New Delhi* p593-616

K.V.Peter, P.G.Sadhan Kumar and S.Nirmaladevi.2008. *Vegetable crops: Research initiatives. Recent initiatives in Horticulture. Horticultural Society of India, New Delhi,* p55-63

P.G.Sadhan Kumar and S.Nirmaladevi.2008. *Research and Educational infrastructure in Horticulture in India. In K.V.Peter(Ed). Basics of horticulture. New India Publishing Agency, New Delhi* p 725-730

Finance

Head of Account	Expenditure (Rs)	Receipts(Rs)
303-31-6634-110	1521424	
303-31-6634-120	453138	
303-31-6634-300	53949	
303-31-6634-152	---	
303-31-6634-210	77368	5377
303-31-6634-142	101078	

AICRP ON MEDICINAL & AROMATIC PLANTS COLLEGE OF HORTICULTURE, VELLANIKKARA

Name of Head of the Station : Dr. V. V. Radhakrishnan

Research Programmes

a. Major research achievements

Following research projects were carried out under AINRP on M&AP

I. CROP IMPROVEMENT

1. LONG PEPPER (*Piper longum*)

Experimental Results: Evaluation of the selected eight genotypes along with local check, 'Viswam' and hybrid during 2008-09 indicated that Acc.No.2 is superior (665 kg/ha) to the existing high yielding variety 'Viswam' (508 kg/ha). Analysis on the association of the characters towards the spike yield indicated that tall plants with maximum number of fruiting branches produces higher spike yield. Height of the plant as well as number of branches has a positive association with dry weight. Fresh weight and size of the spike has a positive association with Piperin content, number of spikes and length of spikes. Analysis on the association of the characters towards the spike yield indicated that tall plants with maximum number of fruiting branches produces higher spike yield. Height of the plant as well as number of branches has a positive association with dry weight. Fresh weight and size of the spike has a positive association with piperine content, number of spikes and length of spikes. *Piper longum* Accession 2 is proposed for farm trial along with Viswam and local check, if available, in 3 locations in each district Trichur, Palakkad and Ernakulam.

2. CHITRAK - *Plumbago rosea*

Experimental Results: Twenty five accessions collected from different ecogeographical places of Kerala were evaluated and documented. Along with the passport data the accessions were registered at NBPGR with IC No. 566499 to 566523. On further replicated trails with 25 accession, Accession-10 a local collection of Trichur District and Accession-9 from Thuruthissery recorded significantly higher number of roots. Accession- 6 from Kozhikode recorded maximum fresh shoot weight. Accession-23 from Santhampara recorded maximum fresh plant weight. Accession-24 from Pulppara recorded maximum fresh root weight. Accession-16 from Vellanikkara recorded maximum height. Accession 1 from Vellanikkara recorded maximum Plumbagin content.

Standardized the tissue culture techniques for mass multiplication of *Plumbago*. In vitro mutagenic studies to induce higher variability for higher tuber yield and Plumbagin content are being carried out.

3. ASOKA (*Saraca asoca*)

Experimental Results: Out of the 42 accessions of Asoka a lot of variability is seen for many of the morphological traits from seedling onwards. Along with the passport data the accessions were registered at NBPGR with IC No. 566456 to 566498. DNA finger printing for the various accessions were carried out and cataloged. The seedling vigor and further growth depends mainly based on the place of the accessions collected. Observations are recorded on various growth parameters of the 42 accessions like height of the plant, number of leaves, girth of the plant after two years of planting. It is seen that the accessions collected from Thrissur and Trivandrum showed vigorous growth represented by its increased height,

number of leaves and higher girth of the stem. It is also shown that higher number of leaves have a positive association with mean girth of stem. Accessions collected from Thrissur district recorded more height followed by higher number of leaves and higher girth compared to Trivandrum. Accession number 32 (Thrissur) and 37 (Thrissur) started flowering during February 2007 after two years of planting.

During the year 2008-09 observations on various morphological traits and active constituents (tannin and phenol) were recorded and analysed. Out of the 42 accessions 24 accessions were selected for assessing the tannin content and its relationship with bark characters.

4. BRAHMI (*Bacopa monnieri*)

Experimental Results: In the years 2008-09, the replicated experiment on Brahmi with collected accessions has been carried out and the confirmatory results are summarized below. Along with the passport data the accessions were registered at NBPGR with IC No. 566427 to 566455. The collected accessions were grouped into five clusters. Cluster I contains fifteen, II & III with three each, IV with two and V with six accessions. Accessions collected from different regions grouped into one showing that there is no parallelism with geographical sources.

The evaluation of Brahmi germplasm indicated that plants having shorter inter node with fleshy bigger size leaves contains more therapeutically important constituent Bacoside A. Non flowering and late flowering accessions having more Bacoside content. Accession 29 has identified as better plant for higher biomass yield and Bacoside A content followed by Accession. No.14. accessions received from coastal region have higher biomass and higher Bacoside content.

II. AGRONOMY

Expt. I Growth analysis of *B.monnieri*

The experiment on growth analysis of *Bacopa monnieri* was done for 2 seasons. The data on growth characters revealed that the growth characters except vine length was increasing with increase in duration of the crop. The maximum growth was observed at 5 months after planting and thereafter the growth was found to be decreased. The fresh weight of the plant as well as the dry weight was maximum at 5 MAP. The quality of brahmi, assessed based on the bacoside content, was also found to be the highest (5.88%) at 5 MAP and thereafter a decline was noticed. So it is concluded that the best time for harvest of brahmi is 5 months after planting.

Expt. II . Effect of organic manures and biofertilisers on yield and quality of *B. monnieri*

The experiment on the effect of organic manures and biofertilizers on growth and yield of brahmi was done during 2007-08. The data on growth characters showed no significant variation among the different organic manures as well as biofertilizers used with respect to vine length, number of leaves, numbers of branches and internodal length. The biomass production and dry matter production was the highest when coirpith compost was applied compared to FYM and vermicompost. The combined application of organic manures with biofertilizers gave the highest biomass and dry matter yield than application of organic manures alone. The fresh and dry yield of brahmi also showed the same trend. The bacoside content of the plant was found to be higher for coirpith compost and combined application. with biofertilizers. The fresh and dry yield and bacoside content were the highest when coirpith compost was applied in combination with Azospirillum and Phosphorus solubilizing bacteria. The leaf P and K content did not vary with organic manures. With respect to nutrient uptake by the plant, the highest uptake of N, P and K were noticed when coirpith compost was applied compared to vermicompost and FYM. The combined application with

biofertilizers showed the highest uptake of N, P and K than application of organic manures alone. The highest N and P content and uptake of N was obtained for application of coirpith compost with Azospirillum and PSB. The available N and P content of soil varied with variation in organic manures while exchangeable K did not show significant difference with organic manures. The application of biofertilizers alone or in combination did not influence the N, P and K content of soil.

Expt III Growth analysis of *Sida cordifolia*

The growth analysis of *Sida cordifolia* was done for two years. The results on growth characters revealed that the number of branches was increasing with increase in duration upto 8 MAP and thereafter declining. The yield attributing characters such as root length was significantly higher at 8 MAP. The fresh as well as dry root yield was the highest at 8 MAP and thereafter decreased. From the data it can be concluded that 8 MAP is the best time for the harvest of *Sida cordifolia* with respect to fresh and dry yield of the crop.

Expt IV Effect of harvesting time on growth, yield and quality of *Sida cordifolia*

The effect of time of harvesting on growth and yield of *Sida cordifolia* was done for two years. The results on growth characters revealed that the number of branches was increasing with increase in duration upto 8 MAP and thereafter declining. The yield attributing characters such as root number, root length and root girth were significantly higher at 8 MAP. The fresh as well as dry root yield was the highest at 8 MAP and thereafter decreased. From the data it can be concluded that 8 MAP is the best time for the harvest of *Sida cordifolia* with respect to fresh and dry yield of the crop.

Expt. V Effect of shade on growth, yield and quality of *Sida cordifolia*

The experiment on effect of shade on yield and quality of *Sida cordifolia* revealed that the growth characters such as height, number of branches and canopy spread were significantly higher under open condition compared to shade. The number of roots, root length and root girth were almost doubled under open than shaded condition. The highest root yield of 1.65 t/ha was observed under open compared to 0.65 t/ha under shade. The biomass as well as dry matter production also showed the same trend. From the experiment it is very evident that *Sida cordifolia* cannot tolerate shade and maximum growth and yield was obtained under open condition.

III. PHYTOCHEMISTRY

Quality assessment of raw drug of Asoka

The barks of the *Saraca asoca* and its major adulterant in market i.e *Polyalthia longifolia* were collected from KAU Campus trees and dried. Attempts were made to find out significant difference between Asoka & Polyalthia bark samples so as to help identification of the genuine sample from the adulterated market sample.

1.Physical evaluation: External physical evaluation through naked eye was conducted to find out the differentiation between the Asoka bark and its major adulterant *Polyalthia longifolia* Observations on the type, colour, texture of the outer and inner portions of the bark, taste, odour and touch were recorded.

plant	outer bark	inner bark	bark type	odour	touch
<i>Saraca asoca</i>	brownish grey, outer bark easily peels off, dried bark is channelled, thick ashy brown rough with raised horizontal	brick red or reddish brown in colour. fibrous inside. Fine, longitudinally	channeled	no specific odour	rough

	lines of protruded circular lenticels .In older barks lenticels cracked. Traversly ridged, sometimes cracked bark is uneven with round or broken lenticels.	arranged fibres and strands. inner bark very smooth			
<i>Polyalthia longifolia</i>	Brownish grey..Bark is comparatively smooth with nonconspicuous lenticels or no lenticels . longitudinal striations	dark brown with rich fibrous material inside. Inner bark not smooth	channeled	no specific odour	less rough

2. Chemical examination:

The aqueous extract of raw bark samples when subjected to haemagglutination assay reveals that asoka sample gives haemagglutination where as the polyalthia bark samples were negative to HA test using O⁺ RBC samples.

plant	HA titre (O ⁺ RBC used)
<i>Saraca asoka</i>	up to 6 th well
<i>Polyalthia longifolia</i>	No agglutination

Farm Advisory Services:

In person	Over Telephone	Through Letter
120	110	4

Field Visits

No. of Visits	Problem identified	Recommendation
10	8	8

Radio talks/ TV Programmes/ Audio-Video Cassettes

Topic	Date	Name of Scientist
1. Sweet potato cultivation	15.3.2009	Dr. A. Latha
2. Value addition in medicinal plants		Dr. A. Latha
3. Medicinal plants as intercrops in Coconut Garden		Dr. A. Latha

List of publications

Scientific papers:

- Dr. V. V. Radhakrishnan 2008. *In vitro* Mutagenesis for Photo Insensitivity to Tuberisation in Coleus ((*Solenostemon rotundifolius*) (Poir.) J.K. Morton) Paper presented in International Symposium on Induced Mutations in Plants 12 - 15 August 2008 at IAEA, Vienna, Austria
- V. V. Radhakrishnan, Vishnu Vardhan Reddy, S. Mini and A. Latha. 2008. Assessment of variability in Brahmi (*Bacopa monnieri*) Journal of Medicinal and Aromatic Plant Sciences, Vol. 30 (4): 361-3665

Radhakrishnan,V.V., Mini.S., and Latha .A.2008.Genetic variability in Chitrak (*Plumbago rosea* L.). *J. Med. Arom Pl.Sci.* 30 (1):88-91

Purushothaman,S.M., Anitha,S., Beena,C., Karthikeyan,K.K and Balachandran.P.V.2008. Effect of various manurial applications on the incidence of brown spot of rice . *The Andhra Agricultural Journal .J(55)3413-414,2008.*

Latha A. Radhakrishnan V.V., Mini .S. and Krishnan S. 2009. Input Use Efficiency as influenced by organic source variation in *Plumbago rosea*. Abstracts of the Proceedings of fourth world congress on conservation agriculture, New Delhi

Latha A, Radhakrishnan V.V. and Mini .S. 2009. Effect of Organic Manures and Biofertilizers on Nutrient uptake yield and quality of *Plumbago rosea* as intercrop with coconut. Golden Jubilee National Symposium on Medicinal & Aromatic Plants, CIMAP Resource Centre, Bangalore on June 26th.

Books : 1

Oushadha Sasya vila paripalanavum Moolya vardhitha Ulpannangalum

Number of visitors to the Institution (Farmer group/ students)

Sl. No.	Farmers/ Students/ Others/ details	No. of visitors
1.	Farmers	400
2.	Students	10,200

Scientists : 120 nos.
Farmers : 20 groups
Students : 70 groups

Important visitors

Sl. No.	Name of the visitor	Designation/ address	Date of visit	Purpose of visit
	Dr. Umesh Srivastava	ADG	15 th Nov, 2008	To attend 17 th Group Meeting of AICRP on MAP held at KAU
	Dr.H.P.Singh	DDG(Hort), ICAR, New Delhi	17 th Nov, 2008	To attend 17 th Group Meeting of AICRP on MAP held at KAU
	Dr.Satyabrata Maiti,	Director, NRC on M&AP, Anand	15-18 th Nov, 2008	To attend 17 th Group Meeting of AICRP on MAP held at KAU

Details of sale of Seeds/ Planting materials/ products/ Biocontrol agents etc

1. Production of Breeder seed

Crop and Variety	Quantity of TLS produced (kg) during 2008-09
Coleus (Var. Suphala)	425 kg
Piper longum (Var. Viswam)	10100 rooted cuttings

2. Seeds

Crop and Variety	Quantity of TLS produced (kg) during 2008-09
Kacholam Seed	250 kg
Asokam	2.5 kg
Ginger	20 kg
Kurunthotti	0.1 kg

3. Seedlings/Cuttings/Grafts/Rhizomes etc.

Crop and Variety	Quantity
Adalodakam	300 rooted cuttings
Kacholam	375 "
Asokam	225 seedlings
Brahmi	300 rooted cuttings
Chethikoduveli	3200 "
Changalamparanda	60 "
Cinnamom	20 seedlings
Curry leaf	50 "
Dhandhapala	550 "
Kattarvazha	450 "
Neelamari	525 "
Karinotchi	125 cuttings
Karimanjal	110 poly bags
Kasthurimanjal	50 "
Panikoorka	150 cuttings
Mylanchi	150 "
Vayambu	425 "
Thippali	250 "
Nagadandi	60 "
Thulasi	125 "
Mentha	75 "
Chakkarakolli	10 cuttings
Pathimugam	60 seedlings
Vathamkolli	125 cuttings
Adambu	20 cuttings
Manchatti	200 "
Aryaveppu	55 "
Chathuramulla	25 "
Africanmali	35 "
Ayyappana	250 "
Murikooti	125 "
Karpoorathulasi	125 "
Neermathalam	30 "
Manithakkali	30 seedlings
Kurunthotti	500 "
Insulin	75 cuttings
Kiriyath	60 seedlings
Pushkaramoolam	35 cuttings
Stevia	75 "
Vellakoduveli	350 "

Other details if any**Other activities**

- The planting materials of important medicinal plants are being produced and distributed from this scheme earning annual revenue of >Rs. 1.7 lakhs
- Germplasm collection of important medicinal plants of Kerala is enriched by collecting the plants all over Kerala. Rare and endangered medicinal plants are also collected from all over Kerala.
- Large scale cultivation of important medicinal plants of Kerala is done as part of the Revolving fund scheme earning net profit of >Rs.1 lakh.
- Attempts are also being taken for the popularisation of herbal home gardens as a means of germplasm conservation.
- Value added products like Naruneendi Syrup, Dandhappala Oil, Vasica Choornam and Rasnadi Choornam produced and distributed with above 1 lakh

Finance

Head	Expenditure	Receipts
Non - plan	-	-
Plan	6.6	-
ICAR	32.71	-
National Medicinal Plant Board Project	0.10	-
Revolving Fund	1.59	3.60

AGRONOMIC RESEARCH STATION, CHALAKUDY

Name of Head of the station : Dr. Suma Paulose

Research Programmes

a) Major research achievements (highlights)

1. Hydraulics of sub-surface water emission devices for sustainable irrigation in brinjal

An experiment was conducted to standardize sub-surface irrigation technology for close growing row crops using brinjal as the test crop. Three types of emission devices were used, viz. drip tape, inline drippers and online surface drippers. Irrigation was provided at two levels, ie. 100% PE and 70% PE. Drip tape and inline drippers were laid 15cm below ground level, a depth established to be optimum by previous trials. Surface drippers were laid on ground surface. The brinjal crop was planted at a spacing of 75cmx60 cm and all agricultural operations excepting irrigation were provided as per KAU Package of Practices Recommendations. Irrigation was given on alternate days as per the technical programme. Observations on growth characters, yield and yield attributes were taken at the proper time.

Pooled analysis of data on yield over two years showed significant effect of inline dripper (ID) over surface drip (SD). Yield was maximum in ID at both levels of irrigation, SD was on par with DT. Among levels of irrigation, irrigation at 100% PE was superior to irrigating at 70% PE in each emission device.

II. Optimisation of field water requirements for efficient operation of wet seeder and cono weeder

Statistical analysis of yield data reveals that weeding using cono weeder has significant influence both on the straw weight and grain weight. All the treatments using cono weeder both with and without standing water, gave significantly higher grain weight than that with hand weeding. Weeding at 20 DAS & 40 DAS using cono weeder and without standing water gave maximum grain weight and treatment with standing water and hand weeding gave minimum grain weight. All the treatments without standing water gave higher yield compared to the treatments with standing water. Among the treatments with standing water, weeding at 20 and 40 DAS was superior to other treatments. Among the treatments without standing water also, weeding at 20 DAS & 40 DAS got higher grain yield.

Analysis on straw weight reveals that, all the treatments without standing water was having significantly higher straw yield compared to the control (treatment with standing water and hand weeding). Among the treatments with standing water, only T6 gave significantly higher straw yield. Both T4 and T5 were on par with T0 (control)

All treatments with standing water were having significantly lesser weed growth compared to the treatments without standing water. Weeding at 20 DAS & 40 DAS using cono weeder and without standing water have maximum weed growth and treatment with standing water and weeding at 20 DAS & 40 DAS using cono weeder have minimum weed growth.

Effect of irrigation on growth and yield of cashew.

Results obtained during the year 2008 indicate that irrigation has no significant effect on number of flushes and inflorescences produced. However yield was significantly influenced by irrigation. All the three levels of irrigation were on par indicating that low level of irrigation is sufficient to get higher yields from cashew.

Extension programme

- i) **Scaling up of Water Productivity in Agriculture for livelihoods through Teaching cum Demonstration, Training of Trainers and Farmers”**

Training programmes organized

Nineteen farmer's training and four trainer's trainings were completed during 2008-09. Total number of trainers trained is 100 and total number of farmers trained is 950.

As part of demonstrations different types of micro sprinklers and drip systems with various types of water control facilities are exhibited. A new field water storage structure is developed. Different water measuring devices, mist irrigation system in the green house and roof rain water harvesting devices are installed.

A. Farmers Training Programmes

Sl No	Location	Duration	No. of farmers
1	ARS, Chalakudy , Thrissur	24/5/08 to 30/05/08	41
2	College of Agriculture Padannakad, Kasargod	18/08/08 to 26/08/08	47
3	KVK, Kollam	22-9-08 to 29/9/08	53
4 & 5	CARD KVK Pathanamthitta	20/10/08 to 28/10/08 & 9/12/08 to 17/12/08	100
6	KVK Thrissur	20/10/08 to 27/10/08	50
7	KVK,Thiruvananthapuram	8/11/08 to 15/11/08	50
8	KVK Ernakulam	22-11-08 to 28/11/08	50
09	KVK, Kottayam	25/11/08 to 3/12/08	50
10	KVK Malappuram	3/12/08 to 11/12/08	50
11	KVK, Idukki	3/12/08 to 11/12/08	50
12	RARS, Pilicode	11-12-08 to 19-12-08	80
13.	KVK, Palakkad	28-01-09 to 03-02-09	40
14	PRS, Panniyur	25-02-09 to 03-03-09	50
15	CWRDM, Kozhikode	03-03-09 to 09-03-09	50
16	KVK, Ambalavayal	25-02-09 to 03-03-09	50
17	RARS, Ambalavayal	02-03-09 to 09-03-09	50
18	ARS, Chalakudy	02-03-09 to 09-03-09	39
19	TSS, Vellayani	04-03-09 to 10-03-09	50

B. Trainers Training Programme :

Location	Duration	No. of Participants
ARS, Chalakudy, Thrissur	7/7/08 to 20/7/08	25
Training Service Scheme, College of Agriculture Vellayani, Thiruvananthapuram	10/12/08 to 23/12/08	25
KVK, Ambalavayal, Wayanad	2/8/08 to 16/8/08	25
KVK, Palakkad	10/12/2008/23/12/2008	25

Demonstration Programmes:

Details of the technology demonstrated

a) Different methods of irrigation including micro irrigation techniques are demonstrated

Micro irrigation

- i. Sprinklers, Mini sprinklers and Micro sprinklers with varying design and discharge rate
- ii. Drip with different discharge rate and emission control devices

b) Water measuring devices like parshall flume, 'V' Notch, Orifices etc.

c) Irrigation conveyance Network in the field

Details of the farmers visiting demonstrations

The demonstration plots are laid out in front of the office near the Information cum sales counter of the Research Station. Hundreds of farmers' visiting the station and counter daily used to visit the demonstration plots. Trainer's and farmer's from Krishi Bhavans , Command Area Development Agency, and other government and non-government institutions and organizations are taken to this station to get acquainted with irrigation techniques and micro irrigation systems.

Model of rain water harvesting

Constructed a ferrocement tank for rain water harvesting under the project "Scaling up of water productivity in agriculture for livelihoods through teaching-cum-demonstration, training of trainers and farmers"

ii) Training on banana and vegetable cultivation to the Kudumbasree units of Chalakudy block

Training on banana and vegetable cultivation were conducted to chalakudy block panchayat for duration of one week . Three batches of farmers comprising about 75 members attended.

Farm advisory service rendered

Date/period	Solutions to farmer's field problems		
	In person	Through Phone	By Post
1.4.2008- 31.3.2009	138	850	55

Scientists of the Station rendered advisory service to the farmers, by visiting the field, by post and through telephone, on various aspects of irrigation and crop production and plant protection of rice, vegetables and banana. Irrigation systems were installed at Govt. Juvenile Home, Thrissur

Field visit to farmer fields (Scientist wise)

Name	Date/period	No. of visits	Main problems tackled
Dr.Suma Paulose Professor & Head.	4/2008 to 3/2009	22	Pests and diseases of rice vegetables,banana. Floriculture development
Dr.K.P.Prameela Professor	"	45	Selecting proper methods of irrigation to Increase water use efficiency.
Dr.T.K Bridgit, Assoc.Professor.	"	35	Cultivation and management of betelvine plants. Pest and diseases of vegetables. Sesamum cultivation. Cowpea management. Paddy cultivation and management.
Dr. Mini Abraham Asst. Professor	"	18	Coconut cultivation. Vegetable diseases. Banana irrigation & Management. Cultivation and management of vanilla plants. Processing of vanilla
Dr. P. Suseela Asst. Professor	"	21	Planning and layout of irrigation systems and irrigation Practices. Selecting proper methods of irrigation to Increase water use efficiency. Protected cultivation of cool season vegetables.

Radio Talks:

- 1 P.Suseela, Assoc. Prof has done an interview in Malayalam on "Modern agriculture techniques for profit and efficiency" at All India radio, Calicut on 1-09-08
1. P.Suseela, Assoc. Prof has done an interview in Malayalam on "Things to be cared while installing pump set at All India radio Calicut on 11-12-08

Television Programme

- 1 P.Suseela, Assoc. Prof has done a TV programme on "Cultivation of vegetables under the greenhouses" in Local TV channel on 12-07-08
- 2 P.Suseela,Assoc.Prof has done a live phone in programme on" Microirrigation" In Doordarsan Kendra TVM on 12-3-09

List of publications

Scientific papers

.Suseela.P. 2008. "Growing cauliflower in greenhouse fetches more" . Journal of Indian Farming. 59(4): pp-9-11

Books

K.P.Prameela, T.K.Bridgit, Suma Paulose, Mini Abraham ,P.Suseela ,A.M.Reji
Natural resource management for better water productivity

Popular Articles

- 1.P.Susccla. 2008. "Different types of micro irrigation". Spice India (Malayalam) monthly,. Spices Board India, Ministry of Commerce & Industry, Govt. of India. 19(4) : pp9-12.
- 2.P.Suseela. 2008. "Micro irrigation – trainings to farmers". Spice India (Malayalam), Malayalam Journal, Vol. 21 (2) : pp-5-7.
3. P.Suseela. 2008. "Application of Water and fertilizers to the plants with minimum expense". Karshakasree, Malayalam Journal, Vol. 13 (5) : pp-35-38.
4. P.Suseela. 2008. "You can fabricate micro sprinkler". Karshakan. Malayalam Journal, Vol. 16 (1) : pp-19-20.
5. P.Suseela. 2008. "Many things are to be keeping in mind while installing pump set". Spice India (Malayalam) monthly. Spices Board India, Ministry of Commerce & Industry, Govt. of India. 21(5) : pp 5-9.
6. P.Suseela. 2008. "Irrigation is essential for coconut plants for increasing the yield". Indian coconut journal, April 2008: pp-2-5.
7. P.Suseela. 2008. "Measures to be taken to protect the coconut plants from draught". Indian coconut journal, March 2008: pp-2-5
8. .Suseela. 2008. "Geomembrane rain water storage tanks for water security". Karshakan. Malayalam Journal, Vol. 16 (10) : pp-57-59.
9. P.Suseela. 2008. "One greenhouse for each house - for attaining self sufficiency in vegetable production in Kerala". Karshakan. Malayalam Journal, Vol. 16 (7) : pp-29-32.
10. P.Suseela. 2008. "Potential of Protected cultivation in Kerala". Malayala Manorama daily, Friday, Sept.5, 2008.
11. P.Suseela. 2008. "Popularization of greenhouse cultivation through trainings". Spice India (Malayalam) monthly. Spices Board India, Ministry of Commerce & Industry, Govt. of India. 21(9) : pp15-17.
12. P.Suseela. 2008. "Greenhouse cultivation increases the yield four times". Karshakasree, Malayalam Journal, Vol. 14 (1): pp-36-37.
13. P.Suseela. 2008. "Production of good quality vegetables and fruits in greenhouses". Karshakan. Malayalam Journal, Vol. 16 (10): pp-60-61.
14. P.Suseela. 2008. "Green revolution through greenhouse revolution". Kerala Karshakan, Malayalam Journal, Jan 2008: pp-28-29.
- 15.P.Suseela. 2008. "Selection of pump sets". Spice India (Malayalam), Malayalam Journal, Vol. 21 (7) : pp-15-16.
16. Mini Abraham.2009." Processing of vanilla beans". Kerala Karshakan, Malayalamjournal,vol.54(8).pp-15-16
17. Bridgit T. K. 2008" Balanced fertilization in rice" Karshakasree

Important visitors

1. Sri. Mullakkara Ratnakaran, Minister of Agriculture, Kerala visited the station on 24-05-08 in connection with the inauguration of the AICRP XIth plan project "Scaling up of water productivity"
2. Sri. A.K. Chandran, M.L.A, Mala, Kerala visited the station on 24-05-08 in connection with the inauguration of the AICRP XIth plan project "Scaling up of water productivity"
3. Sri. Bhawar puri CGM, NABARD, visited the Station on 27-10-08
4. Sri B. D. Devassy, M. L. A., Chalakudy, Visited the Station for the stone laying purpose of Sales counter on 15-01-08 and for the inauguration function of the same on 28-02-09

Details of sale of seeds/Planting materials/bio-control agents

I.b.Foundation Seed

crop	Variety	Code No	Target for 2008-09 (kg)	Quantity produced 2008-09 (kg)	Quantity sold during 2008-09 (kg)	Balance stock as on 1-4-2009 (kg)
Bittergourd	Preethi		40.00	45.550	45.00	0.550
Snakegourd	Kaumudhi		20.00	18.750	18.750	Nil
Watermelon	Sugar baby		0.50	0.425	0.425	Nil
Bhindi	Varsha Upakar		40.00	21.500	21.500	Nil
Ashgourd	KAU Local		35.00	23.550	23.550	Nil
Pumpkin	Ambily		10.00	14.050	14.050	Nil
Amaranthus	Arun		10.00	10.200	10.200	Nil
Brinjal	Haritha		5.00	8.700	8.700	Nil
Chilly	Ujwala		0.50	0.200	0.200	Nil
Cowpea	Kanakamani		100.00	94.00	85.00	9.00
Cowpea	Kairali/Anaswara		50.00	47.750	47.750	Nil
Cowpea	Lola/y/b/ Vyjanthi		50.00	42.650	42.650	Nil
Ridgegourd			1.00	0.785	0.785	Nil
Bottlegourd	Arkabahar		5.00	2.300	2.300	Nil
Brinjal Seedling	Haritha		1000.00	1330	1330	Nil
Chilly Seedlings	Ujwala		1000.00	2033	2033	Nil
Drumstick Seedlings	Annual		200.00	70	70	Nil
Paddy	Red Thriveni		6000.00	5975.00	5975.00	Nil
Paddy	Jyothi		1500.00	977.00	977.00	Nil
Paddy	Manu priya		2000.00	3295.00	3295.00	Nil
Paddy	Njavara		100.00	80.00	80.00	Nil
Gingelly sodd	Kayamkulam-1		50.00	19.00	16.00	3.00

II. Seedlings/Cuttings/Grafts/Rhizomes etc.

Crop	Variety	Code No	Target for 2008-09 (kg)	Quantity produced 2008-09 (kg)	Quantity sold during 2008-09 (kg)	Balance stock as on 1-4-2009 (kg)
Coconut	WCT		5000	4555	4555	nil
Arecanut	Mangala			741	741	nil
"	Mohit nagar			1427	1427	nil
"	South canara			2345	2345	nil
Rooted pepper cuttings	Panniyur -1 Karimunda		2500	2500	2500	nil
Guvava			20	20	12	8
Mangostein			20	180	180	nil
Other fruits			100	150	100	50
Banana suckers			250	312	312	312
Nutmeg			1000	380	365	15
Papaya				150	130	20
Jasmine (Bush)				100	100	100
Canna suckers				150	135	15

Other details if any

Agricultural information cum sales counter

A new information cum sales counter was sanctioned to ARS,Chalakydy granted from the local fund of M.L.A. Foundation stone was laid by Honourable M.L.A , Sri.B.D. Devassy, on 15-11-08 and inauguration of the sales counter was done on 28/2/2009 by Honourable M.L.A , Sri.B.D. Devassy

Preparation and sale of natural vanilla cake

A technology was developed by the station for the powdering of cured vanilla beans without loss of volatile constituents. Using this natural vanilla powder tea cake and plum cake were prepared by SHG group and sold during the Christmas and New Year season. All-round 100 numbers of plum cake (700g), 88 numbers of tea cake (400 g) and 30 numbers of tea cake (800g) were sold during the season.

Finance

Head of A/c	Expenditure (Rs.)	Receipts (Rs.)
Non Plan	2263542	759045
NARP	2592209	
EMD refund, Bank charges	5000	
Plan	156835	
ICAR	3394531	
Other EAPs	3139394	
Revolving fund	474681	544741
Total	12026192	1303786

AROMATIC AND MEDICINAL PLANTS RESEARCH STATION, ODAKKLAI

Name of head of station : Dr. Baby P. Skaria

Research programme

a. Major research achievements

Research Projects

1. Collection and maintenance of germplasm of aromatic and medicinal plants. The station maintains about 450 accessions of lemongrass which is the largest collection in the world. Twelve accessions of palmarosa are also maintained. There is also a good collection of cinnamon (235 nos.), vetiver (18 nos.) and various medicinal plant species 400 nos.) which are maintained.
2. In the study to identify adaptogenic plants and Ayurvedic drugs, a few plants (koovalam, brahmi, guava) and medicines (Triphalachoornam, Draksharishtam, Chyavanaprasam) were found to possess high in vitro high antioxidant capacity.
3. In a project financed by the KSCSTE, studies were conducted on the nursery techniques, manurial and shade requirement as well as quality aspects of medicinally important Ficus species of 'naalpamara' group.

b. Details of research projects.

1. Development of agrotechniques in selected medicinal trees of Kerala' funded by Kerala State Council for Science, Technology and environment was in operation during 2005-08.

Salient findings of the study

I. Propagation in Ficus spp.

a. Seed propagation

Untreated seeds of *F. racemosa*, *F. microcarpa*, *F. religiosa* and *F. benghalensis* have germination percentages of 5.0, 2.3, 27.7 and 82.0% respectively. Soaking seeds in hot water at 65°C for 10 minutes brought about significant increase in germination percentages of *F. racemosa*, *F. microcarpa* and *F. religiosa*. In *F. religiosa*, germination started on 8th day of incubation, but it prolonged up to 35 days whereas in the other three species, it was completed in 10-15 days. In *F. racemosa* and *F. microcarpa* there was drastic decrease in germination percentage after six months. In *F. religiosa* viability started declining after 12 months whereas *F. benghalensis* seeds retained satisfactory germination even after 18 months. Storing seeds in refrigerator retained the viability of seeds of *F. racemosa*, *F. religiosa* and *F. benghalensis* up to two years. Germination percentage of *F. racemosa*, *F. religiosa* and *F. benghalensis* are higher in sowing medium of coir pith, vermicompost and dried litter compared to ordinary potting medium.

b. Vegetative propagation

i. Stem cuttings

Stem cuttings of diameter 15-25 mm is ideal for rooting. The percentage success is 10-12% in *F. racemosa* and *F. religiosa* and 18-20% in *F. microcarpa* and *F. benghalensis*.

ii. Air layering

Air layering in twigs of old trees during May-June gives 40% rooting in *F. racemosa*, 80% in *F. microcarpa* and 90% in *F. religiosa* and *F. benghalensis*. Layering during August – September gives 90% rooting in *F. racemosa*

II. Standardisation of manurial and shade requirement of Palakappayyani (*Oroxylum indicum*)

i. Light requirement

O. indicum is a plant which requires good sunlight; its performance is poor under shaded situation.

ii. Manurial requirement

Seedling of *O. indicum* is to be manured with FYM 20 kg/ plant/year or poultry manure 10 kg/ plant/year as two doses for optimum growth.

III. Pruning practices in *Caesalpinia sappan*

C. sappan should be left unpruned and supported with poles during the initial years for good crop architecture and to obtain stems with higher diameter.

2. Investigations on anti-inflammatory properties of selected underexploited medicinal plants FRC Code No: AMP-06-00-02-2008/ODL (10)/ KSCSTE- on going

Anti-inflammatory activity of all the three plant species included in the study is confirmed by in vivo studies. Use of *Argyreia speciosa*, *Ipomoea mauritiana* and *Artanema sesamoides* for cure of inflammatory conditions in traditional medicine system is scientifically validated. Ethanol extractives of *Artanema sesamoides* and *Argyreia speciosa* roots were much superior in anti-inflammatory activity. *Artanema sesamoides* root extractives showed highest antioxidant activity and very high total phenolic content compared to other two root extractives. It also showed highest anti-inflammatory activity at a lower dosage at 3 hr observation and also at 7th day of consecutive drug administration.

3. Development of good agricultural practices and GAP monograph of *Bacopa monnieri*

The research program include collection and conservation of different ecotypes, characterization of the strains, identification of suitable strain for cultivation, agroecological requirements, propagation methods, agronomic practices, pest & disease control, and quality evaluation aspects.

The work commenced from 1st January 2009. The first stage is collection and conservation of different ecotypes. District wise information is collected on the natural availability, cultivation, marketing, market price, crude drug traders, pharmaceutical industries and brahmi preparations. The different ecotypes and biotypes of *B. monnieri* available in Ernakulam, kannur, Vayanadu and Idukki districts were collected and established in the herbal garden of the research centre. Photographs were taken. Observations are taken from the brahmi samples preserved in the herbal garden.

Ernakulam: Wide extend of brahmi is seen in North Paravoor. Brahmi cultivation is not generally prevalent in this district. The average market value ranges between 10 and 15 Rs./kg. Parathuvayalil Ayurveda Pharmacy, Kerala Ayurveda Pharmacy Ltd., Arjuna Natural Extracts Ltd are Brahmi Using Companies.

Kannur: Marshy places, river shores, paddy fields, wet lands in kannur are rich in brahmi. Saline water is good for their growth. Brahmi cultivation started in small scale. The average market value ranges between 25-35 Rs /Kg.

Idukki: Wet lands in Idukki district harbour brahmi. Brahmi cultivation started in few places. The average market value ranges between 20-30 Rs./Kg.

Wayanad: Brahmi is seen growing in marshy places and paddy fields. Brahmi cultivation is not observed. The average market value ranges between 20-40 Rs./Kg. Annual Requirement of Brahmi in Kerala is about 69183 kg (fresh).

4. Study of selected Adaptogenic Plants and Ayurvedic Drugs with special reference to Polyphenolic Composition and Antioxidant Activity (KAU-Oushadhi collaborative project funded by National Medicinal Plants Board, Govt. of India)

The project aims at studying the antioxidant capacity of adaptogenic plants and rasayana drugs in Ayurveda in relation to their content of polyphenol compounds.

During the period under report, methods were developed for chemical analysis of medicinal plants, crude drugs and formulations selected for the study. Methods of extraction, HPLC analysis of polyphenolic components and assay of antioxidant capacity by five different methods were developed and validated. Seasonal variations in the polyphenolic composition and antioxidant capacity of ten selected adaptogenic medicinal plants were studied on samples collected during August 2008 and February 2009. Studies on the changes in quality and activity of selected adaptogenic Ayurvedic drugs during shelf storage were initiated.

Development projects.

1. National Horticulture mission Project (Aromatic plants component), seeds and planting materials of different aromatic and medicinal plants were produced and sold to farmers giving an income of 6 .0 lakhs to the station. During the year different sophisticated equipments were procured for the Regional Analytical Laboratory of the station
2. Under the spices component of the above scheme, rooted pepper cuttings and grafts/budlings of nut meg are produced for sales to farmers . Also the planting materials of clove, all spice , curry leaf and cinnamon were produced in the station . The total production was to the tune of Rs. 1.5 lakhs in the year
3. Facilitation Centre for medicinal plants: This project is funded by National Medicinal Plants Board . A total of 5 trainings were organised at different district of a state and 249 farmers were trained on cultivation of medicinal plants . In the work shop conducted during the year under scheme 350 participants from different sectors of Medicinal plants attended.
4. RKVY project "Strengthening of analytical laboratory for quality testing and certification of produce of medicinal plants at AMPRS, Odakkali" (Outlay Rs. 22.00 lakhs)

This project envisaged purchase and installation of certain sophisticated items of equipment in the laboratory to strengthen its analytical capability for testing and certifying farmer's produce and standardization of methods for quality analysis.

Extension programmes

a. Highlights of extension activities

Being one of the pioneer institutions engaged in the research on aromatic and medicinal plants, good liaison is maintained between producers, traders, and the user industry. Dissemination of technology is efficiently carried out through regular farmer contact programmes, correspondence, news papers, audio and visual media. The station functions as a quality testing centre for essential oils and important medicinal plants & crude drugs thereby enabling the farmers to fetch the maximum price for their produce based on quality. Agriclinc and training programmes are integral part of our extension activities. We have participated local agricultural fairs and exhibitions. The station meets the demand of planting materials from potential cultivators not only from within the state but also from places everywhere. Dr. Baby P. Skaria served as a resource person in the monthly T&V Workshop programme of the Eranakulam District

Farm Advisory Services			
	In person	Over telephone	Through letters
1.	110	246	65

Radio talks / TV programmes /: Audio-video cassettes		
Radio talks :		
Topic	Date	Name of Scientist
Prospects of Vetiver (AIR, Kochi)	16-2-2009	Dr. Gracy Mathew
Audio-video cassettes:		
CD on medicinal plants prepared for sale to public at a sale price of Rs:100/-		

List of publications

Skaria, B.P., Joy P.P., Mathew, S., Mathew, G. and Joseph, A. 2008. CD on 'Medicinal and Aromatic Plants'. Aromatic and Medicinal Plants Research Station, Odakkali

Skaria, B.P., Raj, M.N., Mathew, S., Joy P.P., Mathew, G. and Joseph, A. (Eds.) 2009. "Oushadha sasya krishikku oru vazhikatti" (in Malayalam), Aromatic and Medicinal Plants Research Station, Odakkali, Kerala Agricultural University, Trichur. 270p.

Book Chapters

Skaria, B.P. 2008. *Oushadhavilakalile Samyojitha keeda-roga niyanthranam* In: *Oushadhikaliloode Aarogyam – Manninum Manushyanum* (Malayalam) Eds. N. Mini Raj, E.V. Nybe, M. Asha Sankar and Lissamma Joseph). Dept. of Plantation Crops, College of Horticulture, Kerala Agricultural University, Thrissur. Pp.43-49

Mathew, S. 2008. *Mikacha Krishi reethikalum Nirmana reethikalum Oushadha Vilakalil*. In: *Oushadhikaliloode Aarogyam – Manninum Manushyanum* (Malayalam) Eds. N. Mini Raj, E.V. Nybe, M. Asha Sankar and Lissamma Joseph). Dept. of Plantation Crops, College of Horticulture, Kerala Agricultural University, Thrissur. Pp.442-447.

Joy, P. P. 2008. *Kizhangu Vilakal-2*. In: *Oushadhikaliloode Aarogyam – Manninum Manushyanum* (Malayalam) Eds. N. Mini Raj, E.V. Nybe, M. Asha Sankar and Lissamma Joseph). Dept. of Plantation Crops, College of Horticulture, Kerala Agricultural University, Thrissur. Pp.127-144.

G. Mathew. 2008. *Vriksha Oushadhikal-1* In: *Oushadhikaliloode Aarogyam – Manninum Manushyanum* (Malayalam) Eds. N. Mini Raj, E.V. Nybe, M. Asha Sankar and Lissamma Joseph). Dept. of Plantation Crops, College of Horticulture, Kerala Agricultural University, Thrissur. Pp.166-198

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- Skaria, B.P. 2009. *Oushadha Sasya Vilakalude Pradhanyam*. In: "Oushadha sasya krishikku oru vazhikatti"(Malayalam) Eds. Skaria, B.P., Raj, M.N., Mathew, S., Joy P.P., Mathew, G. and Joseph, A. Aromatic and Medicinal Plants Research Station, Odakkali, Kerala Agricultural University, Trichur. P. 13-19.
- Mathew, S., 2009. "*Nalla Krishi Sampradayanga*". In: "Oushadha sasya krishikku oru vazhikatti"(Malayalam) Eds. Skaria, B.P., Raj, M.N., Mathew, S., Joy P.P., Mathew, G. and Joseph, A. Aromatic and Medicinal Plants Research Station, Odakkali, Kerala Agricultural University, Trichur. P. 234-241.
- Joy, P. P., 2009. "Medicinal Herbs". In: "Oushadha sasya krishikku oru vazhikatti"(Malayalam) Eds. Skaria, B.P., Raj, M.N., Mathew, S., Joy P.P., Mathew, G. and Joseph, A. Aromatic and Medicinal Plants Research Station, Odakkali, Kerala Agricultural University, Trichur. p.32-48
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- Joseph, A. 2009. " " . In: "Oushadha sasya krishikku oru vazhikatti"(Malayalam) Eds. Skaria, B.P., Raj, M.N., Mathew, S., Joy P.P., Mathew, G. and Joseph, A. Aromatic and Medicinal Plants Research Station, Odakkali, Kerala Agricultural University, Trichur. p.

Scientific papers

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- Joy P.P., Skaria, B. P., Mathew, S., Mathew, G. and Joseph, A. 2008. Status of Aromatic Crops in India. National Seminar on Recent Trends in Research on Spices and Aromatic Plants, Hissar, 10-12th September, 2008. 123-127
- Joseph, A., Skaria, B.P., Mathew, S., Joy P.P. and Mathew, G. 2008. Giant Potato – An under-exploited medicinal plant. Indian Journal of Arecanut, Spices and Medicinal plants 10 (1): 8-12
- Joy P.P., Skaria, B. P., Mathew, S., Mathew, G. and Joseph, A. 2009. Standardisation of oleoresin extraction in lemongrass (*Cymbopogon flexuosus*). Proceedings of National Workshop on Spices and Aromatic Plants, February 4-5, 2009 PAU, Ludhiana. P 125-135
- Ancy Joseph, Chandrasekharan A.M. Samuel Mathew., Baby P. Skaria, Sheeja E. C. and Savita V. Rajan. 2009. Preliminary Screening of *Ipomoea Mauritiana* Tuber Extracts for Anti-Inflammatory Activity. National Seminar on 'Molecules to Drugs', Mar Athanasius College, Kothamangalam, Kerala, 21-22 January 2009. 16-17
- Ancy Joseph 2008. Medicinal Plant propagation. *Oushadham*. 9(8): 5-8.

Technical Bulletins

- Gracy Mathew, Skaria, B.P. and Joy, P. P. 2009. Development of Agrotechniques in Selected Medicinal Trees of Kerala. Project Completion Report of KSCSTE funded project. Aromatic and Medicinal Plants Research Station, Odakkali, Asamannoor PO, Kerala. P. 62

Popular Articles

1. Dr. Baby P Skaria, Neethu S Nair. "Chakkarakkolli"- Keralakarshakan, March 2009, page no-57-58
2. Mathew, G., Manju P.S. and Skaria B.P. 2009. Kunnimaniyute oushadhathilakkam Kerala Karshakan. 8 (54): 48-49
3. "Kunnimaniyude oushadhathilakkam" - Dr. Gracy Mathew, Manju P S, Dr. Baby P Skaria: Keralakarshakan, January 2009Page 48-49
4. "Ramachasugandham Eni puthan mekhalakalil"- Sheeja E C, Biji Joseph, Savitha V Rajan, Neethu S Nair, Dr. Ancy Joseph: Karshakan, May 2008 page 6-10
5. "Edavilayayi Pachouli" - Sheeja E C, Biji Joseph, Savitha V Rajan, Neethu S Nair, Dr. Ancy Joseph: Karshakan, June 2008 page 25-28
6. "Sugandhathaila oushadhasasyakrishi karshaka – vyavasayi koottaymayiloote"- Dr. Baby P Skaria, Dr. Gracy Mathew, Keralakarshakan, June 2008 page 58-60

Important visitors

A total of 800 visitors including foreign nationals visited the station . The distinguished visitors are the following.

- 1) Sri .K.R .Viswambharan IAS , Vice Chancellor, KAU (24/5/08 & 31/1/09)
- 2) Prof. Hassan M. Elshaer, Consultant, Desert Res. Centre , Egypt (15/7/08)
- 3) Mr. Khalid Alturk, President, Alturki Group, Saudi Arabia (15/7/08)
Sri. K.V. Ahamed Bavappa, Former Director, CPCRI (21/8/08)

Details of sale of seeds / planting materials

Crop & variety	Production	Revenue (Rs.)
Bhindi- Arka anamika	13.5 kg	12150
Cow pea- Kanakamani	14.75 kg	2950
Cow pea- Anaswara	40	16000
Bitter gourd- Preethi	10.5	15750
Snake gourd- Kaumudi	10.50 kg	15750
Snake gourd-baby	4.725kg	7100
Ash gourd -KAU local	8	9600
Cucumber- Mudikode local	8 kg	12000
Cucumber –AAUC 2	6	10800
Amaranthus- Arun	12.8	12800
Brinjal- Haritha	4.75 kg	5700
Yard Long Bean- Lola	39 kg	46800
Ridge gourd - Deepthi	4 kg	4000
Chilli, Ujwala	3.6 kg	9000
Pumpkin- Ambili	7½	11250
Coconut WCT (RF scheme)	4650 Nos	162750
Areanut seedlings Kasargodan (RF scheme)	4800	38400
Mohitagar (RF)	2000	20000
Improved pepper varieties	6600	33000
Mango graft	425	12750
Jack graft Muttom varika	530	13250

Guava layer- Allahabad safeda	100	2000
Cocoa seedling Hybrid	5000	50000
Forest plants (Teak, Mahagoni)	3800	38000
Ornamental plants	3500	35000
Vegetable seedling (Tomato, Chilly, Brinjal)	1700	8500
Pepper Karimunda	26325	52650
Bush pepper	100	3500
Nutmeg graft/ bud	435	30450
Cinnamon seedlings	200	1000
Curry leaf	190	1900
Medicinal plants	2100	10500
LG seed OD- 19	218	261600
Vetiver slips	30895	30895
Total		Rs. 985645

Finance 2008-09

Head	Expenditure	Receipts
Non Plan	5965179	1126237
Plan	514159	
ICAR	-	
OEAPs	4435922	
Revolving fund	901969	1212263
Total	11817229	2338500

PINEAPPLE RESEARCH STATION, VAZHAKULAM

Name of Head of the Station : Dr. Kuriakose, K.P.

Research programmes

a) Major research achievements (highlights)

One pineapple hybrid developed at this station is under farm trial.

A clonal variant of pineapple developed at this station is under farm trial.

One yellow variety of passionfruit developed at this station is under farm trial.

Presence of Pineapple Mealybug Wilt Associated Virus was detected in Vazhakulam area.

Extension programmes

a) Highlights of extension activities

The management problems faced by pineapple farmers are regularly attended by visiting fields, in person, seminars, through telephones, emails etc. Extension activities are mainly done in association with the Pineapple Farmers Association, ever since the inception of the station. This has contributed much to the development of pineapple in Kerala. A one day Pineapple Festival was organized on 22.12.2008 in association with Pineapple Farmers Association and Jeevan TV. The theme of the festival was "Home processing of pineapple". The Festival was inaugurated by Minister for Agriculture Sri. Mullakara Ratnakaran. The Minister has visited the first organic pineapple farm in Kerala managed as per the technical advice from this station. The Minister has held a discussion with pineapple farmers, convened at the station.

Finance 2008-09

Head	Expenditure(Rs)	Receipts(Rs)
Non plan	-	-
Plan	1864175	33291
ICAR	-	-
OEAPs	1029547	139538
Revolving fund	-	-

BANANA RESEARCH STATION, KANNARA

Name of Head of the station : Dr. K.C. Aipe

Faculty Improvement Programme

a) Deputation of scientists for seminars / Workshop/Symposia

Name of the participant	Title of the Seminar/Symposium/ Group meeting	Organizers/Venue	Date
Dr. Rema Menon Dr. Suma A Dr. Anita Cherian K Dr. Maicy kutty P Mathew	International Conference on quality production of banana for domestic and export market	NRCB, Trichy	24-10-08 to 26-10-08
Dr. Rema Menon Dr. Maicykutty P. Mathew Dr. Suma A Dr. Anita Cherian K	Attended Pre-ZREAC Workshop	RARS, Pattambi	One day - 5.5.08
Dr. Rema Menon Dr. Maicykutty P. Mathew Dr. Suma A Dr. Anita Cherian K	15 th Biennial Workshop of AICRP on Tropical Fruits	ICAR & TNAU, Coimbatore	9-12, May, 2008
Dr. Rema Menon Dr. Maicykutty P. Mathew Dr. Suma A Dr. Anita Cherian K	ZREAC Workshop	RARS, Pattambi	One day - 20.5.08

b) Deputation of scientists for training programmes/Summer school/winter school

Name of the participant	Title of the Seminar/Symposium/Group meeting	Venue/Organizers	Date
Dr. Anita Cherian.K	International training programme on molecular diagnosis of viral diseases of banana	NRCB, Trichy and QDPI, Australia	28-10-08 to 2-11-08
Dr. A. Suma	Training on fiber extraction	NRCB, Trichy	3-02-09 to 4-02-09

BANANA

Varietal evaluation and Improvement

The germplasm (284 accessions) collected from different sources within and outside the country were conserved in a compact field gene bank. Twenty nine new additions were made by collecting material from NBPGR, NEW Delhi, NRCB, Trichy, TNAU, Coimbatore and BCKV, Kalyani. Farm trial on three varieties, Yangambi KM-5, Big Ebanga and Manjeri Nendran-II were completed. The improved cooking banana hybrid FHIA-03 was advanced to farm trial. Hybridisation work is being continued for developing superior synthetic diploids and Nendran hybrids.

Accessions in the germplasm were screened against nematodes, pseudostem borer, leaf spot diseases, Fusarium wilt and bunchy top.

Planting density, Propagation and Root stocks

Planting three suckers per pit at a spacing of 2 x 3 m and giving 100% recommended dose of fertilizers resulted in higher per hectare yield in banana var. nendran.

Nutrition

Studies on stage wise application of N and K₂O revealed that application of N and K₂O as per the package of practices was better followed by application of N and K₂O in three splits with 80 percent N and 20 percent K₂O in the vegetative stage.

Water Management , weed control and Orchard Management

Irrigating at 80 ER at all growth stages was ideal for Nendran for maintaining proper growth and yield.

Turmeric proved to be the most profitable intercrop with rainfed Nendran

Value addition

Banana varieties were screened for fibre recovery percentage and banana var. nendran gave the maximum fibre recovery. Standardised the mechanized extraction of banana fibre. Prototypes of different products were prepared.

Pest Management

The pest surveillance on banana was conducted. Major pests recorded were pseudostem borer, rhizome weevil, banana aphid, leaf caterpillars and root mealybug. Detailed studies on biology and management of pseudostem borer and root mealy bug are being continued. Taxonomic study of root mealy bugs showed that there are two species infesting banana, namely, *Geococcus citrinus* Kuwana and *G. coffeae* Green. The biology of *G. citrinus* was studied on germinated green gram seeds. *Geococcus citrinus* is a bisexual species. Females were wingless and males were winged with single pair of wings. The females always covered their body with thin waxy filaments and eggs were also covered with it. Males have four stages in the life cycle. There is an additional pupal stage with duration of five days. The total life cycle took about 34-39 days. Biological control studies on root mealy bug are in progress.

The biology of pseudostem borer was worked out. The total life cycle took about 54 days. The germplasm of banana (185 varieties/ accessions) was screened for the presence of pseudostem borer infestation. Thirteen varieties were infested. These were CRPB-39, FHIA-17, Matti, Kadali, Namkanika, Nendran, Big Ebanga, Bhimkhel, Red Banana, Palayankodan, Dudhsagar, Kanchikela and Njock-kon.

Survey on banana nematodes conducted in three districts, namely, Thrissur Palakkad and Ernakulam. The nematode genera commonly encountered in these sites were *Rotylenchulus*, and *Tylenchorynchus*. Very low population of *Radopholus*, *Helicotylenchus* and *Meloidogyne*. *Hoplolaimus* and *Heterodera* were observed from few sites

Disease Management

The major diseases of banana recorded during the period are leaf spot diseases, viral diseases like Bunchy Top, Banana Bract Mosaic and Infectious Chlorosis, and Rhizome rot. Panama Wilt was recorded on varieties like Rasthali, Kadali and Njalipooan

Rotting on the pseudostem of banana var. Kadali was recorded in Thrissur district. The fungus was identified as *Sclerotium* sp. The symptoms were the appearance of reddish coloured

rotting on the pseudostem on which numerous sclerotia were seen. Correlation of incidence of Sigatoka leaf spot, with weather parameters was worked out. The results on the correlation showed that the incidence of sigatoka leaf spot disease had significant positive correlation with rainfall and humidity and negative correlation with temperature .

Sigatoka leaf spot disease could be effectively managed by spraying Propiconazole (Tilt 25 EC) 1 ml/l (0.1%) + spraying of *Pseudomonas fluorescens* @ 5 g/ litre three times. Intensive investigations on viral diseases are being carried out by standardizing the molecular and serological indexing of tissue culture plants and suckers against the viruses infecting banana. The genotypes in germplasm and planting materials are being screened using ELISA. The facilities for molecular indexing are being established in this station.

JACK FRUIT

Varietal trial

Promising clones of jack were collected from different regions and evaluated their performance. Muttam varikka, Pechiparai -1, Singapore Jack, Palur-1, Burliar-1 and Velipala could be established in the field.

Propagation and Root stocks

The most effective propagation method in jack was inarching where the graft take was 90% with a final success percentage of 50 per cent .Trials on epicotyl grafting and soft wood grafting are being continued

Pest Management

Survey on pests of Jackfruit showed that 12 species of insects and mites occur on jack. Defoliation by grass hopper and leaf caterpillar was of regular occurrence. Lycaenid caterpillar, a white sphingid caterpillar, green leafhopper and a green katydid were observed during the year. Infestation by the tingid bug was wide spread but of mild nature. The spittle bug, *Clovia lineaticollis* is a mild but regular pest whenever new shoots are formed

Disease management

Diseases recorded were leaf spot disease & fruit rot caused by *Colletotrichum gloeosporioides*, Rhizopus fruit rot and pink disease caused by *Corticium salmonicolor*.

PINEAPPLE

The pineapple germplasm is being maintained. Back crossing of hybrids with commercial varieties viz, Kew and Mauritius is in progress. Seedlings of the progenies are being evaluated.

RAMBUTAN

Rambutan budded plants procured from a private nursery were planted to study its establishment and performance

i) Training programme organized at the station

Trainings were given to various groups of farmers on various aspects of banana cultivation

ii) Farm Advisory services

The scientists of the station visited farmers field, identified the pests and diseases, nutritional and physiological disorders and made appropriate recommendations. The scientists also rendered advises to a large number of farmers over phone and internet.

Important visitors

- ❖ Dr. K.R. Vishwambaram, Honourable Vice Chancellor, KAU visited the station on 14-1-09
- ❖ Dr. Prakash Patil, Sr.Scientist, Project coordinator's cell, IIHRBangalore on 16-1-2009
- ❖ Dr.Lalitha Sunil Kumar, Scientist NCL,Pune along with her Ph.D student, Mrs Pallavi Shankar visited the station on 16-19th march 2009

Details of sale of seeds / planting materials/biocontrol agencies etc.

Item	Quantity	Revenue Rs
Seeds and planting materials		
Banana suckers	28000	1,44,000
Banana TC plants	6000	90,000
Rooted Pepper cuttings	1983	3966
Coconut seedlings	750	18,000
Turmeric	580 kg.	8700
Vegetable seeds	21 kg	18,000
Amorphophallus	2500 kg	37,500

Finance

Head	Expenditure (lakh)	Receipts (lakh)
Non Plan	65.60	}
Plan	0.59	
ICAR	46.92	} 14.71
Other EAPs	57.63	
Total	170.74	}

Revolving Fund : SHG –

Seed Money	-	69,000/-
Receipt transferred to Comptroller	-	26,000/-

CADBURY-KAU CO-OPERATIVE COCOA RESEARCH PROJECT, VELLANIKKARA

Research Programmes:

a. Major research achievements (highlights):

During the year two consignments of bud wood of cocoa consisting of 74 clones resistant to *Phytophthora* pod rot were imported from the International Cocoa Quarantine Centre, University of Reading UK. Out of these 53 clones survived. The details of clones imported are provided in Table 1.

Table 1. Details of cocoa clones imported from the International Cocoa Quarantine Centre, University of Reading, UK.

During the year 30 crosses involving 10 selected female and 8 male parents were made. The pods are in varying stages of development. 134 hybrid seedlings resistant to *Phytophthora* pod rot were field planted during the year.

Twenty two inbred genotypes were selfed to produce the next generation inbreds and the pods are developing in three plants and 19 turned out to be self incompatible. Seventy seven inbred cross seedlings derived from 4 distant inbreds were field planted during the year.

Extension programmes

a) Highlights of extension activities (attach photographs of important activities):

- ❖ During the year a field day on cocoa was organized in the CCRP farm. The programme was sponsored by the Directorate of Cashewnut & Cocoa Development, Kochi.
- ❖ A training programme on Cocoa diseases and pests was organized in the farm of Mr. Thomas, Kanjirappally as a part of the DCCD funded project.
- ❖ Classes on cocoa cultivation were handled by the faculty members in farmers' seminars organized by Cadbury India Ltd and Manarkad Social Service Society in Attappady and Kattappana respectively
- ❖ Produced four video CDs on cocoa cultivation and processing on small scale
- ❖ Published booklets on cocoa processing both in Malayalam and English
- ❖ Published a book on Cocoa in India
- ❖ The ATIC SAIU on cocoa products is visited by 353 farmers and 2256 students

Farm advisory Services:

Department	In person	Over telephone	Through letters
CCRP	60	450	5

Field visits

No. of visits	Problem identified	Recommendations
4	Tea mosquito	Spraying Ekalux 2ml/l

Radio talks / TV programmes / Audio-Video cassettes:

Topic	Date	Name of scientist	Venue
Farm level processing of cocoa	25.11.08	Dr.S.Prasannakumari Amma	25.11.08
Cocoa cultivation	25.11.08	Dr.E.K.Lalitha Bai	25.11.08
Intercropping tubercrops in coconut plantations	6.2.09	Dr.S.Prasannakumari Amma	AIR, Thrissur

Number of Publications:

Scientific papers	Technical bulletins	Popular Articles	Books	Video CD
1	2			4

List of publications**Scientific papers**

S.Prasannakumari Amma, 2008. Empowerment of cocoa farming sector through farm level value addition. Abstr. National Seminar on Food security through innovations in food processing and entrepreneurship development, Kerala Agricultural University, 29th and 30th September 2008

Booklets

Mallika, V.K and Prasannakumari Amma, S. 2008. *Cocoa processing at farm level* (English & Malayalam) Published by the Directorate of Extension and funded by the Directorate of Cashewnut & Cocoa Development

Important visitors:

Sl. No.	Name of the visitor/s	Designation/ address
1.	Dr.Rai, Dr.V.George Thomas, Dr.K.U.KNamboothiri Dr.R.Chandramohan, Dr.Bakshi, Dr.Malik	Quinquennial review team
2.	Dr.K.Rajamani, Dr.N.Shobha and Dr.P.Muthukrishnan	Faculty members, Dept. of Plantation Crops & Spices, TNAU, Coimbatore
3	David Preece	Head, Cadbury International, UK
4	Mr. David Croft,	Director of Conformance and Sustainability, Cadbury Schweppes, UK
5	Mr.K.P.Magudapathy	Associate Vice President, Cadbury India Ltd.
6	Mr.R.Rajesh	General Manager, Cadbury India Ltd
7	Mr. C.Vijayakumar	General Manager, Cadbury India Ltd
8	Dr.Elain Aphshara	Senior Scientist ,CPCRI Regional Station, Vittal

❖ Details of sales/planting materials/ products/ biocontrol agents

Item	Quantity	Revenue (Rs. In lakhs)
F ₁ Cocoa Hybrid seed pods	1,24,203	5.064
F ₁ Hybrid cocoa seedlings	8103	0.81
Budded cocoa plants	5001	1.00

Finance 2008-'09

Head	Expenditure (Rs.)	Internal Receipts (Rs.)
Non-plan	Nil	Nil
Plan	1,04,754	
Other EAPs		
Cadbury- KAU Co-operative Cocoa Research Project	37,46,054	8,48,629
SHM Production of Video CD	1,68,000	
DCCD- Survey, Surveillance and Training on cocoa diseases	40,941	
DCCD- Field day	50,000	
DCCD- Printing of booklet on cocoa processing	10,000	
DCCD- Printing book on cocoa	38,530	
NCOF -Setting model organic Farm	14,750	
Revolving Fund (1) Chocolate	34,854	4,809
Revolving Fund (2) Planting materials	1,29,571	1,54,570

CENTRE FOR GENDER STUDIES IN AGRICULTURE AND FARM VELLANIKKARA

Research Programmes

a. Major research achievements

- i. Three Kazchakula demonstration plots have been laid out in Tholur Panchayath of the Thrissur District. Each demonstration plot has 50 plants (150 plants). Each unit has been supported by providing with critical inputs.
- ii. Two Kadali banana sucker production plots have been laid out at KAU and Ayanikkad, Tholur Panchayath.
- iii. Nine kadali demonstration plots in continuation to the last years plots as ratoon crops. Fifty percent of the amount was distributed to each unit.

Extension Programmes

a. Highlights of extension activities

- iv. Continued support to the field demonstration units of women managed agribusiness entrepreneurs
- v. Training cum skill workshop programmes for women farmers.
 - a) Women's Camp on 17.12.2008 at Tholur Panchayath for SHG groups.
 - b) International Women's Day celebration on 8th March 2009 at Ayanikkad, Tholur.
 - c) Exposure visit to COVAS, Mannuthy on 26th March 2009 for the women farmers of the Tholur Panchayath.
 - d) Exposure visit to KAU on 28th March 2009 for the people of Ayanikkad, Tholur.

Scientific papers

Gender: Harmony Vs Harassment (2009)

Important visitors:

Sl. No.	Name of the visitor	Designation/address
1.	Dr. Kiran Negi	Member of the Project Monitoring Team of Department of Biotechnology, Govt. of India

Finance

Head	Expenditure (Rs.)	Internal Receipts (Rs.)
Non-Plan	-	-
Plan	Rs. 3,15,380	-
ICAR	-	-
Other EAPs		
i. Promoting Bio – Resource Based Pilgrim Needs as a Livelihood Option by the Rural Women of Kerala'	Rs.4,31,000	-
ii. Gender Issues in Rice Based Production System and Refinement of Selected Technologies in Women Perspective	Rs.1.528 lakhs	-
Revolving Fund	-	-

NORTHERN ZONE

REGIONAL AGRICULTURAL RESEARCH STATION PILICODE

Name of Head of Station : Dr. B. Jayaprakash Naik

Research programmes

a. Major research achievements (highlights)

1. Utilization of Existing Germplasm and Description of Varieties (CAP-01-00-01/76 PIL 9 KAU)

The project aims to evaluate the exotic and indigenous cultivars of coconut available in the station, to describe the morphological characteristics of each variety and to conduct replicated trials with promising types. The germplasm collection of coconut consists of 40 indigenous and 35 exotic types. The morphological and yield attributes are being recorded.

The varieties Kerasagara as well as Kudat, Philippines Lono and St. Vincent were found superior to other genotypes in terms of nut and copra yield/palm. Seedlings of Kerasagara have been raised for establishing seed garden. The genotypes Kudat, Philippines Lono and St. Vincent were proposed for release.

2. Screening Coconut Cultivars for Tender Nut Purpose [CAP-02-00-01/2000/PIL(2)KAU]

The objectives are to identify superior genotypes suitable for tender nut purpose, to study the seasonal variation in quality parameters of coconut water, and to decide the optimum physiological maturity having maximum quality, quantity and consumer acceptance.

The genotype MGD was found superior in terms of volume of nut water and nuts per palm per year. Total sugars, reducing sugars, TSS, ascorbic acid and protein were found maximum in Malayan Yellow Dwarf followed by Gangabondam and West Coast Tall. The genotype MGD was proposed for release as a variety suitable for tender nut purpose and to multiply the seedlings for distribution.

3. Development of Short Statured High Yielding Coconut Variety with Good Nut Quality (CAP-02-00-01-2006/PIL(9)KAU)

The objective of the project is to identify and evaluate dwarf coconut varieties with good nut quality and their utilization for the production of short statured high yielding coconut hybrids.

Survey was conducted in the farmer's fields to identify desirable palms having good yield and dwarf stature. Some of the palms identified were selected as mother palms for the production of *inter-se* and hybrid seed nuts. The *inter-se* seed nuts procured from farmer's field were sown in the nursery for further studies.

4. Trial of Promising Seed Materials [CAP 02-00-02/76-PIL (A) KAU]

The objectives are to compare the performances of promising types with West Coast Tall, to isolate superior types and hybrids of coconut and to study the economics of raising promising types and hybrids in comparison with WCT.

The annual nut production was significantly high in the hybrid Chandrasankara, followed by Kerasankara, Lakshaganga and Keraganga and type PP Tall. The Copra yield/ palm of the hybrids, Philippines ordinary and PP tall were on par. The cumulative nut yield obtained was highest in Keraganga followed by Lakshaganga, Chandrasankara, LO, PP tall and Kerasankara. In general the hybrids were superior to WCT and other varieties in nut yield. The mean annual yields for the last six

years were on par in all four hybrids and the types LM and PP Tall. The Copra yield/palm/year was highest in the hybrids indicating the superiority of hybrids over other varieties.

5. Evaluation of Coconut Hybrids (Exploitation of Hybrid Vigour in Coconut) **[CAP- 02- 00-07/73-PIL-KAU]**

The study has the objectives of studying the extent of heterosis in different hybrids involving 10 parental combinations as well as of studying the influence of 'Ayiramkachi' on promising tall and dwarf parents for yield and other characteristics.

The annual nut yield / palm significantly varied between hybrids and the hybrid LM x MYD produced maximum number of nuts followed by AYK X WCT, LM X GB and LO X AYK which were on par in nut yield. The cumulative nut yield was high in AYK x WCT and LM x MYD. Except in combination with PO and AO, the AYK performed well with other tall and dwarf combinations.

6. Establishment of Model Organic Coconut Farm (343-31-2377)

Objectives of the project is to study the influences of organic cultivation for short and long term performance of coconut and intercrops, to study the soil dynamic in terms of available nutrient in the soil before and after organic cultivation and to act as a model coconut garden in respect of the source and availability of organic manures

An isolated 5 ha. coconut plantation in the T and T1 blocks of RARS Pilicode will be developed in to a model organic coconut farm. Application of organic manure as per the schedule was started from August 2007 onwards. Soil and water conservation measures, sowing cowpea in the basins and growing banana as intercrops were taken up.

7. Studies on Yellowing of Arecanut in Kannur District

The study aims at Identifying the causative factors for yellowing of Arecanut ,Quantifying the extent of damage by the major causative factors; examining the possibility of managing yellowing of arecanut through adoption of proper management techniques across a range of production conditions; documentation of farmers' know-how in management of yellowing in arecanut and exploring the feasibility of crop improvement through extensive survey of genetic stock available in the region for resistance/ tolerance.

A detailed survey was conducted across the arecanut tracts of Kannur district covering 150 arecanut farmers in the high, mid and low lands of Alakkode, Sreekandapuram and Naduvil Panchayaths. The severity of the yellowing was noticed in both young and aged palms. Severity was seen more in Sreekandapuram Panchayath. Along with yellowing, bud rot and crown choking was also noticed in all the three Panchayaths especially in Alakkode. The severity of yellowing was low in well managed plots. The yellowing symptoms were noticed in both local and high yielding variety palms.

8. Genetic Improvement of Dessert Mangoes of Malabar Region (RKVY Project)

The study aims to generate database on the availability of local dessert type mangoes in Malabar region; to study the diversity of these mangoes in relation to morphological and quality aspects of mangoes; to generate data base on mango processing industries, quality aspects, manpower, marketability and price trend; to standardize the quality aspects of dessert/table type and their suitability for value addition as well as to popularize the superior genotypes of dessert mangoes in Malabar Region.

Eight diverse types suitable for dessert purpose have been identified from Nileshwar block of Kasaragod and Taliparamba of Kannur districts and character described using NBPGR Descriptors for mangoes. Kunhimangalam, Nambiar Mango, Gomanga, Kilichundan, Kappakka manga, Kurukkan, Kuntani, Cherymanga are the types collected. The characters such as bearing habit season of flowering fruit yield and quality were studied . A germplasm of diverse type will be maintained at RARS, Pilicode for further evaluation.

9. Conservation and Evaluation of Malabari Breed of Goats (Gr-07-01-92/Kau)

The objectives of the study are; conservation and evaluation of Malabari goats and; selective breeding of Malabari goats for meat and milk.

Altogether 106 kiddings were there out of which 45.28% were single births and 56.7% twin births or above. Kidding rate was 1.62. Male to female ratio was 1:0.85. Average kidding interval was 289±20.22 days. Numbers of births were maximum during summer months and mortality was maximum during winter months. Major reason for mortality was respiratory tract infections. Altogether 113 does belonging to farmers were bred with bucks maintained in the unit and 126 goat kids were supplied to needy farmers during the year.

List of publications

1. Dr. B Jayaprakash Naik (2008) Performance of dwarf cashew and its crosses in: Proceedings PLACROSYM XVIII, NRCC, Puthur 10-13 Dec 2008.
2. Dr. B Jayaprakash Naik, Dr. A.K.Babylatha, Dr. P. C. Balakrishnan, Dr. M. P. Giridharan (2008) KASUMAVU KRISHI REETHIGALUM KASUMANGA SAMSKARANAVUM (Malayalam) (P 14) Pub: KAU & DCCD Kochi.
3. Dr. G. S. L. H. V. Prasada Rao, Dr. B Jayaprakash Naik, Dr. M P Giridharan (2008) BADALAGUTHIRUVA HAVAMANA MATHU AHARA SURAKSHATE (Kannada) (P 8) Published by ATMA, Dept. of agriculture, Kasaragod

16. Finance 2008-09

Head	Expenditure	Receipts
Non-Plan	1,28,48,456	1,61,66,900
Plan	7,94,496	
ICAR	7,47,577	
Other EAPs	20,69,960	
Revolving fund I	14,06,696	13,26,661
Revolving fund II	4,82,174	4,23,157

PEPPER RESEARCH STATION, PANNIYUR

Name of Head of Station : Dr.K.P.Mammooty

Research Programmes :

a. Major research achievements (highlights)

Research Highlights During 2008-09

Crop: Black Pepper

- In the germplasm collection at present 227 cultivated types of black pepper and 72 wild types are being maintained in the station .During the year 2008, KM III , Angamali , KM II and Valiyaramundi were the top yielders and recorded more than 2 kg /vine of green berry yield.
- Among the intervarietal hybrids planted during 2000 , P6 x P 5 is found to be promising. During 2008, the hybrid P6 x P 5 recorded the maximum green berry yield of 2.5 kg/vine. This hybrid was promoted for the new CVT under AICRP Spices at different states during the National AICRP workshop held during 2006 and recommended for release during ZREC meeting held at RARS,Pilicode during 18th Feb 2009 .
- Among the cultures evaluated under CVT – 2000 series, Cul 5489(PRS) recorded the maximum green berry yield of 3.8 kg/vine followed by IISR cultures - Cul 1041 and HP 105 with 2.5 kg/vine 2008-09 .
- In the organic farming trial Integrated management was found to be significantly superior to other two treatments, organic and inorganic farming
- Management of *Phytophthora* foot rot disease in black pepper Defoliation and death of vines were significantly low in T1(Potassium Phosphonate+ Trichoderma).

Crop : RICE

- First high yielding non lodging awnless rice cultures suitable to salinity prone Kaipad paddy tracts of Northern Kerala were evolved . The promising seven cultures viz., JK 70, JO 583, MK 22 , JO 532-1, JO 345, JK 15 and JK 59 were evaluated during 2008 Kharif in five locations . JK 70 and JO 345 were recommended for release during ZREC meeting held at RARS,Pilicode during 18th Feb 2009 .
- High yielding wet land rice cultures MK 157 and JK 14 were evaluated at different locations and MK 157 , which is a medium duration non -lodging variety and good cooking quality was found to be promising and accepted by farmers.

10. Extension Programmes

a) Highlights of extension activities

- A seven days training programme on “*Scaling up of water technology in Agriculture for a better living*” was organized here in association with ARS chalakudy and ICAR.

The training was inaugurated by Kurumathur Grama Panchayat President ,Field visits to the drip installed plots and Karshaka Award winner plots were also conducted .Block panchayat president issued certificates to the trainees.

- Classes were handled to students of COH,Vellanikkara during their RAWF training programme on 14-8-2008 at PRS, Panniyur .
- Field evaluation of Vegetable plots were done in association with VFPCK on 27-8-08
- Technical sessions were carried out for farmers in association with NABARD and credit institution on 5-9-08 at, Kadirur SCB, Thalassery
- Attended Research Extension Interface of the Department of Agriculture in Kannur, Kozhikode and Wayanad Districts
- Technical session on composting techniques and organic farming was handled in association with KVIC at Irritty
- Under ATMA programme of the Kannur district the scientists from this station handled various technical sessions.
- Revitalisation of Katampally area under paddy was materialized by the active involvement of scientists from this station by providing adequate training on kaipad cultivation and soil health management prior to the season
- Technical session on INM was conducted at Peralassery in association with Coconut Development Board

Finance 2008-09

Head	Budget(lakhs)	Expenditure	Receipts
Non- plan	39.520	24.39155	8.72849
Plan	4.380	0.99663	
ICAR- AICRP Spices	23.050	28.58926	
NHM	20.390	10.41307	
Net working	6.000	5.65587	
RKVY	10.000	9.99984	
Total	103.340	80.04622	

HIGH RANGE ZONE

REGIONAL AGRICULTURAL RESEARCH STATION

AMBALAVAYAL, WAYANAD

Name of Head of the Station : Dr. V.S. Devadas, Associate Director of Research

Introduction:

The High Range Zone is a sub region of Western ghats lying at an elevation of 750 metres above mean sea level. The region comprise of the hill districts of Wayanad, Idukki, Nelliampathy and Attappady ranges of Palghat, Thannithode and Seethathode panchayats of Pathanamthita, Aryankavu, Kulathupuzha and Thenmala panchayats of Kollam district, Peringamala, Aryannadu, Amboori, Vithura and Kallikadu Panchayats of Thiruvananthapuram District. The total geographical area of the zone is 1140.67 sq. km. representing 28.67 per cent of the total geographical area of the state. The zone is mainly agrarian in nature with a pre-dominance of high value perennial crops. The major crops growing in this area are coffee, pepper, paddy, cardamom, rubber, tea, ginger, tapioca etc. The climate prevailing in the zone is by and large mild subtropical, which is conducive for growing both tropical and subtropical fruits.

The NARP phase I sub project for this zone was launched in Nov. 1983 and was completed in Nov. 1988. The NARP Phase II project was in operation since April, 1988 and was completed on 19-4-1992. Under the National Agricultural Research Project, the Regional Agricultural Research Station at Ambalavayal functioned as the lead station with the Cardamom Research Station at Pampadumpara as its sub station.

RARS, AMBALAVAYAL

The station was established on 5th July, 1945 as a part of the Wayanad Colonization Scheme to supply seeds and planting materials, to impart training on improved Agriculture and to conduct research on crops pertaining to this area. With the formation of Kerala state, it was brought under the Department of Agriculture. It was upgraded to the status of a Central Horticultural Research Station in 1966 and transferred to Kerala Agricultural University in 1972. It was elevated to the status of a Regional Agricultural Research Station in 1983 under the National Agricultural Research Project with Cardamom Research Station, Pampadumpara as its sub station.

The Regional Agricultural Research Station, Ambalavayal is located at an altitude of 974 meters above Mean sea level in Sultan Bathery Taluk of Wayanad District. It is 100 km North-east of Kozhikode.

Mandate of the Station / Unit :

The station was started on 5-7-1945 to carry out research on various aspects of improvement of Agriculture in Wayanad in general and the colonization area in particular and to render technical advice on scientific cultivation to the farmers of the area.

Lead Functions

Pepper and pepper based cropping in high ranges, hill paddy, cool season vegetables, soil and water management, subtropical fruits and coffee based cropping system.

Research programmes

a. Major research achievements

Nine Research Projects and 11 projects with the financial assistance of Kerala Agricultural University and 10 projects with the financial help of other agencies are in progress. The details of the research projects are mentioned below:

(1) Spices

(1.1) Black pepper

Comparative studies of 13 varieties of pepper and studies on clonal variations in Panniyur-1 are in progress.

(1.2) Ginger

Germplasm of 27 Ginger varieties are being preserved in the station. Maran, V₂E₅₋₂, Rio-de-Janeiro are the best varieties among them. Studies on the effect of Azospirillum on ginger is in progress

(1.3) Turmeric

Germplasm of 36 Turmeric varieties are being preserved in the station. Studies on the effect of Azospirillum on turmeric is in progress

2. Rice

Germplasm of 109 varieties of rice are being preserved in the station.

(2.1) Scented Rice

17 varieties of scented rice preserved in the station.

3. Vegetables

The seed production and distribution of vegetables like tomato, ladies finger, brinjal, bittergourd and cool season vegetables are being undertaken.

(3.1) Cool Season Vegetables.

Under the plan project on cool season vegetables/ varieties of cabbage, carrot, potato, turnip, cauliflower, palak, radish etc were tested under Wayanad condition. The following varieties are found to be promising under Wayanad conditions

CROP	PROMISING VARIETIES
Cabbage	Golden Acre
Cauliflower	PSB K1
Knol-Khol	Vienna
Beet Root	Beet Dark Red
Carrot	Super Kuroda
Radish	Pusa Hima
Palak	Pusa Harith
Pea	Arkel Dwarf

4. Mixed cropping:

Mixed cropping in the garden lands with arecanut, cardamom, and pepper is in progress. The data are being analysed.

5. Agromet Advisory Service

Weather data is being collected and based on the meteorological data, weekly weather data bulletins are issued to 50 selected farmers of the District and also reach to farmers through Malanad Channel (Regional TV Channel).

6. Medicinal and Aromatic plants

More than 120 medicinal and aromatic plants were so far collected and are maintained at this station and also providing the planting materials of medicinal plants to farmers.

7. Central Sector Scheme (National Horticulture Mission)

As the part of this scheme planting materials of clove, all spice, garcinia, cinnamon, nutmeg etc were produced and supplied to farmers.

8. Ornamental Plants:

The survey for collecting the germplasm of various ornamental plants is in progress. The collected plants are being protected and nurtured. Planting materials of different ornamental plants were produced and supplied to farmers.

Activities under PTD Scheme

- 264 nos. of coconut seedlings were distributed to 121 selected farmers.
- Participatory Technology Development trials of “Cool Season Vegetables” for the year 2008-'09 was started by the month of October, in paddy fallows in 30 farmers field.
- From these wards, thirty farmers were selected (10 each from three wards - Ambalavayal (Kalathuvayal), Muttill (Vazhavatta), and Panamaram (Arincherumala) Panchayaths) for the trials of Cool Season Vegetables.
- Nine different Cool Season Vegetables seeds (20 items) were distributed among the selected farmers and the distribution was inaugurated by Adv.George Pothan, Chairman, Wayanad District Panchayath.
- A study tour to UPASI and KVK Ooty, on 4th March 2009 was conducted for these selected farmers for the year 2008-'09 to acquaint farmers on cultivation of cool season vegetables.

Farmers Training Programmes

- A farmers training programme on “*Prospects of Cultivation of Medicinal Plants on Commercial Basis*” was held at Regional Agricultural Research Station, Ambalavayal on 6th & 7th January 2009 with financial assistance of National Medicinal Plants Board, implemented through Aromatic and Medicinal Plants Research Station, Odakali
- Farmers training on water management, rain water harvesting and ground water recharging was held at RARS Ambalavayal from 02/03/2009 to 08/03/2009

Under PTD Scheme

- One day training programme on “**Cultivation practices of cool season vegetables**” was conducted for the selected farmers by Dr. V.S. Devadas, Associate Director and Sri. N.V. Satheesan, Assistant Professor (SS).
- One day training programme on “**Vegetable Seed Production**” for farmers of Panamaram Panchayath on 21/01/2009.

Under NAIP Scheme

- Workshop on GI Registration of Jeerakasala and Gandhakasala at Ambalavayal on 5.09.08.

- Farmers training programme on Improved package of practices for Paddy cultivation, Improved package of practices for Pepper cultivation & Organic waste recycling techniques on 11/03/2009
- Farmers training programme on Rainwater harvesting, Micro irrigation and Farm Mechanisation. on 12/03/2009
- Farmers training programme on Vegetable cultivation & Processing of fruits and vegetables. on 13/03/2009

Exhibitions participated

RARS, Ambalavayal participated in Wayanad Flower Show held from 16/01/2009 to 27/01/2009 at Kalpetta, where plants and publications were sold.

iv. Radio talks/ TV Programmes/ Audio-Video Cassettes.

Topic	Date	Name of Scientist
Scope of Horticultural Crops in Wayanad	15/10/2008	Dr. V.S. Devadas, Associate Director of Research
Lime Application in Soil for Different Crops	13/05/2009	Dr. A.K. Sreelatha, Assistant Professor

List of Publications

Scientific papers : Nil
 Technical Bulletins : Nil
 Popular Articles : Nil
 Books : Nil

No. of visitors to the Institution (farmer group/ students)

Large numbers of farmers groups, students, public, tourists etc visit the station every day

Important visitors

Sri. P.P. Gopi, District Collector, Wayanad, Dr. A.P. Srivastava, National Co-ordinator, NAIP, Sri. K.R. Viswambharan, Vice Chancellor, Kerala Agricultural University, Dr. Saraswathi from Regional Coffee Research Station, Kalpetta, Dr. Shiva from Indian Institute of Spices Research, Calicut, Smt. Lissy, Deputy Director of Agriculture for District Panchayath Wayanad, Sri. Jahangeer Kasim from Vegetable and Fruit Promotion Council of Kerala, Kalpetta and Sri. Jose from Wayanad Social Service Society, Mananthavady and about 40 scientists from KAU were participated in the NAIP Launching Workshop.

Production and sales of planting materials

Sl. No	Item	Production (nos.)				Total Sold
		ICAR RF	SHM	NHM	Total	
I. Fruit Plants						
1	Acid Lime	530			530	97
2	Arinelli	100			100	90
3	Avacado	4000			4000	3500
4	Chamba seedlings	1029			1029	1002
5	Guava Kilo	942			942	644
6	Guava layer	1800			1800	1500
7	Lemon	1161			1161	1052
8	Litchi	80			80	68
9	Mango Graft		28467		28467	26340
10	Mangosteen	5000			5000	1000
11	Nelli	1500			1500	112
12	Orange	500			500	374
13	Rambuttan	2400			2400	1682
14	Rose apple seedlings	1975			1975	1195
15	Strawberry cuttings	1500			1500	850
16	West Indian cherry	795			795	692
II. Plantation, Medicinal & Spices						
1	All spice seedlings	1800			1800	102
2	Arecanut seedlings	6500			6500	3567
3	Aryavep	13450			13450	940
4	Badam	1240			1240	182
5	Bush pepper graft	1625			1625	308
6	Cinnamon seedlings	6500			6500	1400
7	Clove seedlings	22500			22500	5915
8	Coconut seedlings	3500			3500	1905
9	Coffee seedlings CxR	23013			23013	18655
10	Garcinia	3470			3470	520
11	Karingali	620			620	10
12	Mahagani	3457			3457	2437
13	Njaval	188			188	62
14	Pathimugham	6004			6004	4522
15	Pepper Cuttings		195713	538735	734448	405082
16	Teak	5000			5000	2275
17	Ginger*		3012		3012	1250
<i>* Production in kilogram & sold as vegetable ginger</i>						
III. Ornamental Plants						
1	Annual Flower Plant	4850			4850	3518
2	Anthurium	1473			1473	1285
3	Begonia	679			679	448
4	Chempakom	500			500	390
5	Cycas Big pot	400			400	162
6	Foliage plants	1430			1430	875
7	Garden palm	979			979	467
8	Heliconia	526			526	287
9	Jasmine	209			209	90
10	Other big pots	1740			1740	893

11	Red Palm Big Pot	75		75	6
12	Rose Big pot	1800		1800	748
13	Rose bud	6742		6742	5492
14	Flower seeds	5000		5000	2000
IV. Vegetable Seeds					
1	Snake guard - Baby	22.050		22.050	21.765
2	Bitter guard - Priyanka	115.500		115.500	59.245
3	Yard Long Bean - Sarika	239.000		239.000	196.435
4	Amaranthus	11.000		11.000	6.000
5	Bush cowpea	22.000		22.000	21.543
6	Chill	1.200		1.200	1.200
7	Pumpkin	3.000		3.000	3.000
8	Tomato	5.400		5.400	1.970
9	French bean	14.900		14.900	8.122
V. Paddy Seeds					
1	Matta triveni			250.000	0
2	Deepthi			244.000	0
3	Athira			160.000	0
4	Jeerakasala			10.000	0
5	Gandhakasala			50.000	0
6	Uma			1750.000	0
7	Kanchana			570.000	0

Other details if any

The NAIP Project "Multi Enterprise Farming Models to address the Agrarian Crisis of Wayanad District" was accepted by the ICAR and the project started on 27-5-2008 (fund released on 22-12-2008).

Finance 2008 - 09

Head	Expenditure	Transferred to Comptroller	Receipts	Bank Interest
Non-Plan*	13293089			
Plan*	991474			
AICRP (ICAR 75% - 25%)*	221965			
Other EAPs*	11696592			
ICAR**	3811022	1000000	4365008	72618
KAU Revolving Fund**	25178		157864	1573
Farm Revenue**	356391	3315000	3690371	2557

* As per expenditure statement

** As per bank pass book

REGIONAL AGRIL. RESEARCH STATION, KUMARAKOM

Name of Head of Station

: Dr. K.G. Padmakumar

Research Programmes

1. Major Research Achievements

Cultivation technology of *Ganoderma lucidum*, the wonder herb was standardized for the first time. Under the State Horticultural Project "Mushroom spawn production nursery" a new medium, coconut water supplemented by Potato Dextrose Agar was standardized for culturing the common mushroom fungi which supported fast and efficient growth of the culture. Similarly a technique was standardized to reduce the sterilization time from 2 hours to 20 minutes by using an organic product named "Crop Protect"

A new edible mushroom. "Tricholoma sp" was identified for the first time and its cultivation technology is also standardized for the first time.

Studies on coconut hybrids with WCT x MYD, WCT x CGD and WCT x COD with check variety WCT revealed that WCT x CGD ranked first in nut production (69.4 nuts/palm/year). Root wilt disease incidence was low in WCT x CGD (33.3% palms affected).

Variability and character association studies conducted in Chowghat Green Dwarf showed that genetic improvement in the population could be achieved by adopting selection for weights of copra and kernel, husk : nut ratio, thickness of husk and weight of husked and un husked nut. Since non additive gene action was observed for oil content, diameter of husked nut and thickness of meat, possibility of exploiting hybrid breeding in this variety is under consideration.

Evaluation of germ plasm of garcinia genotypes collected during 1991 showed that among 17 clones evaluated, clone GC 45/90 recorded the highest yield of dry fruit rind (14.48kg/tree). Among 1996 planting GC3/116/96 is found to be the top yielder (15.18kg dry rind/tree).

Breeding works carried out in vegetable cowpea, KMV-1 with Co-6 has helped to identify 16 promising lines of vegetable cowpea with resistance/tolerance to cowpea aphid borne mosaic virus and the trial is in progress.

Under the centrally sponsored scheme on Macro management of Agricultural supplementation – Aromatic and Medicinal plants 5 genotypes of *Garcinia indica*, Kokum were introduced. Fruits obtained from the Kokum trees were used for the preparation of Kokum syrup on experimental basis.

A study on cage culture of Pearlspace was undertaken in Vembanad lake in order to extend technology of cage fish culture developed and demonstrated for the first time by the RARS, Kumarakom. The study was organized through four Self Help Groups (SHG) with the support of the Gandhi Smaraka Gram Seva Kendram (GSGSK), S.L.Puram, Cherthala. The participating fishers were given field training on cage fish culture. The performance of pearlspaces (*E. suratensis*) under the intensive cage system during the trial was notably impressive where the initial crop has been harvested. Pearlspace raised at a stocking density of 200/ cage, attained a maximum size ranged from 250 g 130 days to 280 g per 140 days in the replicated trials. The highest harvested biomass per cage is 34.5 kg. The survival of stocked fishes varied from 24 to 100% with an average of 86%.

The studies indicate that pearl spot, or Karimeen, the high value fish endemic to Peninsular India especially, Kerala backwaters is a potential candidate species for open water cage culture.

This is for the first time that cage culture of such a high value species was undertaken and the technique is of utmost significance as it is considered a prescription for the landless and poor which enable them to take up commercial aquaculture without affecting other water uses.

The Fish Seed Production project funded by the ICAR, involves production of quality seed of endemic fish species for distribution among farmers at affordable prices. In the context of the heavy demand for local fish species such as pearlspot (*Etroplus suratensis*) and Golden catfish (*H. brachysoma*) as compared to carps, seed production of these species were also undertaken.

Captive breeding of *H. brachysoma* and *E. suratensis* were undertaken as per techniques standardized for the first time at this center. The seeds are in high demand and a consignment of the produced seed were utilized by the State Fisheries Department for conservation stocking in Sasthamkotta lake. A sum of Rs 1.04 lakhs was realized through sale of the seeds.

In order to display and demonstration of endemic fishes of the Kuttanad region, a public aquarium for endemic fishes was also constructed under this scheme.

In the SHM sponsored project on Establishment of pest and disease surveillance unit at RARS, Kumarakom, surveillance of pest and diseases of vegetables and fruits were undertaken and correlated with weather parameters.

Extension Programmes

(a) Highlights of Extension Activities

Scientists of this station attended off campus training programmes and imparted classes on different topics like organic farming, IPM in rice, coconut, banana, spices and vegetables, crop management in rice, bio pesticides, bio fertilizers, watershed management and water harvesting technologies, mushroom cultivation, aquaculture, stress management in crops, seed production technology, sustainable agriculture and roof rain water harvesting were held in different locations of Kottayam, Ernakulam, Alappuzha and Idukki districts for the Department Officials and farmers by the scientists of this station.

Scientists of this station were actively involved in the Paddy Mission Programme in Kottayam district and Village Adoption Programme of Thalayolaparambu Panchayat.

List of Publications

1. Bindu.L and K.G. Padmakumar. 2008. Food of Pearlsport, *Etroplus suratensis* (Bloch) from the Vembanad lake, Kerala. *J. Mar. Biol. Assoc. India.* 50 (2) : 156 - 160.
1. Bindu.L and K.G. Padmakumar. 2008. Hatchery seed production protocols for conservation of endangered catfish, *Horabagrus brachysoma* (Gunther), endemic to Western Ghats, India. In Proc. 20th Kerala Science Congress. 28-31 January 2008, Thiruvananthapuram. India. pp6-8
3. Padmakumar K.G., L. Bindu and P.S. Manu. 2008. Aquaculture for food security. *Kerala Calling.* 28(3): 32-34

4. Bindu. L, S.Salini, M.Vidya Moni, P.S. Manu and K.G.Padmakumar. 2009. Breeding and Embryonic Development in the Indian catfish, *Heteropneustes fossilis* (Bloch). *Fishing Chimes*. 29(1):188-191
5. Padmakumar K.G., L. Bindu and P.S. Manu. 2009. Captive breeding and seed production of *Etiropus suratensis* in controlled systems. *Asian Fisheries Science*. 22(1) : 51-60.
6. Padmakumar K.G., L. Bindu, P.S Sreerekha and Nitta Joseph. 2009. Food and Feeding of the Golden catfish, *Horabagrus brachysoma* (Gunther). *Indian J. Fisheries*. Vol. 56/57 (In press).
7. Padmakumar K.G., P.S. Manu and L. Bindu. 2009. Openwater culture of Pearlsport, *Etiropus suratensis* (Bloch) in low volume cages. *Asian Fisheries Science*. (In press)
8. Elizabeth K Syriac and Geetha K, Indian J weed science Vol.39 (1&2), 2007 : Pages 109-111

Monograph Published

K.G.Padmakumar, Gopalakrishnan, Bindu. L and Manu P.S. 2008. *Spot Your Fish* . Fish identification manual. Kerala State Biodiversity Board.

Technical Bulletins

Field Identification Manual for Freshwater fishes of Vembanad - Dr. K.G. Padmakumar

Popular Articles

1. കരിമ്പിലങ്ങൾ ഉണക്കിയാൽ (2008) ഗ്രാമശ്രീ 2 (11 - 12)
2. കൂട്ടനാടിന്റെ ജല സമൃദ്ധി എന്ന മിഥ്യ (2008) ഗ്രാമശ്രീ 3 (1 - 3)
3. ഭക്ഷ്യസുരക്ഷക്ക് കാർഷിക യന്ത്രങ്ങൾ (2009) ഗ്രാമശ്രീ 3 (3 - 4)
4. മാങ്ങയുടെ ശത്രു കായിച്ചുകൾ - മലയാള മനോരമ 10/4/2009

Number of Visitors to the Institution (Farmer Group/Students)

Farmers – 425

Students – 224

Details of Sale of Seeds/Planting Materials/Bio-control Agents etc.

Item	Quantity Nos./Kg.	Revenue
Coconut seedling (WCT)	10600	
Earthworms	56.528kg	
Garcenia grafts	732	
Nutmeg budlings	482	
Nutmeg seedlings	1600	
Other grafts(Mango, Kokum, Jack Sapota, cashewm Mangosteen etc.	320	
Paddy seed	5.7 tons	
Fish fingerlings/fry	9.3 lakhs	
Mushroom Spawn	12174 pkts	
Vegetable Seeds		
Amaranthus	15.9 kg	

Ashgourd	3.2 kg	
Bhindi	18.0 kg	
Bitter gourd (Priyanka)	9.1 kg	
Brinjal	7.0 kg	
Cowpea	73.5 kg	
Cucumber	3.7 kg	
Pumpkin	1.5 kg	
Snake gourd	8.0 kg	
Vermi compost	4258kg	
Banana Suckers	678	
	Total	Rs.16.216 lakhs

13. Other Details if any

Scientists of the station have been selected as members of the district level technical advisory committee of *Kerala Vikasana Padhathi* and they used to scrutinize the projects related to agriculture and allied aspects. The station is associated in the implementation of Hariyali project in Madappally block and Veliyanad Block

An arthropod biodiversity survey 2009 of Kuttanad first of its kind was conducted from January 22nd to 23rd 2009 with the participation of farmers, Agricultural Officers, Scientists, naturalists and B.Sc(Ag) students. There were about 200 participants. This programme was inaugurated by the Hon'ble Minister for Agriculture Sri. Mullakkara Rathnakaran at Pallathuruthi, Allappuzha District. The survey was conducted 11 padasekharams representing the different ecological zones of Kuttanad – 6 locations in Allappuzha, 4 in Kottayam and 1 location in Pathanamthitta. The samples of pests, natural enemy and aquatic insects collected were sorted, preserved and the details were documented.

Earth day 2008 was celebrated in Kottayam District on 22nd April 2008. A poster painting competition for school students and a seminar was organized. The programme was inaugurated by Sri. V.N. Vasavan, MLA, Kottayam. Cash awards and certificates were issued to the successful school students

A committee was formed by the Kerala Agricultural University and Agricultural Engg Division Dept of Agriculture with Dr. Noble Abraham Assoc Prof RARS Kumarakom as member as per the decision taken in the meeting held on 6/12/08 at District Collector's conference hall Alappuzha convened by the Hon,ble Minister for Agriculture. A monitoring cell consisting of Engineers and technicians were in operation at RARS Mancompu and office of the Exe Engineer (Agri) Alappuzha through out the harvest season.

Organised the first Vem enad Fish count -2008 in association with the Biodiversity Board , National Bureau of Fish Genetic Resources, Atree and other local non Governmental Organizations. Dr K G.Padmakumar served as the Co -ordinator of this programme

Finance 2008-2009

Head	Expenditure (Rs.)	Receipts (Rs.)
Non-plan	15628003	
Plan	2602127	Internal-1258002
ICAR	149793	ICAR(Veg.Seeds)-269124 ICAR(Fisheries) -104523
Other EAPs	2078026	
Revolving Fund	812617	KAU-RF-753384
ICAR- RF (fisheries)	187719	
ICAR-RF(Hort.)	338239	

RICE RESEARCH STATION MONCOMPU

Name of Head of the Station : Dr. Abraham Varughese, Professor

Research Programmes

a. Research highlights

I. Crop Improvement

1. Breeding short duration high yielding varieties of rice suited to Kuttanad (RIC-02-01-21-93/MON(9)KAU)

Quality analysis of the promising cultures was conducted. Two cultures SD 36 (KAU M 108-262-1) and M 20 (MO 8 20 KR) were submitted for KAU Variety Evaluation Committee for evaluation and recommendation. The following crosses were also made between locally adapted varieties and short duration cultures/varieties and F1 seeds collected.

(1)Remya/ IET 19044, (2) Remya/IET 19397, (3)Jyothy/ IET 19005, (4)Remanika/ IET 19005

2. Breeding high yielding varieties of rice with resistance to important rice diseases of Kuttanad (RIC/03-02-08-93/MON(9)KAU)

Quality analysis of the promising cultures are in progress. The best performing culture will be proposed for release after quality analysis. From the screening trials BLB resistant varieties were collected and used in the breeding programme. The following fresh crossings were made to evolve varieties with BLB resistance.

(1) Uma/ DV 85, (2) Jyothy/ BJ 1, (3) Remya/ BJ 1, (4) Krishnanjana/ DV 85

3. Collection, maintenance and evaluation of rice (RIC/01-00-02-82/MON(9)KAU)

During the period, 452 accessions of rice were raised in the field and seed materials collected. 30 more cultures selected from National Screening Nursery of AICRIP having Bacterial Blight resistance (score 0-3) were added to the germplasm.

4. Genetic analysis of gall midge resistance in rice and evolving resistant varieties for gall midge biotype 5 (RIC/03-01-11-99/MON(9)ICAR)

Selections were made from the following 3 crosses.

(1) KAU M 59-29-2-1-2 (GM 1)/ NHTA 8, (2) KAU M 61-6-1-1-2 (GM 8)/ Phalguna and KAU M 59-29-2-1-2 (GM 1)/Triguna

Seeds were multiplied from the cultures which attained uniformity and IET was conducted with 12 cultures from 4 crosses. Observations were recorded for various characters. The highest yielding entries were M 109-1-2-3 (6250 kg/ha. Kakathiya/MO 6), M 112-10-6-3(6796 kg/ha. KAU M 59-29-2-1-2/ Triguna) and M 112-10-6-5(6240 kg/ha.)respectively where as the check variety Jyothy gave an yield of 4150 kg.

5. Breeding for high yielding rice varieties with resistance to major pests of Kuttanad (RIC/01-03-06-2003/MON(9)KAU)

From the screening trials cultures/ varieties with moderate resistance to major pests like stem borer and leaf folder were selected and used in the breeding program. The following crosses were made.

Bhadra/ IET20095	Remya / Resmi	Karthika/ IET 20095
Jyoty/ IET 20095	Remanika/ IET 19665	Krishnanjana/ IET 20095
Krishnanjana/ IET 20084	Jyothy/IET 19692	Aruna/ IET 19692
Krishnanjana/ IET 20034	Karthika/ IET 20084	Aruna/ IET20034

6. Breeding for high yielding rice varieties with resistance/tolerance to adverse soil conditions (RIC/01-03-06-2003/MON(9)/KAU)

The first part of the programme was a participatory screening of already existing rice varieties in different locations in the Kari lands of Kuttanad wherein around sixty rice varieties were tested in different locations of Kari lands. Results of the trial revealed that Uma, IR 47551 and IR 50138 can be recommended for cultivation at Karumady, Uma, Vytilla 2 and Krishnanjana in Purakkad Kari and Vytilla 6, IR 47544 and Uma in Vaikom Kari.

A parallel programme for developing new varieties incorporating high yield and resistance to adverse soil conditions was also taken up from 2004-05 onwards. Cross combinations involving the varieties adapted to the region were made and single plant selections were made from the segregating generations. The stabilized cultures are in Initial Evaluation stage now, which are to be field tested in the kari lands.

7. Breeding for high yielding rice varieties with submergence tolerance (RIC-02-01-10-90/MON (9) ICAR)

Single plant selections are continued from the segregating populations involving flood resistant parents and high yielding varieties.

8. Characterization and Evaluation of medicinal rice (*Oryza sativa*. L) var Njavara

Single plant selections were continued from the heterogenous mixture of Njavara and high yielding types with short duration were selected

AICRIP TRIALS

Eight AICRIP trials as detailed below were laid out in the field during Kharif 2008.

9. Advanced Variety Trial - VE (RIC-02-01-10-90/MON (9) ICAR)

Twenty one entries received from DRR including 18 inbreds were tested along with 3 checks in an RBD with three replications. Among the entries, IET 20309 recorded the maximum yield of 5300 kg/ha followed by IET 20308 with 5200 kg/ha and IET 20310 with 4800 kg/ha.

10. Advanced Variety Trial - 2- E (RIC-02-01-10-90/MON (9) ICAR)

Twelve entries including 8 inbreds and 4 checks were tested during Khariff 2008 for yield and reaction to biotic stresses. Among the entries, IET 20132 recorded the maximum yield of 5000 kg/ha followed by IET 20134 with 4900 kg/ha. The national check Annada recorded 3800 kg/ha. Remanika, the local check recorded 3500 kg/ha.

11. Advanced Variety Trial - 1- E (RIC-02-01-10-90/MON (9) ICAR)

Seven entries received from DRR including 3 inbreds were tested along with 4 checks in an RBD with three replications. Among the entries, IET 20413 recorded the maximum yield of 5280 kg/ha followed by IET 20405 with 5060 kg/ha and IET 20405 with 4840 kg/ha.

12. Advanced Variety Trial - 2- IME (RIC-02-01-10-90/MON (9) ICAR)

Seven entries with 3 inbreds and 4 checks were evaluated during Khariff 2008. The local check Uma recorded the maximum yield of 4110 kg/ha followed by the hybrid check PA 6201 with 3920 kg/ha

13. Advanced Variety Trial - 1- IME (RIC-02-01-10-90/MON (9) ICAR)

Twenty five entries including 17 inbreds, 4 hybrids and 4 checks were tested during Khariff 2008 for yield and reaction to biotic stresses in an RBD with three replications. Among the entries, IET 19985 recorded the maximum yield of 5870 kg/ha followed by IET 20553 with 5350 kg/ha and IET 20524 with 4620 kg/ha. Uma, the local check gave 4400 kg/ha .

14. Initial Variety Trial - VE (RIC-02-01-09-90/MON (9) ICAR)

Thirty entries were laid out in an RBD with two replications. IET 20854 recorded the maximum yield of 4500 kg/ha followed by IET 20859 and IET 20855 with 4400 kg/ha each and IET 20853 with 4300 kg/ha.

15. Initial Variety Trial - E (RIC-02-01-09-90/MON (9) ICAR)

Forty eight entries received from DRR, Hyderabad along with check variety Remanika were laid out in an RBD with two replications. IET 21076 recorded the maximum yield of 5700 kg/ha followed by IET 21075 with 5600 kg/ha and IET 21106 with 5400 kg/ha.

16. Initial Variety Trial - IME (RIC-02-01-09-90/MON (9) ICAR)

Eighty entries received from DRR, Hyderabad along with check variety Uma were laid out in an RBD with two replications. IET 21006 recorded the maximum yield with 5900 kg/ha followed by IET 20970 with 5800 kg/ha and IET 20964 with 5700 kg/ha.

17. Seed production programme

A total of Qtls of Breeder seeds and Qtls of Foundation seeds were produced during 2008. The following are the kinds and quantities of Breeder and foundation seeds produced.

Sl.No	Varieties	Breeder Seed (Kg)	Foundation Seed (Kg)	Truthfully labeled seed(Kg)
1.	Bhadra (MO-4)	346	0	0
2	Asha (MO-5)	7	0	0
3	Pavizham (MO-6)	33	0	379
4	Karthika (MO-7)	91	0	0
5	Aruna (MO-8)	26	0	0
6	Makom (MO-9)	41	125	39
7	Remya (MO-10)	25	0	0
8	Kanakom (MO-11)	30	0	0

9	Renjini (MO-12)	22	0	0
10	Pavithra (MO-13)	9	0	0
11	Panchami (MO-14)	17	0	0
12	Remanika (MO-15)	25	66	0
13	Uma (MO-16)	1214	779	2191.5
14	Revathy (MO-17)	63.5	0	0
15	Karishma (MO-18)	29	47	0
16	Krishnanjana (MO-19)	39	95	15
17	Gowri (MO-20)	40	0	105
18	Jyothi	0	0	1617
	Total	2057.5	1112	4346.5

II. Crop Management

1. Rice productivity in relation to internal supply capacity of nutrients

(RIC/02-02-18-2004/MON(3)/AICRIP)

The objective of this trial is to evaluate the field variability in soil supply capacity of nutrients and its relationship to rice productivity at current fertilizer management levels.

N omission plots have statistically significant grain and straw yield reduction during all seasons of study.

Continuous P omission has resulted in visual P deficiency symptoms only during the eighth season and consequent significant grain and straw yield reduction.

K omission plots are still giving grain and straw yields on par with POP applied plots even during the eighth season. The quantity of straw added during each Pancha season is 5515 kg ha⁻¹ and during the Additional Crop season is

7525 kg ha⁻¹. Thereby the quantity of K added to the soil during the Pancha season is 83 kg K ha⁻¹ and the Additional Crop season is 150 kg K ha⁻¹.

The Farmers' fertilizer practice (110:45:65 kg NPK ha⁻¹) of higher N and K application resulted only in grain and straw yield on par with POP (90:45:45 kg NPK ha⁻¹) indicating that there is no need for the higher dose of fertilizers which will only result in economic loss to the farmer.

2. Screening of rice germplasm for Fe and Zn contents (RIC/08-00-01-2004/MON(3)/AICRIP)

The objective of this study is to identify promising donors accumulating more Fe and Zn especially in seed that can be used in bio-fortification programmes. In the screening trial 30 entries were included and were replicated thrice in 2m² plots. The grain samples are being analysed at DRR for Fe and Zn content. The Fe status of the experimental site is 488ppm and Zn status is 0.9ppm.

3. Field Evaluation of Rice Herbicide PIH 2023

The test herbicide PIH 2023 10% SC was evaluated for its effectiveness in direct seeded rice during the Puncta 2007-08 and the additional crop season 2008 in comparison with hand weeding twice, Clincher and Almix. The herbicide was found to be effective for controlling echinocloa, sedges and broad leaved weeds in a single application. The grain yield and weed dry weight recorded for the herbicide at 25, 30 and 60 gm ai/ha were statistically on par with hand weeding twice and significantly superior to Clincher and Almix.

4. Weed management trial for transplanted rice

In this experiment, a new herbicide molecule Penoxsulam 24 SC was evaluated for weed control efficiency at 0.0225 and 0.0250 kg ai/ha both as pre emergence and early post emergence. The herbicide was found to be effective against grasses, sedges and broad leaved weeds. The grain yield recorded for the different doses at different times of application were statistically on par with weed free check, hand weeding twice and Butachlor.

5. Effect of tillage and nutrient management on performance of direct seeded rice under Rice-Rice-Water Fallow cropping system

The treatments included four tillage methods viz. Conventional tillage, Zero tillage, Minimum tillage before Puncta and Minimum tillage before Additional crop along with two sources of P fertilizer with and without additional Sulphur. During Rabi '07-08 and Kharif '08, the highest yield was obtained for conventional tillage and significantly superior to Zero tillage. Minimum Tillage before the additional crop or before Puncta also recorded grain yield statistically on par with conventional tillage but there is an yield reduction to the tune of 20 per cent. The yield reduction was about 50 per cent in the case of zero tillage.

III. Crop protection

1. Evaluation of new fungicide formulations for sheath blight control

(RIC-12-02-06-89/MON (5) ICAR)

Rabi 2007-08: The systemic fungicides Spencer 24 SC @ 0.75 ml/lit and Nativo 75 WG @0.4 g/lit were effective in controlling the sheath blight disease and increasing the yield.

2. Evaluation of new fungicides against blast

(RIC/03-02-06-2004/MON(5)/AICRIP)

Rabi 2007-08: The newer fungicides namely Fuji-one 40 EC @ 1.5 ml/lit, Baan 75 WP @ 0.6 g/lit and RIL 013/F1 35 SC @ 2 ml/lit were performed very well in restricting neck blast incidence and spread over control. There was significant difference in grain yield data.

Kharif 2008: Five new molecules with different concentrations were tested against neck blast disease during this season. The newer chemicals like Metominostrobin 20 SC (0.5,1.0 ml and 2.0 ml), RIL 013/F1 35 SC (2.0 ml/lit), Baan 75 WP (0.6 g/lit) and Fuji-One 40 EC (1.5 ml/lit) were found effective against neck blast incidence and severity over control. The grain yield data showed that Baan 75 WP @ 0.6 g/lit produced higher yield and others were on par with Baan 75 WP.

3. Evaluation of biopesticides against location specific diseases

(RIC/13-00-19-99/MON (5) ICAR)

Rabi 2007-08: Two botanical fungicides viz., Defender @ 2.5 ml/lit and Biofer @ 1.5 ml/lit were found effective against sheath blight and brown leaf spot disease incidence and on par with the standard check fungicide Bavistin 50 WP @ 1.0 g/lit.

4. Evaluation of fungicides against location specific diseases

(RIC/03-02-07-2004/MON(5) AICRIP)

Three newer fungicides with two standard check fungicides were tested against location specific diseases (Sheath blight) during Kharif 2008. The results showed that the newer formulations namely Metominostrobin 20 SC(0.5ml, 1.0 ml and 2.0 ml/lit) and Taqat 75 WP (1.5 g/lit) were found most effective in restricting sheath blight disease incidence and severity during Kharif 2008. The grain yield data was not significant.

5. National Screening Nursery (NSN)

(RIC/03-02-03-84/MON (5) ICAR)

894 AICRIP cultures (168 NSN-1, 557 NSN-2, 56 NHSN and 65 DSN cultures) were screened against blast, sheath blight, brown spot, sheath rot and bacterial leaf blight diseases during Rabi 2007-08. 20 cultures showed their Multiple Resistant nature for all major diseases.

During Kharif 2008, 934 cultures (193 NSN-I, 622 NSN-II, 76 NHSN and 43 DSN cultures) were screened against blast, sheath blight, brown spot, sheath rot and bacterial leaf blight diseases. 175 cultures showed Multiple Resistant for all above major diseases. Out of 175 entries, 54 NSN-I, 93 NSN-II, 22 NHSN and 6 DSN cultures were expressed their Multiple Resistant nature during this season.

6. Screening rice varieties against important diseases

(RIC/03-02-04-84/MON(5)/KAU)

16 moncompu varieties and 5 cultures were screened . MO 17 and Culture SD36 showed multiple resistance towards sheath blight, sheath rot and blast. MO 5 showed multiple resistance towards sheath blight, sheath rot, blast and brown leaf spot.

7. Control of False smut of rice

Kharif 2008 : Contact and systemic fungicides of different concentrations along with biocontrol agent *Pseudomonas fluorescens* were tested against false smut disease during flowering stage. Though all the new fungicides were found significantly effective over the untreated plots, Result 25 EC(1.0 ml/lit), Kocide 2000 54 DF (2.5 g/lit), Kocide 101 77 WP (2.0 g/lit) and *Pseudomonas fluorescens* (10 g/lit) were found superior over the standard check fungicides in checking the false smut incidence during this season. However, the data on the grain yield were not significant.

8. Pesticide Compatibility Trial

Rabi 2007-08: The fungicide insecticide combination spray of Sivic 75 WP @ 0.6 g + Caldan 50 SP @ 1.6 g, Kitazin 48 EC @ 2 ml + Caldan 50 SP @ 1.6 g/lit and Kitazin 48 EC @ 2 ml + Indoxacarb @ 0.4 ml were found most effective in reducing the neck blast incidence, stem borer and leaf folder pests of rice during this season.

9. Production Oriented Survey

(RIC/05-00-06-2004/MON (6) ICAR)

Production oriented survey was conducted in Alleppey, Pathanamthitta and Kottayam districts during the month of February and March 2008. 80-100 kg/acre of lime was applied for acidity problem at the time of land preparation/gap filling.

The farmers applied over dose of insecticides/fungicide due to high labour cost for plant protection operations. So the farmers have sprayed minimum of 4-5 application of insecticide/fungicide in every season. The farmers used biocontrol agent *Pseudomonas fluorescens* supplied by Department of Agriculture for major diseases. The farmers interest was combined application of insecticide and fungicides to reduce the spraying cost. The average yield of Kharif crop was 5 to 6 ton/ha.

Farmers applied Cartap (5 kg/acre), Azataf (250 g/acre), Monocrotophos (250 ml/acre) for stem borer and leaf folder. Tatamida (50 ml/acre), Carbaryl (250 g/acre) for bph and thrips, Bavistin (200 g/acre), Contaf (250 ml/acre) and Tilt (100 ml/acre) for sheath blight, blast disease control.

10. Etiology and management of virus and bacterial diseases of rice in Kuttanad

RIC/12-04-01/91/MON (5) KAU

60 varieties out of 193 of NSN1, 194 out of 622 of NSN2, 21 out of 76 of NSHN and 12 out of 43 of DSN showed resistance to bacterial leaf blight in screening nurseries during rabi 08.

Extension Programmes

a) Highlights of extension activities

- **Functioning of Gramasree Self Help Group**

Production details

Sl.No.	Item	Quantity	Amount (Rs.)
1.	Sugarcane juice	791 No.s	3955
2.	Vermicompost	180 kg.	1080
3.	Earthworm	200 g.	120
4.	Mushroom spawn	344 pckts	7224
5.	Mushroom	25.84 kg.	2584
6.	Pseudomonas	667 kg.	53360
	Total		68,323

- **Formation of Sales Counter**

A Sales cum Information counter was started from 12.3.08 onwards at Rice Research Station, Moncompu for dissemination of knowledge and sale of KAU products. Coconut seedlings, vegetable seeds, squash, jam, jaggary, vermicompost, Pseudomonas, sugarcane juice, KAU publications etc. are being sold through this sales counter.

- **Mitigating distress of Kuttanad farmers**

A Karshaka Sevana Kendra was opened at RRS, Moncompu on 25.3.08 to help the Kuttanad farmers who were in distress following an unexpected and untimely rain which occurred during the second week of March, 2008. Ten Paddy reapers obtained from the MP fund were given on rent basis to the farmers based on their request to complete the harvesting.

- **HRD activity**

The scientists of the station took classes for Assistant Director of Agriculture and Agricultural Officers of Alappuzha in the Pre season training organized by DOA during Kharif 2008 and Rabi 2008-09. They also took classes for farmers in the various seminars organized by Dept of Agriculture, NGO's etc.

The scientists also participated actively in the Farmers Field School conducted by various krishi bhavans.

Participated in the Research-Extension Interface conducted by Department of Agriculture at Kottayam, Alappuzha and Pathanamthitta and BTT meetings of ATMA programme in Alappuzha district.

The scientists also participated in the Arthropod survey conducted by the RARS, Kumarakom on 23.1.09.

- **Field Visits**

As members of Multidisciplinary Diagnostic team and Paddy mission, the scientists visited the field and provided suitable control measures for Farmers field problems of Alappuzha and Pathanamthitta districts.

Attended the pepper field visit programme of Agricultural Department for the selection of disease free pepper cuttings.

- **Farm advisory services**

Analyzed about 100 soil and water samples brought by farmers, for pH and EC and gave proper advice to them for soil and water management.

The scientists of the station rendered Farm advisory services to the farmers of Kerala in person, through letters and also through telephone .

List of Publications

Scientific papers

Devika . R. 2009.Variability, Heritability and Genetic advance in rice (*Oryza sativa*

L) Proceedings of the 21st Science Congress.p.78-80

Surendran. M. 2009. Biopesticides for rice sheath blight disease control of Kuttanad

Proceedings of the 21st Science Congress.p.81-82

Technical Bulletins:	Nil
Popular Articles	: 2
Books	: Nil

Finance 2008 - 09

Head	Expenditure	Receipts
Non-Plan	58,32,862	5,82,558
Plan	7,50,927	-
ICAR	29,83,291	-
Other EAPs	7,43,637	-

ONATTUKARA REGIONAL AGRICULTURAL RESEARCH STATION, KAYAMKULAM

Name of Head of Station : Dr.Sverup John, Professor

Research Programmes

- a. Major Research achievements (highlights)
- Under RKVY project entitled “Strengthening of rice cultivation in Onattukara” eight experiments viz; Collection, conservation and cataloguing of rice germplasm, Evolution of medium duration rice varieties suitable for Onattukara, Performance evaluation of speciality rice in Onattukara, Performance evaluation rice varieties suited to the uplands in Onattukara. Standardization of agrotechniques of the medicinal rice Njavara for improving quality and yield , Management of earhead blackening in rice, Integrated pest management for yield maximization in rice for Onattukara and yield maximization in rice through integrated nutrient management were undertaken. Salient findings are
 - The accessions in the germplasm were enhanced to 32 by collecting varinellu, mundakan, cheradi and chettivirippu. Medium duration rice variety Aiswarya recorded highest grain yield of 4580 kg ha⁻¹.
 - Medicinal rice Njavara and scented rice IET 13553, IET 13552 and pusa basmati-1 can successfully be cultivated in Onattukara.
 - Bhagya recorded the highest grain yield of 3.96 t ha⁻¹ in upland followed by Jyothi (3.60 t ha⁻¹).
 - Application of full dose of fertilizer 40:20:20 N, P₂O₅ and K₂O recorded highest grain yield of 917 kg ha⁻¹ in Njavara.
 - Earhead blackening incidence was minimum (5%) in plots which received bavistin 50% wp @ 500 g/ha.
 - Leaf roller incidence was significantly low in IPM plots when compared with farmers practice. Maximum grain yield of 3580 kg ha⁻¹ was obtained in the treatment combination of IPM practice with the variety Onam followed by IPM practice with Bhagya
 - Under the experiment Green technology for rice based cropping system in Onattukara, seeds of rice variety Dhanu, Sesamum variety Thilarani, Groundnut(TMV-7) Cowpea(Kanakamani) and Bhindi(Arka anamika) were organically produced for the next season.
 - Seed multiplication of two promising rice cultures for eastern lateritic region viz; cul-56 and cul-18 were done
 - Under AICRP sesame (breeding)IVTS(27X3 RBD), AVTS (20x4RBD) and germ plasm maintenance (156) were conducted
 - Under the CDB project entitled survey and identification of root(wilt) disease free palms and evolution of tolerant genotypes in coconut through selection and hybridization, identified 189 elite mother palms, procured 10,003 elite seed nuts, produced 604 hybrid seedlings and distributed 5807 elite seedlings.

- Under the RKVY project entitled Comprehensive coconut care Programme for root(wilt) affected area in Onattukara, 1000 palms each from Thazhakkara and Pathiyoor gramma Panchayaths were selected. Inauguration of the Project at Thazhakkara was done by Sri.K.R.Viswambharan IAS the Hon'ble Vice-Chancellor of Kerala Agricultural University, and at Pathiyoor by Sri C.K.Sadasivan, MLA, Kayamkulam. Initial survey was conducted in each project area. Integrated nutrient management practices and plant protections were done for the selected palms in each panchayaths. Pre treatment survey indicated that Rhinoceros beetle, coconut mite and corid bug are predominant pest infesting coconut palms of the project area. Among the disease root(wilt) and leaf rot were observed. Root (wilt) was observed in 97.8% palms in Thazhakkara compared to 76.4% in Pathiyoor. Leaf rot infestation was found to be severe in both the locations (99%) and of medium severity.

Mission Programme:

i). Rice mission

a). Alappuzha District

Dr.T.N.Vilasini, Professor, Smt.Susamma.P.George, Asst.Professor(Sel.Gr.), Dr.M.Indira, Associate Professor, Dr.G.Suja, Associate Professor and Dr.M.R.Bindu, Associate Professor served as members of rice mission programme of Alappuzha District.

b). Pathanamthitta District

Smt.Susamma.P.George, Dr.M.Indira, Dr.G.suja and Dr.M.R.Bindu served as members of rice mission of Pathanamthitta District.

c). Kollam District

Smt.Susamma.P.George and Dr.M.R.Bindu served as members of rice mission

ii). Coconut mission

Dr.Sverup Jon, Project Director &Head served as the co-ordinator of coconut mission in the central zone. Dr.T.N.Vilasini, Professor is selected as the team leader of coconut mission in Alappuzha District. Dr.P.Sushamakumari, Smt.Susamma.P.George, Dr.M.Indira, Dr.G.Suja and Dr.M.R.Bindu served as members of the mission.

List of Publications

Scientific papers

- i) Bindu.M.R. and Mallika, V.K. 2008. Micro grafting in Cocoa (*Theobroma cacao L.*) *Int. J. Agri Sci* 4 (2) PP 601-603
- ii) Indira.M.. and Nair, C.S. 2008 – Standardization of NPK requirement in banana cv ‘Njalipoovan (*Musa AB group*) in Onattukara soil of south Kerala *J.Horti.sci* 3(2).pp 127-131
- iii) Bindu, M.R, Indira.M., Suja.G., Sushamakumari.P. and Sverup John - 2009 PUSA. 8973 – a high yielding greengram variety for Onattukara *Procee of 21st Kerala Sci. Congress* held at Kollam from 28-31 January 2009 pp 141-143.

- iv) Indira, M . and Nair, C.S. 2009 . Effect of NPK nutrition on quality of banana c.v.Njalipoovan (*Musa* AB group) in Onattukara soil . *procee of 21st Kerala Science Congress* held at Kollam from 28-31 January 2009 pp 65-68

Popular articles

- i). Sverup John – 2008 . Onam Oottukarayila virippu krishi Gramasree 2(7)PP 6-8
 II). Suja,G, and Sverup John 2009. Mampazhapuzhuvinethirai thulasikkeni Malayala Manorama daily

Number of visitors to the Institution (Farmer group/students)

Important visitors

NO.	Name of visitor	Date of visit
1.	Sri.K.R.Viswambharan, Hon'ble Vice-Chancellor, Kerala Agricultural University	26-12-08
2.	Sri.KR.Viswambharan, Hon'ble Vice-Chancellor, Kerala Agricultural University Sri.V.K.Balakrishnan, District Collector, Alappuzha Sri.C.K.Sadasivan, MLA, Kayamkulam Sri.M.Murali, MLA, Mavelikkara Sri.Koovur Kunjumon, MLA	21-2-09

Finance 2008-09

Head	Expenditure	Receipts
Non-plan	73,45,206/-	732562/-
Plan	4,91,386/-	
ICAR	17,90,907/-	
Other EAP's	32,31,806	
Revolving fund	4,31,166	669359/-

RICE RESEARCH STATION, VYTTILA

Name of Head of Station : Dr. K. Anilakumar

Research programme :

a. Major research achievements:

Rice and rice based farming system:

- Semi dwarf mutants of Pokkali viz. M 7.3, M 15.1 and M 21.1 yielded 8.0 t/ha compared to 5.8 t / ha for VTL-6.
- Three cultures of CSTVT (Coastal Saline Tolerant Variety Trial) viz. 2011, 2012 and 2013 out yielded VTL-6 and selected for further detailed screening.
- Two cultures of NSASN (National Saline Alkaline Screening Nursery) namely, 3818 and 3828 out yielded VTL-6 by 20 % and selected for further studies.
- Standardised cheap protocol for large scale production of tissue culture in banana.
- Standardised the protocol for tissue culture production of true to type plantlets of orchids.
- Identified the enzyme markers like peroxidase, superoxide dismutase, proline etc. for salinity tolerance screening.
- The positive influence of rice yield in pokkali fields due to tidal action can be attributed to the washing away and reduction of toxic products and addition and increase in the nutrient content in the soil especially exchangeable K and increase in the dissolved oxygen content of flood water.
- Slow release nitrogen fertilisers had little effect on rice yield in pokkali fields.
- Under the conditions of high flood water coupled with low tide affect the germination and survival of direct sown seeds of pokkali suffers the most and can not be practiced as an alternate method unless adequate water regulation is ensured.
- The seedling establishment was found to be more influenced by the soil acidity than salinity in acid saline soils of pokkali.

Extension and other activities.

Scientists of the station participated in various agricultural seminars and group meetings organised by the Department of Agriculture, Karshaka Samithis, Panchayats and input agencies. The scientists of the station have been nominated as members of the District Level Diagnostic team and attended to the farmers field problems. The Head of station has been nominated as the Member of the Pokkali Land Development Agency and

attended the meetings convened by its Chairman, the District Collector of Ernakulam. The scientists of this center also have been nominated to function as technical experts for the District Horticultural Mission, Ernakulam, and Consultative Committee of the Ernakulam District Co-operative Bank.

List of publications:

a. Scientific papers:

- K.S. Shylaraj, Preeta Liz Korah, Snitha. S and Lovely B. High yielding semidwarf Pokkali rice mutants tolerant to abiotic stresses of coastal saline ecosystem. Accepted for poster presentation in International Symposium on Induced Mutations in Plants held on 12-15 August 2008, at Vienna, Austria

14. Details of seeds / planting materials produced.

Crop / Variety	Code .	Quantity produced (kg)
Paddy VTL 3	3	85
VTL 4	3	820
VTL 6	3	3600
VTL 7	3	250
Cultures	3	500
Bhindi Arka anamika	8	34
Amaranthus Arun	6	76.5
Bitter gourd Preethi	10	1.2
Ridge gourd	28	3.5
Cow pea Yard long bean	34	9.14
Banana – Tissue culture	737	2105

16. Finance (2008- 2009) Rs in lakhs

Head of a/c	Provision for the year (lakhs)	Expenditure(Rs)	Station receipts(Rs)
Non plan	79.995	62.655	3.320
Plan	19.055	10.406	
ICAR/ Other EAPs	49.17	45.094	
Total	148.220	118.155	3.320

SUGARCANE RESEARCH STATION, KALLUNGAL P.O., THIRUVALLA.

Name of Head of station : Dr.T.M.Kurian

8. Other activities (brief outline only) :

Station took the lead in organizing and forming a sugarcane farmers society which was subsequently registered as "Madhya Thiruvithamcore Karimpu Vikasana Samithi. Application filed for G.I. Registration of Central Travancore jaggery jointly by Kerala Agricultural University, Madhya Thiruvithamcore Karimpu Vikasana Samithi and Gurkhandasari Cooperative Society, Arumanoor, Kottayam.

During the year, 25 tones of sugarcane has been processed for jaggery preparation using the jaggery unit at the station and sold out.

Research

a. Major research achievements (highlights)

Sugarcane

Crop Improvement

- Zonal varietal trial for identifying midalte varieties- 2004-2005 series, Culture No. Co 2001-08 recorded highest cane yield of 124.69 t/ha, CCS of 13.84 t/ha and cane length of 276.22 cm
- Zonal varietal trial for identifying early maturing varieties- 2005-2006 series, Culture No. CoVc 9982 recorded highest yield of 136.85 t/ha, CCS of 18.95 t/ha, CCS of 13.83 %, sucrose of 19.63 % and cane length of 256.11 cm
- Zonal varietal trial for identifying midlate maturing varieties- 2005-2006 series, Culture No. Co 0218 recorded highest yield of 134.01 t/ha and highest cane length of 267.55 cm
- Zonal varietal trial for identifying early maturing varieties- 2007-2008 series, Culture No. CoM 0326 recorded highest cane yield of 127.56 t/ha
- Zonal varietal trial for identifying midlate maturing varieties- 2007-2008, Culture No. CoM 0316 recorded highest cane yield of 101.40 t/ha
- Evolution of sugarcane varieties for the different agro climatic tracts of Kerala and fluff exchange programme – 1997 series, Culture No. 12/97 showed highest cane yield followed by Culture no. 44/97 and moderately resistant to red rot. For red rot reaction, six cultures were moderately resistant and one was moderately susceptible.
- Evolution of sugarcane varieties for the different agro climatic tracts of Kerala and fluff exchange programme – 1998 series, Culture No. 119/98 showed highest cane yield and moderately resistant to red rot. For red rot reaction, six cultures were moderately resistant and three were moderately susceptible.
- Evolution of sugarcane varieties for the different agro climatic tracts of Kerala and fluff exchange programme – 1998 series, Culture No. 58/99 showed highest cane yield and moderately resistant to red rot. For red rot reaction, seven cultures were moderately resistant and three were moderately susceptible.

Crop management

- Agrotechniques were standardized for the advanced zonal cultures viz., Co 2000-10 and CoTI 1153

- In sugarcane ratoon crop pre emergence application of the weedicide Metribuzine 1 kg ai/ha along with hoeing 45 days after ratoon initiation is found to be effective in controlling weeds.
- Spraying of ethrel at 500 ppm four months after planting was found to be effective for controlling flowering in sugarcane for improving the quality of the product and staggered harvesting in madhuri variety.
- Application of 75 % of the recommended dose of NPK as inorganic and 25 % as organic (FYM) in plant and ratoon crop of sugarcane is found to be superior with respect to cane yield and sugar yield compared to the other combinations of organics and in organics.
- Double row planting at a spacing of 30:60cm recorded higher cane yield than other spacing trials
- Madhuri, Madhumathi and Co TI 93116 were selected for standardization of agrotechniques for maximising jaggery yield and recovery percentage
- Technology has been standardized for the preparation of four forms of jaggery with improved quality viz., liquid, semisolid, solid (ball form) and powder.

Plant Protection

- Twenty two entries tested in the IVT (Early), 14 varieties showed moderately resistant reaction; seven varieties showed moderately susceptible reaction; and one showed susceptible reaction.
- Seventeen entries tested in the IVT (Midlate), only one variety - showed resistant reaction and eleven varieties showed moderately resistant reaction.
- Four entries tested in the AVT (Early) II Plant, one variety showed moderately susceptible; two varieties showed susceptible reaction and one showed highly susceptible reaction.
- Nine entries tested in the AVT (Midlate)I plant, three varieties showed moderately resistant reaction; three varieties showed moderately susceptible reaction; three varieties showed susceptible reaction.
- Twelve entries tested in the AVT (Midlate)II Plant, five varieties showed moderately resistant reaction; five varieties showed susceptible reaction; two varieties showed highly susceptible reaction.
- Survey was conducted in two districts of South Kerala viz., Pathanamthitta and Alappuzha. There was low incidence of red rot, leaf spot and rust diseases; low to moderate incidence of woolly aphid and shoot borer.

Vegetable

- In snake gourd variety Kaumudi at spacing of 2 x 2 m and a fertilizer dose of 150 % of the recommended dose of NPK is optimum and economic.

Extension programmes

a. Highlights of extension activities

Sugarcane Research Station, Thiruvalla was actively involved in the extension programme of the University to cater to the technical needs of the farming community and others involved in agricultural extension and education. Some of the major contribution is stated below.

Preliminary action was initiated to register Marayoor Jaggery as GI, two meetings were convened on 20-05-2008, one at Marayoor and another at Kathaloor in collaboration with Department of Agriculture. Separate committees were formed at these places. Dr.Atman, Associate Director of Research and Co-ordinator of WTO cell, Dr.C.R.Elsy, Professor and Convenor, IPR cell, Dr.Jessy Thomas, Professor and member of IPR cell, Dr. V.R.Shajan, Associate Professor, SRS, Thiruvalla and A.O.s Krishibhavan Marayoor and Kathaloor attended the meeting

G.I. registration for Central Travancore jaggery was filed jointly by Kerala Agricultural University, Madhya Thiruvithamcore Karimpu Vikasana Samithi and Gurkhandasari Cooperative

Society, Arumanoor, Kottayam. A sugarcane farmer's society has been registered with the name "Madhya Thiruvithamcore Karimpu Vikasana Samithi".

Sugarcane farmer's meeting was held on 29.4.2008 at Sugarcane Research Station, Thiruvalla. The meeting was chaired by the Director of Research. Dr. Atman, Associate Director of Research and Co-ordinator of WTO cell, Dr. C.R. Elsy, Professor and Convenor, IPR cell, KAU, Dr. Joseph Philip, ADR, Kumarakom, Dr. Sosamma Cheriyan, Professor and Smt. Anitha, AO, Eraviperoor. Dr. Jessy Thomas, Professor and member of IPR cell and four A.O.s from the Kerala Agriculture Department also attended the meeting.

Sugarcane farmers meet was held at Kuttoor on 2.6.2009 jointly organized by Kerala Agricultural University (SRS, Thiruvalla) and Department of Agriculture and 250 farmers participated. The meet was inaugurated by Hon. Minister of Agriculture in the presence of Hon. Vice Chancellor, Director of Research and Joint Director of Agriculture and other dignitaries. A high quality semisolid jaggery 'Madhuram' developed at SRS, Thiruvalla was released by Hon. Minister of Agriculture.

Dr. T.M. Kurian, Professor and Head of the station is the chairman of the Research – Extension Interface Programme for Pathanamthitta District and all scientists of the station serves as resource personals in the interface.

The scientists of the station handled classes for Departmental officials, farmers of Pathanamthitta, Kottayam and Idukki districts. Dr. Jessy.M. Kuriakose, Professor handled eleven classes and Smt. Nimmy Jose, Assistant Professor handled one class for farmers and Agricultural Assistants during 2008-09

The station celebrated the Karshakadinam (17.8.2008) by supplying planting materials, taking classes for farmers. Dr. T.M. Kurian conducted field visits in Thiruvananthapuram and Pandanad sugarcane plots and Dr. Jessy.M. Kuriakose, Professor took class on scientific vegetable production for the farmers of Ezhamkulam Krishi Bhavan.

Elite planting materials including breeder seeds of vegetables have been produced and distributed from the station. A total quantity 150 Kg. vegetable seeds (Breeder seed 25.4Kg.), 6.35 tones of sugarcane sets, 1555 nos of banana suckers and 840 nos coconut seedlings have been distributed from the station during 2008-09.

Dr. T.M. Kurian, Professor, Dr. Jessy.M. Kuriakose, Professor and Dr. V.R. Shajan, Associate Professor are the technical experts from Kerala Agricultural University in the SHM, RKVY and ATMA programmes for Pathanamthitta district. In the farm school for vegetables in Kulanada Krishi Bhavan, Dr. Jessy.M. Kuriakose, Professor was the leading resource person.

Smt. Nimmy Jose, Assistant Professor is the technical member of the district seed campaign committee for IPM in Pathanamthitta district. Scientists of this station served as the members of different BTT of ATMA Pathanamthitta district. The station has participated actively in five agricultural exhibitions conducted at Alappuzha, Neyyattinkara, Changanachery, Kottayam and Thrissur and exhibited jaggery products, sugarcane and vegetable varieties released from the station. Coconut and arecanut bunches were exhibited and supplied improved vegetable seeds for sale.

The scientists of the station were judges for selection of progressive farmers in Pathanamthitta district together with State Agriculture Department. They also served in committee for judging the home gardens, institutional gardens, collections of ornamental plants, agricultural produce etc. in connection with the Pushpamelas organised by Horticulture Development Society, Thiruvalla.

Technical advice is being disseminated to farmers directly and also over phone. During 2008-09 about 15 farmers were given technical guidance in farming. The scientists also visited problem fields as and when reported and gave necessary recommendations. Periodical field visits by experts are being conducted to monitor crop situation

The meteorological data recorded in the station is utilized in the entire district of Pathanamthitta.

b. Details of activities

i) Training programmes organized: Nil

Scientists of this station had served as resource person in various agricultural seminars/ training programmes.

Farm advisory Services

In person	Over telephone	Trough letters
Scientists of this station gave advice on scientific cultivation of sugarcane, vegetables, banana, coconut, nutmeg etc as and when the growers approached and also suggested suitable control measures for field problems	Scientists of this station gave advice on scientific cultivation including suitable control measures for field problems in the major crops of the tracts.	

Visitors

I) No. of visitors to the Institution (farmer group/students)

II) Important visitors

1. Dr. N.V. Naidu., Principal Scientist (Sugarcane).RARS, Anakapalle
2. Dr. Rajesh Kumar., Principal Scientist. IISR, Lucknow
3. Dr. Pawar., Scientist (Pathology), VSI, Pune
4. Dr. Dwivedi, G.P., Sr. Scientist (Ent.), SRI.Pusa

Finance 2008-2009

Head	Expenditure (Rs.)	Receipts
Non-Plan		
347-31-0034 (Non-Plan)	4814135	
347-31-0035 NARP (Non-Plan)	603812	
Plan		
347-31-2251 Seed and nursery programe	84832	
347-31-2273-Srengthening Res. On Cucurbatious Vegetables (Res. On Vegetables)	32500	
347-31-4427- Research on sugarcane	20345	
Other plan scheme		
347-31-2373-Establishment of Vermicompost Unit	990	
347-31-3474-Product diversification of sugarcane	NIL	
347-31-3475-Organic vegetable cultivation	NIL	
ICAR		
347-31-6632 AICRP on Sugarcane (ICAR 75-25)	1721309	
347-31-5517 Frontline Demonstration	36000	
Other EAPs		
347-31-8460 – Establishment of sugarcane processing unit at Sugarcane Research Station, Thiruvalla (RKVY)	892544	
347-31-8453-Establishment of a Network centre for production of planting materials	200000	
EAP Total	2849853	
Revolving Fund	NIL	
Receipts		653685

FACULTY VETERINARY AND ANIMAL SCIENCES

CENTRE FOR PIG PRODUCTION & RESEARCH, MANNUTHY

Name of Head of the Station

: Dr. P.T. Philomina, Professor

Research Programmes

a. Major Research Achievements (Highlights) (Attached photographs of three breed)

1. The Center has evolved and implemented on a trial basis the terminal sire system of breeding for production of three breed combinations with Duroc as terminal sire (i.e. Duroc as terminal sire and crosses of Desi, Large White Yorkshire and Land race).
2. Under the field condition swill feed was found to be equally effective compared to concentrate feed in producing growth of the fatter pigs.
3. A study on Phytase supplementation on the availability of different minerals and their interactions in pigs was conducted. Phytase supplementation increased body weight gain, dry matter intake and mineral availability (Calcium, Phosphorous and Manganese). Phytase supplementation of ration decreased feed cost per kg body weight gain.
4. A study on the isolation and characterization of bacteria associated with gastroenteritis in weaned piglets. Bacteria causing gastroenteritis in weaned piglets, pathogenesis of isolates and antibiotic susceptibility pattern of isolates is studied.
5. Comparative study is undertaken on the efficiency of the two types of housing systems adopted for farrowing in relation with litter size, birth weight weakly weight gain and pattern of mortality till weaning in the crossbred piglets.
6. An investigation was carried out with the objective to determine the effect of organic chromium propionate supplementation on the growth of cross bred pigs. The supplementation of chromium propionate did not affect the growth or feed conversion efficiency of growing (Large White Yorkshire X Desi) cross bred pigs, There was non-significant decrease in triglycerides and increase in HDL cholesterol level, it can be beneficially used to improve the lipid profile of the cross bred pigs.
7. One open sty is under modification to provide adequate space for movement and feeding as well as for better ventilation.

2. Extension Programmes

a. Highlights of extension activities (Attached photographs of important activities)

The Centre provides technical knowledge to the progressive farmers in establishing the piggery units with respect of the construction of the pig house, health care, management, waste disposal and other problems faced on day to day basis over telephone and personal call.

The Centre supplied about **1752 numbers** of breeding and fattening piglets to farmers during the period.

Details of Sale of Seeds / Planting materials/ Biocontrol agents

Head	Item	Quantity (Nos)	Revenue (Rs. In lakhs)
CPPR & Scaling up of piglets	Piglets	1571	39,41,144/-
AICRP on Pigs	piglets	181	1,83,382/-
Total		1752	41,24,526/-

Finance (From 01-04-2008 to 31-03-2009)

Head	Budget Estimate (Rs. in lakhs)	Expenditure (Rs.in lakhs)	Receipts (Rs. in lakhs)
Non Plan CPPR	43.85	32.33	20,91,144/
Plan Scaling up of piglet production	33.00	29.50	18,50,000/
EAP AICRP on Pigs	38.90	26.57	1,83,382/
Total	115.75	88.40	41,24,526/
Note: About 45% of recurring expenditure (Salaries/wages/feed/medicines and other recurring cost) remitted back to University as receipts.			

UNIVERSITY POULTRY & DUCK FARM, MANNUTHY

Name of Head of the Station : Dr. Leo Joseph

Details of sale of seeds/planting materials/biocontrol agents etc.

Item	Quantity	Revenue
Day old chicks	1,81,828	
Partly grown chicks	50,745	-
Hatching eggs	1,36,091	-

Finance

Head	Expenditure(Lakh Rs)	Receipts (Lakh Rs)
Non-Plan	70.69	39.98
Plan	1.56	-
ICAR	21.00	-
Revolving Fund	16.31	17.27

LIVESTOCK PRODUCTS TECHNOLOGY (MEAT TECHNOLOGY UNIT)

Name of Head of the Station : Dr. P. Kuttinarayanan

Research Programmes

- a. Major Research achievements (highlights):
- Various research activities and marketing studies with respect to irradiated meat and meat products were conducted. Exhibition and popularization of the irradiated products was also conducted. It was observed that irradiated meat is having an extended storage life of 20 to 35 days and radiated products is having 60 to 75 days depending on the nature of the product.
 - A concept paper on the project "creating bioengineered skin-a multidisciplinary approach" has been subjected to dept. of Biotechnology, Govt. of India. Further discussions are expected to take place shortly.
 - Preliminary studies on the carcass characteristics of Gir cattle were initiated. The Gir breed of cattle offer a great potential for meat production in India with respect to dressing percentage and meat yield as indicated by the pilot study.
 - Studies on utilization of pork skin collagen (PSC) were conducted. Initial data indicate that PSC can act as a desirable fat replacer in low-fat frankfurter emulsions without compromising the eating qualities.

Extension Programmes

- a) Highlights of extension activities
(Attach Photographs of important activities)
- b) Details of activities (wherever applicable)
- Production, processing and marketing of meat and meat products to the tune of more than Rs. 75 lakhs.
 - Preventing the exploitation of farmers by middle-men by fixing a reasonable purchase price for meat animals including duck and rabbit.
 - Providing trained manpower to the meat industry
 - Popularizing novel meat products and processing technologies (reports attached)
 - Demonstrating the various facets of meat production, preservation and processing and to different categories of visitors and students

Important visitors:

	Name and Designation
1.	Mr. Anisur Rehman, Minister of Animal Husbandry & Dairying, West Bengal
2.	Dr. V. N. Bandre, Asst. commissioner, Maharashtra
3	.Dr. R. G. Kulkarni, Commissioner of Animal Husbandry, Maharashtra
4.	Mr. Samere Amlesom, Dean & Vice Chancellor, Hamelmalo Agricultural College of Education, Eritrea

Details of Sales of Meat and Meat Products

Item	Quantity (Kg)	Revenue (Rs.)
Beef	18253	
Veal	1266	
Pork	29242	
Fat Free Pork	755	
Mutton	860	
Rabbit	781	
Duck	2152	
Quail	205	
Turkey	4.5	
Curry Cut Pork	191	
Belly Pork	219	
Broiler Mutton	48	
Total Meat Production	53976.5	66,72,321
Meat products	3434.3	4,53,238
Byproducts	-----	4,58,618
TOTAL		75,84,177

Finance 2008-09*

Head	Expenditure (Rs.)	Receipts
Plan	49,70,967	24,40,463
Revolving Fund	69,72,476	78,64,685
Transferred to comptroller	12,00,000	-----

* Vide Letter No. BG/A1/8583/2009 dated 26.3.2009, sanction was accorded by the Comptroller to utilize the ICAR Development Grant for the purchase of walk-in Deep Freezer and remodeling for an amount not exceeding Rs. 25, 00,000.

GOAT AND SHEEP FARM, MANNUTHY

Name of Head of the Station : DR.K.C.Raghavan

Research Programme:

Ongoing:

Conservation and Evaluation of Malabari Breed of goats.

The weight at birth, two months and six months of age in Malabari goats is 1.78, 3.82 and 12.95kg respectively. The prolificacy rate reported for the year was 72.22 and 27.77 for singles and twins. The average peak yield reported was 670ml.

Conservation and Evaluation of Attapadi breed of goats.

The weight at birth, two months and six months of age in Malabari goats is 1.99, 3.50 and 13.14kg respectively. The prolificacy rate reported for the year was 33.33 and 66.66 for singles and twins. The average peak yield reported was 570ml.

Selective breeding of Alpine x Sannen x Malabari x Boer goats.

The weight at birth, two months and six months of age in Malabari goats is 2.65, 5.32 and 17.48kg respectively. The prolificacy rate reported for the year was 27.86, 63.93, 7.37 and 0.81 % for singles, twins, triplets and quadruplets respectively. The average peak yield reported was 575ml.

Establishment of elite germplasm of Malabari breed under AICRP on Goats.

A total number of 16 bucks suitable for breeding were distributed during the year 2008-09. Eleven selection indices were constructed. Based on the best index, the expected genetic progress in body weight at six months of age was 1.490 kg.

Studies on kid mortality in goats

Kids showed a weakness at around one week of age, which slowly progressed to ataxia, and rarely death. Neonatal hypoglycemia and mineral deficiency were identified as primary causes. Glucose administration and mineral supplementation reduced the kid mortality rates. Studies are progressing towards identification of specific cause and rectifying it.

M.V.Sc Projects

Completed

Early pregnancy diagnosis using ultrasonography in goats. Pregnancy can be diagnosed as early as 19 days at an average from 5th week onwards (Dept of Animal Reproduction)

Comparative study of storage stability of hepatobiliary enzymes in ruminants of humid tropics. (Dept of Biochemistry)

Ongoing

1. Genetic resistance to gastro-intestinal nematodes in goats. . (Dept of Animal Breeding and Genetics)
2. Beta lactoglobulin polymorphism in goats of Kerala. . (Dept of Animal Breeding and Genetics)
3. Genetic polymorphism of Major Histocompatibility Complex classII genes in goats. (Dept of Animal Breeding and Genetics)
4. Anti-oxidant status and metabolic profile of goats during pregnancy and lactation.(Dept of Biochemistry)

Other Research activities

1. Effect of maize supplementation at pregnancy.
2. Relationship between level of immunoglobulin levels and growth and mortality.
3. Screening for parasites in kids and adults.
4. Sero-conversion studies of antirabies vaccination in goats (Dept, of preventive medicine)

The farm is also acting as a source for the supply of Malabari bucks to AI center, Mannuthy and source of Sheep RBC for research programmes for the Dept of Physiology, Microbiology, Clinical Medicine etc.

Teaching

Internship training

Batches	Number of students	Number of days
2003 batch	25	21

VHSE on-the-job training

Name of the school	Number of students	Number of days
Govt VHSE school, Ayyanthole, Thrissur	26	10

B VSc and AH course practical conducted at Goat Farm

Course Number	Course Title	Number of students
LPM 321	Sheep and goat production and management	66
LPM 121	Animal Housing and Sanitation	72
LPM 111	General Livestock Production and Management	72
AGB 221	Livestock Breeding Systems	76

Extension Activities- highlights

The experts in farm in collaboration with Tholur panchayath are implementing a goat-rearing programme.

Farmers from extension training centre, Mannuthy make regular visit to the farm.

Radio talk

Scientist	Date	Subject
Dr K.C. Raghavan	18.7.2008	Status of goat farming in Kerala-All India Radio,Thrissur.

Video conferencing on goat rearing

Scientist	Date	Audience
Dr Radhika, G.	11.11.08	VRCs at Wayanad through ATIC Mannuthy

Farm Advisory Session

In person	Over phone	Letter
2500	3000	50

Details of sale of seeds/planting materials/bio-control agents etc.

Item	Quantity	Revenue
1.Animals	196 nos.	2,72,317
2.Goat Milk	1451.3 litres	29,026
3.Goat Manure	12128 kg	50,000
Total		3,51,343

Finance 2008-2009

Head	Expenditure	Receipts
Plan	1616655	376343

6. Dr Deepa G Menon conducted a class in the Cluster Meeting of VHSE teachers in the topic Hatchery Management to teachers on 25/10/08 at VHSE Ayyanthole.
7. Dr Deepa G Menon conducted a class on Bio-security & Farm management to the VCI Trainees during the Training conducted by the Department of Veterinary Public Health on the Diagnosis and Control of Bird Flu – 2 batches on 11/12/08 and 17/12/08 at COVAS, Mannuthy.
8. Dr Deepa G Menon conducted a class on Incidence & Control of Zoonotic Diseases to the Students of B Sc Zoology of SKVC, Thrissur on 15/11/08a at COVAS, Mannuthy.
9. Dr Deepa G Menon conducted a class on Poultry rearing to 38 Kudumbasrce members at Extension Training Centre, Mannuthy on 20/1/2009.
10. Dr Anitha P conducted a class on Poultry Rearing for 40 unemployed women at COSTFORD, on 21/1/2009.
11. Dr Anitha P conducted a class on Poultry Farming for 35 farmers from Idukki under ATMA programme on 18/2/2009.
12. Dr A Jalaludeen provided Technical Guidance to SIRD, Assam, from 26/2/09 to 2/03/09.

Highlights of Extension Activities

Farm Advisory Services.

In Person	Over Telephone	Through Letters
456	879	23

Radio Talk/ TV Programme/ Audio/video Cassettes

Topic	Date	Name of Scientist
Incubation and Hatchery Management	23/6/08	Dr. P Anitha
Quail Rearing	23/6/08	Dr P A. Peethambaran
Duck Farming	23/6/08	Dr A Jalaludeen
Poultry for Egg and Meat	8/8/2008	Dr A Jalaludeen
Practical Aspects of Layer farming	25/3/09	Dr A Jalaludeen
Commercial Poultry Rearing	16/9/08	Dr Deepa G Menon
Rearing of Pet Birds	23/9/08	Dr Deepa G Menon

List of Publications

Popular articles:

Wet litter - A burden in Poultry Industry
 Dr. Binoj Chacko and Dr. A.Jalaludeen
 Poultry Punch Vol.24 (2) PP. 45-46

Details of sale of Seeds/Planting materials/Bio control agents etc.

From the revolving fund hatchery the following no of chicks were sold.

- i. Gramalakhshmi : 26772
- ii. Gramasree : 29929
- iii. Grama Priya : 90061
- iv. Giriraja : 3154

Finance

Head	Expenditure	Receipt
Non-Plan		
Plan		
ICAR		
Other EAPs		
Revolving Fund	Rs. 18590385	Rs. 19996667

CATTLE BREEDING FARM, THUMBURMUZHI

Name of Head of the Station : Dr.Francis Xavier

Academic programmes

a. UG Programme:

The Cattle Breeding Farm, Thumburmuzhi functions as a nodal centre in imparting training to the Students on various aspects of dairy cattle production during their internship period. A similar type of training with special emphasis on dairying was also given to the B.Tech. (D.Sc & Tech.) students.

Research programmes

a. Major research achievements

As part of the curriculum the BVSc and AH internees were given training in various aspects of Farm management, Breeding and Production. The farm also acts as a field unit of the ICAR Field Progeny Testing Scheme of Centre for Advanced Studies in Animal Genetics & Breeding, CV& AS, Mannuthy. The semen of high, pedigreed crossbred bulls are used for artificial insemination. Evaluation of the bulls is carried out by progeny testing. In addition routine research activities like recording of milk production, reproduction and growth traits are also carried out and the details are furnished.

b. Research Projects

Details of completed projects during 2008-09

RKVY Govt. of Kerala : "Establishing a Gene Sanctuary for fodder crops" at Thumburmuzhi.

Major achievements:

NEW variety (pre-release stage) THUMBURMUZHY 1 with 17%protein

- Developing "Thumburmuzhi I" with a new grass variety suitable for agro climatic zone of Kerala with a Crude Protein content of 17.5%, 120 Tillers and biomass 500 tonne/hect in an year.
- Collected 50 samples of fodder from different districts.
- Propagated selected fodder grass.
- Developed agricultural practices for new fodder grass varieties.
- Nutritional analysis of collected fodder.
- 15 Fodder bamboo varieties were collected and planted.
- Made blow ups of photograph of fodder and indigenous grass & bamboo for exhibition.
- Prepared exhibition boards.

- Construction of fodder museum.
- 24 x 16 x 4 m Geo membrane lined pond with 17 lakhs litre rain water harvested.
- New Sprinkler and motor system to irrigate 10 hec. of land.
- Tree nursery with 550 number of fodder tree saplings planted.
- Wire mesh fencing of fodder land to prevent crop raid by wild animals.
- Demonstration plots for fodder varieties for farmers.
- Farm training and field trails with new fodder varieties.
- Interactive CD on fodder in vernacular for farmers.
- Aerobic composting unit for organic fodder production and Livestock Waste Management. 'Thumburmuzhi model compost' unit for farmers waste management and rural income generation

Highlights of extension activities

1. Artificial insemination and treatment of sick Livestock of rural farmers of the area as per mandate of the station and supply of improved variety of fodder slips to the farmers are the major extension activities.
2. The first Project of CBF after its inception-"RKVY- Project-Establishing of gene sanctuary of fodder crops at Thumburmuzhy" with Dr.Francis Xavier as PI and Dr.Shyama and Dr.John Abraham, COVAS, Pookot as Associates envisaged Rs.20 lakhs for infrastructure development completed.
3. Farmers were trained in Livestock Production during the period.
4. Power generation from the Bio Gas plant which was commissioned during March 2008 with an outlay Rs.1.5 lakhs. The use of LPG in CBF was terminated and power generated (6 KV) from Bio gas is utilized for the works of milking machine and office power needs reducing the Electricity bills.
5. Scientific replanting of waste land of the station with improved exotic fodder was completed .
6. We have organized a one day exposure camp of farmers in Association with NABARD to motivate farmers to adopt new technologies. 30 farmers participated in the camp. Dr.George Thomas, Professor KAU and Dr.K.Syama, Professor, CBF, Thumburmuzhi handled classes for the farmers.
7. 20 officers from NABARD visited the farm along with Chief General Manager Mr.Bhawar Puri.
8. Dr.Francis Xavier, Professor & Head served as Govt. of India Nominee (CPCSEA) in the following institutions.

- 1 TVM Medical College
2. Calicut Medical College
3. National College of Pharmacy Mukkam
4. Pariyaram Medical College
5. Amrita Medical College
6. St. James College of Pharmacy Chalakudy
7. Cochin University Dept. of Biotechnology
8. Calicut University Dept. of Biotechnology
9. Nagarjuna Herbal Concentrate Ltd., Thodupuzha
10. Al Shifa College of Pharmacy.

B. Details of activities

A total of 93 artificial inseminations were done and 19,712 Nos. of fodder slips were supplied to the farmers during the report period. In addition the farmers were given advice on various aspects of cattle rearing and given opportunities to witness routine farm operations. Field visits were made occasionally as part of first aid service.

Farm Advisory Services

In Person	Over Telephone
65	60

- iii) Field visit : 15
iv) Radio talks/TV programmes/Audio-video cassettes : 15
DVD on fodder varieties

Important visitors

1. Sri.P.M.Varghese, Ex. Panchayath Pressident, Nedumbassery Panchayath.
2. Dr.P.C.Alex, ADR (Vety)
3. P.V.Gangadharan, Member, Paiyaram Gramma Panchayath
4. Dr.Prema K., Vety. Surgeon, V.D Mattupetty.
5. Dr.R.Unnikrishnan, Vety Surgeon visited on 26.11.2008.
6. Dr.Ani.S.Das, M.D., KLD MM.Board visited on 9.12.2008.
7. Dr.Shaji Antony, DGM (BT) i/c Muvattupuzha -- KLD MM Board.
8. Dr.Rajesh, Asst.Manager (AH), KLD Board
9. Shri. George Joseph (MBA Student), Mampilly House,
10. Dr.P.S.Geethakutty, Professor & Head, NIRD, Hyderabad.
11. Dr.P.Rajendran, Director, PPM Cell and Ex. Officer, Addl.Sec., Govt. of Kerala.

Finance

Head	Expenditure	Receipts
Non-plan	91,05,376	91,00,000
Plan		
ICAR(Catch-up grant)	7,85,000	7,85,000
Other EAPs	20,00,000	20,00,000
Revolving Fund	0	
Total	80,85,455	1,18,85,000

LIVESTOCK RESEARCH STATION THIRUVAZHAMKUNNU

Name of Head of the Station : Dr.K.Anilkumar

Research programmes

Project I MPTS Evaluation / Tree improvement

Sub Projects :

- 1) Collection and evaluation of promising species/cultivars of fuel, fodder and small timber species.
- 2) Provenance evaluation of mangium (*Acacia mangium Willd.*)
- 3) Provenance evaluation of teak (*Tectona grandis* Linn f.)

Project II Agroforestry management

Sub Projects :

- 1) Standardization of thinning and pruning regimes for *Acacia mangium* stands

Part:1 Effect of population density and pruning on growth of *Acacia mangium*.Willd:
- 2) Standardization of thinning and pruning regimes for *Acacia mangium* stands

Part :2 Effect of thinning and pruning in a five-year-old *Acacia mangium*.Willd stand
- 3) Compatibility of different fodder tree-grass combinations in a silvopastoral system

a. Major research achievements (highlights)

- The provenance evaluation trial on *Acacia mangium* after seven years of tree age showed growth variation among provenances. In general, Papua New Guinean provenances performed better in the humid high rain fall conditions of Kerala. Provenances of Upper aramia, Oriomo and Arufi Village were the better performers in overall growth.
- The performance of the progeny of promising *A. mangium* provenances were tested in the seedling stage and found that offsprings of Arufi Village provenance showed better performance.

- The provenance evaluation trial on Teak in the seventh year of stand age showed similar consistent trends with Nilambur provenances such as Cherupuzha, Nedumkayam-1 and Karuali showing better growth.
- Planting density-cum-pruning trial on *Acacia mangium* was established in 2001. After seven years of stand growth, tree height seems to have stabilized within all density plots while the DBH and mean tree volume registered increase the decreasing planting density. However, stand volume in $\text{m}^3 \text{ha}^{-1}$ was considerably higher for closely spaced stands ($5000 \text{ trees ha}^{-1}$; $655 \text{ m}^3 \text{ ha}^{-1}$) indicating the dominant role of population density on stand volume production.
- Tree pruning invariably retarded tree growth in all the density plots, the effect of which was more pronounced in the widely spaced stands. Also, there was only marginal improvement in tree form consequent to stand pruning. Hence, heavy annual pruning to the extent of up to 50% tree height is not advisable for a fast growing tree species like *Acacia mangium*.
- Medicinal shrub *Plumbago rosea* was intercropped with *Acacia mangium* managed at varying planting densities and pruning levels. Highest tuber yield was observed in the moderately dense *A. mangium* stands (2.33 kg ; $1250 \text{ trees ha}^{-1}$) while the lowest crop yield was observed from heavily stocked stands (0.90 kg ; $5000 \text{ trees ha}^{-1}$). Tree pruning could not inflict considerable changes in understory crop yield though it was marginally higher in the pruned stands.
- Changes in soil properties were monitored as a function of planting density for 7-year-old *Acacia mangium* stands. Soil nitrogen, phosphorus and potassium showed only modest response to planting density and pruning while highest organic carbon content was observed in the moderately dense stands (2.63% ; $2 \times 2 \text{ m}$). However, treeless control plot showed characteristically lower nutrient status and organic matter content (1.59%) as compared to soils under *A. mangium* cover.
- Among the planting densities the widely spaced stands ($4 \times 4 \text{ m}$, $625 \text{ trees ha}^{-1}$) had highest soil moisture content (27.82%) while treeless control plots showed considerable reduction (9.8%).
- Soil bulk density showed only modest variation among *Acacia mangium* planting density-cum-pruning treatment plots. However, soil bulk density was significantly higher in the tree-less open plots (1.03 g cm^{-3}) which confirms the role of trees in improving the soil physical properties.

- Understorey productivity evaluation trial involving growing of black pepper (*Piper nigrum*) in a 12-year-old *A. mangium* stand managed at various thinning regimes revealed better pepper vine growth under heavily thinned stands (533 trees ha⁻¹). Results suggest the possibility of intercropping with *A. mangium* through judicious regulation of stand stocking.
- The silvo-pastoral trial involving four fast growing fodder tree species and fodder grass species is in the early establishment phase (3 years). Preliminary observations suggest that *Gmelina arborea* showed better growth among the fodder tree species. Among the fodder grass species, hybrid Napier (HBN) showed better growth irrespective of tree species. Early observations however, suggest that maximum herbage production was in combination with *Pterocarpus marsupium* (1.51 Mg ha⁻¹).

List of publications

Scientific papers :

- Kunhamu, T.K. Mohan Kumar, B., Viswanath S. 2009. Does thinning affect litterfall, litter decomposition, and associated nutrient release in *Acacia mangium* stands of Kerala in the peninsular India? *Canadian Journal of Forest Research*. 39: 1-10.
- Kunhamu, T.K., Mohan Kumar, B., Viswanath, S., and Sureshkumar, P. 2008. Root activity of young *Acacia mangium* Willd trees: influence of stand density and pruning as studied by 32P soil injection technique. *Agroforestry Systems*. Springer, The Netherlands, Online first. DOI 10.1007/s10457-009-9205-2

Finance 2008 – 09

Head	Expenditure
Non-Plan	Rs 11935139
Plan Seed & Nursery	Rs 6425
ICAR AICRP on AF	Rs 2364357
Other EAPs- Addl Facilites	Rs 1843315
Revolving Fund	Nil
Total Receipts	Rs 5467 299

K A U DAIRY PLANT, MANNUTHY

Name of Head of the Station : Dr. P I Geevarghese

Academic programmes:

The students from the College of Veterinary and Animal Sciences, Mannuthy and Pookod were admitted to the institution for Internship training

The students from College of Dairy Science and Technology were admitted to the Plant for regular Plant training.

Extension programmes :-

- a) Highlights of extension activities

Dr.P.I.Geevarghese , Professor and Head, attended the workshop on “ Food security” arranged for the Dairy Extension Officers of the Dairy Development department , Govt. of Kerala on 20-1-09 at Sulthan Bathery and presented topics on milk procurement.

Dr.P.I.Geevarghese , Professor and Head attended the seminar on Dairying organized by the Centre for gender studies , KAU at Tholur Panchayat on 11-3-09 and took a class on profitable dairy farming.

Sri P Sudheer Babu Assistant Professor acted as consultant for the design, fabrication and erection of fluid milk plants and product manufacturing facilities at the following Dairy Co-Operatives.

1. Sulthan Bathery Dairy Co-operative Society, Sulthan Bathery.
2. Pulpally Ksheera vikasana Sahakarana Sangham Ltd
3. Varadoor Ksheerolpadaka Sahakarana SanghamLtd.
4. Vakeri Ksheerolpadaka Sahakarana Sangham Ltd.
5. Mananthavady Ksheerolpadaka Sahakarana Sangham Ltd.
6. Panamaram Ksheerolpadaka Sahakarana Sangham Ltd.
7. Meenangadi Ksheerolpadaka Sahakarana Sangham Ltd.

List of publications: Technical

Scientific Papers / Posters/ Abstracts presented in national and international seminars

Dr.P.I.Geevarghese. Professor and Head: 4 Abstracts.

Sri. P Sudheer Babu Assistant Professor: 4 Abstracts

Dr. S N Rajakumar Assistant Professor : 3 Abstracts

Beena A.K and Geevarghese,P.I. (2009) Current trends in packaging . College of Dairy Science and Technology Magazine- pp 48-51.

Geevarghese, P.I. (2008) Organic Dairy Farming. Paper presented at the National Seminar on “Food security through innovation in Food Processing and Entrepreneurship development” conducted at KAU

(i) No. of visitors to the Institution (farmer group/students) : 8382

(ii) Important visitors : 2

1. Dr. B V Venkateshiah, Dean, Dairy Science College Bangalore.
2. Dr. Semere Amleson, Dean, Agricultural College, East Africa.

Details of sale of Milk and Milk Products

Item	Quantity	Revenue
Pasteurised cow milk	158195 Ltr	
Pasteurised buffalo milk	15204Ltr	
Ghee	503Ltr	
Curd	8540 Ltr	
Ice cream 500 ml	1018 Packets	
Ice cream 100 ml	1198Cups	
Ice cream 50 ml	7237 cups	
Khoa 25 gms	9089 packets	
Paneer 250 gms	2078 packets	
Sambharam 200ml	2266 packets	
Gulabjamun 10 Nos	654 packets	
Whey drink 200 ml	3103 Packets	
Yoghurt 50 ml	1807 cups	
Sip-up	3215 Packets	
Palada 1 Ltr	38 Ltrs	
Kalan 500gm	37 Packets	Rs. 4174269

Other details if any

During the period the Dairy plant procured 1,63,278 Liters of cow milk and 26329 Liters of buffalo milk. An amount of Rs 4174269/- was collected by sale of milk and milk products during this period. During the financial year an amount of Rs 6,00,000/- (Rupees six lakhs only) was transferred to the University account from the revolving fund of the Dairy Plant. The plant was a centre of attraction for the visitors including school and college students, farmers, entrepreneurs etc.

Finance 2008-09

Head	Expenditure	Receipts
Non-Plan	545294	
Plan	1921202	
ICAR	559579	
Other EAPs Re-imbursment of 50% Stipend from Board of Apprentice ship Chennai.		6540
Revolving Fund	3616259	4174269

AICRP ON POULTRY FOR EGGS, MANNUTHY

Name of the Head of the Station : Dr. K. Narayanankutty

Research Programmes

a. Major research achievements (highlights)

- During 2008-09, Performance study of S24 Generation was carried out in this project
- The egg numbers at 40 weeks of age was 123.75 and 118.61 eggs for IWN and IWP strains respectively
- The egg weights at 28th week were 50.02 and 50.42 g respectively for IWN and IWP strains
- The mortality rates for chick, grower and layer stages were very low at 2.16 and 0.47 per cent respectively.

Extension Programmes

a. Highlights of extension activities

- Pooram Exhibition
- Farmers counseling
- Publication of books and leaflets

b. Details of activities (wherever applicable)

i) Training Programme organized

Topic	No. of Trainees	Category	Venue	Date	Name of scientists
Poultry rearing, breeding and Artificial Insemination	80	Internship for BVSc students	AICRP Farm	Through -out the year	Dr.K.Narayanankutty Dr.R.Richard Churchil Dr. Binoj Chacko

ii) Farm Advisory services

In Person	Over Telephone	Through Letters
More than 100 in number	More than 200 in number	-

List of Publications

Scientific Papers : 11
 Technical Bulletins : 1
 Popular Articles: 1
 Books :2

No. of visitors to the institution (farmer group/ students) : more than 300

Important visitors

1. Dr. R. N. Chatterjee, Principal Scientist, PD on Poultry, Hyderabad
2. Dr. Rasool, ADG, ICAR

Staff strength as on 31.03.2009

Scientific	: 4
Administrative	: 5
Supporting	: 4
Others (specify)	: Labourers - 17
Total	: 30

Details of sale of seeds/ planting materials/ biocontrol agents etc.

Item	Quantity	Revenue
Hatching eggs	8261	} Total Rs. 1896549
Day old parent stock chicks	750	
Commercial day old	2810	
Birds for breeding purpose	3671	
Table eggs	851709	

Finance

Head	Expenditure	Receipts
Non-plan	-	-
Plan	3.47 lakhs	-
ICAR	82.75 lakhs	18.97 lakhs
Other EAPs		-
Revolving Fund		-
Total		

**CENTRE FOR ADVANCED STUDIES IN ANIMAL
GENETICS & BREEDING MANNUTHY**

Name of Head of the Station : Dr. K. V. Raghunandan

Faculty improvement programme

(a) Deputation of Scientists for Seminars/Workshops/Symposia

Name & Designation	Name of Seminar	Venue	Date
Dr.Raghunandan, Director	Institutional Biosafety Committee Meeting	KAU , Vellanikkara	8 Jan 2009

(b) Deputation of Scientists for training programmes/Seminars/Summer School/Winter School/Short course

Name & Designation	Details of training			Sponsoring Organization
	Topic	Venue	Date	
Dr. G. Radhika, Assistant Professor	National Seminar on recent trends in Animal Welfare and Sustainable Livestock Production.	COVAS, Mannuthy,	Jan' 09	
Dr. G. Radhika, Assistant Professor	International Summit on Advancing Veterinary Medical Care – Challenges and Opportunities	TANUVAS, Chennai	Feb' 09	TANUVAS, Chennai

(c) Details of Seminars/Workshops/Symposia conducted at the Station

Particulars	Topic	Venue	Date
Midterm review meeting	Progeny Testing Scheme ICAR	Project Directorate of ICAR Meerut	23 rd Jan 2009

Academic programmes

	Intake capacity & No. of students enrolled during 2005-06		Out turn of students during 2005-2006		
	Male	Female		Male	Female
UG	--	--	UG	--	--
PG(discipline-wise)	01	03	PG	1	02
Ph.D. (Discipline-wise)	0	01	Ph.D	0	0
	--	--		0	0

All India Coordinated Research Project on Malabari Goat Improvement

1. The objectives of the Project are

1. Characterization and evaluation of Malabari goats under field conditions.
2. Generation of baseline information on management practices, population trends, feeding system, disease pattern and mortality, socioeconomic and gene marker traits under village conditions.
3. To select the genetically superior males from the farmer's flocks and to establish an elite germplasm centre.
4. To use superior sires for improving the productivity of goat farmers' flock.
5. To evaluate the socio-economic status of goat breeders and the economics of goat production under village conditions.
6. Evaluation of performance under intensive, semi-intensive and extensive system of management.

Highlights & Achievements

Three field centers of Tellechery, Badagara and Tanur belonging to three northern districts of Kerala forms the field centers of study. Since the movement of goats is very high two more field centers have started, one at perambra in calicut district and Thavanur in Malappuram district, to get the required number of animals for the implementation of technical programme. The goat farm attached to College of Veterinary and Animal Sciences, Mannuthy is utilised for the elite germplasm centre. A total of 1270 goats were registered during the year 2007-2008. Of these 81.73% were available for recording till the end of the year.

- The overall least square mean body weights recorded were 3.12 ± 0.11 , 8.28 ± 0.18 and 15.99 ± 0.33 kg respectively for below one, three and six months of age.
- The overall mean of chest girth at below one, three and six months of age were 35.47 ± 0.45 , 46.12 ± 0.46 and 56.67 ± 0.58 cm respectively. Corresponding values for overall means of body length were recorded as 32.49 ± 0.50 , 42.30 ± 0.46 and 50.51 ± 0.63 cm. The overall mean heights at withers at below one, three and six months of age were 35.67 ± 0.46 , 45.17 ± 0.45 and 55.32 ± 0.58 cm respectively.
- Peak yields of milk in Malabari goats were recorded and the mean peak yields recorded was 1237.62 ± 75.44 ml.
- The percentage of singles, twins, triplets and quadruplets were 24.00, 61.47, 13.19 and 1.05 respectively. The percentage of multiple births was higher in Tanur (79.29%) than in Badagara (74.87%) and Tellichery (74.56%).
- The heritability estimates of body weights at below one, three and six months of age were 0.636 ± 0.436 , 0.023 ± 0.229 and 0.799 ± 0.476 respectively.
- Genetic and phenotypic correlations were estimated for body weight and body measurements. Positive genetic correlations were reported in most of the cases. The heritability estimate of peak yield was 0.846 ± 0.561 .
- Genetic correlation coefficients estimated with peak yield to body weight and body measurements were positive and significant except with chest girth at six months of age. They ranged from 0.08 (for chest girth at sixth month and peak yield) to 0.88 (for peak yield and body weight at third month). Phenotypic correlations were positive except with body length and chest girth at six months of age.

- Prediction equations were developed for estimation of body weight using chest girth, paunch girth, body length and height at withers for below one, three and six months of age.
- The phenotypic and genetic parameters estimated in the present study were utilized to construct different selection indices in Malabari goats. Eleven indices were constructed. Based on the best index, the expected genetic progress in body weight at six months of age was 1.490 kg

An index was also constructed with the objective of increasing milk production together with the body weight at different ages by incorporating dam's peak yield as one of the traits. This index had the r_{IH} value of 0.5703.

GENETIC VARIABILITY ANALYSIS OF INDIAN ELEPHANTS USING MICROSATELLITE MARKERS

This Project was sanctioned by the ICAR vide sanction order File No.7-23/2003-ASR II dated, 25-10-2004 for a period of three years with a total outlay of Rs.13,59,640 lakhs. The project envisages to tests the extent and character of molecular genetic variation using highly polymorphic microsatellite markers with the following objectives:

1. To establish a gene bank of elephants consisting of DNA samples from at least 300 Indian elephants belonging to different populations.
2. To characterize the different populations of elephants using microsatellite markers.
3. To estimate the allele and genotype frequencies at the polymorphic loci.
4. To analyse the genetic divergence/similarity among different populations of Indian elephants based on microsatellite polymorphisms.
5. To set up a panel of highly polymorphic microsatellite markers for elephants suitable for molecular genetic analysis.

The scheme was concluded during last financial year.

Achievements & Highlights

1. A DNA bank consisting of 337 genomic DNA samples of Indian Elephants established
2. Determined the number of alleles , allelic size range, heterozygosity, PIC, percentage exclusion probabilities and individualization potential of 18 microsat
3. A panel of microsatellite markers was set up which could be useful in individual identification , verification of percentage , testing of inbreeding among wild populations and other purposes such as wild life census and forensics

MOLECULAR CHARACTERISATION OF LOCAL PIGS OF KERALA USING MICROSATELLITE MARKERS

Objectives:

1. To establish a gene bank of local pigs of Kerala consisting of DNA samples from 300 – 400 local pigs belonging to different populations.
2. To characterize the different populations using microsatellite markers available from the pig genome map.

3. To estimate the allele and genotype frequencies at the polymorphic loci.
4. To analyse the genetic divergence / similarity among different populations of local pigs based on microsatellite polymorphisms.

The scheme terminated on during June 2009

Highlights

1. Angamali Pigs were found to be different from other indigenous pigs of Kerala on Phylogeny analysis.
2. The local pigs were genotyped using 25 microsatellite markers.

ICAR FIELD PROGENY TESTING SCHEME

Highlights

The main objective of the scheme is to select best bulls from among highly pedigreed bulls selected by ICAR by conducting artificial inseminations on cows reared by farmers in the field and evaluating the production performance of the female progenies. In addition to this, the scheme also aims at improving the milk yield of the cows in the field. Now the scheme is in operation in six milk societies at Chemapamkandam, Marottichal, Chuvannumannu, Chirackakode, Avannur and Puzhakkal.

During the period under report 3254 insemination using highly pedigreed bulls have been carried out. 3147 animals have been followed up for pregnancy diagnosis out of which 1275 animals were found to be pregnant indicating a conception rate of 40.5%. 405 numbers of female calves born from the scheme has been identified.

ACHIVEMENTS

Dam-daughter comparison for milk production has been done on 101 dam-daughter pairs in the field, to test the improvement in the milk yield. The result has shown that the average first lactation milk yield of the progeny animals born in the scheme was 2447 kg against their dams' average of 1994 kg in different parities. The overall average milk yield of progeny cows calved during 2007 was found to be 2416 kg and their contemporary calvers born to other bulls was 2106 kg. This shows the cows born in the scheme are capable of producing 500 kg more milk than their previous generation and 300 kg more milk than their contemporaries. Every year around 450 female calves are born from this scheme. From these female calves when they mature we can expect 1,20,000 kg (300 kg X 400 females) additional milk giving an additional revenue of Rs 24lakhs. This will have cumulative effect when they calve subsequently.

KAU SCHEMES

1. Vechur cattle conservation project

This institution has successfully conserved the only native cattle of Kerala which happened to be the smallest breed of cattle in the world studied so far. This precious germplasm is maintained as mother stock and all scientific analysis was carried out to expose the profile of this breed to scientific community

The alpha-LA gene of vechur cattle has been cloned and completely sequenced . The sequence was found to be having homology with that of Bos Taurus and human . The study did not reveal any structural or functional similarity with taat of human

Above all, the visitors and distinguished guests of the University use to visit the unit frequently. Now many VIPs have expressed their interest to visit this farm and see the native cattle of Kerala during the coming months.

A centre was established to multiply and propagate this breed to interested farmers. The farmers interested in Vechur farming were given special training on various aspects of farm techniques and the importance of native germplasm. During last year 21 good vechur animals were supplied to farmers as seed material to establish Vechur farm. A regular contact programme on technical aspects on the farms and necessary semen for insemination were distributed to these farmers whenever necessary. During last year more than 85 doses of semen were distributed to needy farmers.

Research on Rabbit.

The rabbit farm is functioning as a source of seed materials on various breeds of broiler rabbits. 557 Rabbits were supplied to various farmers and a regular contact programme is arranged to clear their problems whenever required.

Diallel crossing experiment was conducted using three breeds of rabbits in order to find out the best suited rabbit meat breed for Kerala. White Giant male X Grey Giant female cross was found to be the best meat producer.

All necessary technical advices and materials were given to the rabbit farmers by the Scientists of this Centre. Four breeds viz., Soviet Chinchilla, New Zealand White, White Giant and Grey Giant are maintained as mother stock.

A project on Genetic Analysis of Rabbits in Kerala was sanctioned from the Directorate of animal Husbandry, Kerala with a financial outlay of 5 Lakhs for 2 years. The project is in progress.

Details of research projects

1. Completed projects during 2008-09

Microsatellite markers of Pigs	ICAR	Dr. A.P. Usha	Dr.K.V.Raghunandan Ddr.M.R.Rajan Dr.K.C. Raghavan Dr.K.Anilkumar Dr.T.V.Aravindakshan	3.80
Microsatellite markers of Elephants	ICAR	Dr.T.V. Aravindakshan	Dr.A.P.Usha Dr.K.Anilkumar	3.895

2. Ongoing projects

Name of Projects	Funding Agency	Name of PI	Outlay
Field Progeny Testing Scheme	ICAR	Dr.Stephen Mathew	26.16
AICRP on Goat improvement	ICAR	Dr.K.C. Raghavan	15.78
Vechur Cattle Improvement Project (Plan)	KAU	Dr. K.V. Raghunandan	7.64
Rabbit Breeding Scheme(Plan)	KAU	Dr.K.A.Bindu	1.95
Genetic Evaluation of Milk Production & Composition Traits of Cross Breed Cattle in Wayanad	AHD	Dr. G. Radhika	2.37
Genetic Analysis of Rabbits in Kerala	AHD	Dr. K.A. Bindu	5.0

Extension programmes

a) Highlights of extension activities

1. Farmers contact programme in every month.
2. Conducting study classes for the farmers in the societies collaborating with the scheme.
3. Conducting cattle infertility camps, vaccination camps in the area of operation of the scheme.

The Rabbit unit and Vechur centre functioning in this Centre extends all technical and other support to farmers involved in farming. A regular contact and counseling programmes either through phone or mail is arranged to clear various problems arise during various stages of farming. All necessary training were given to various type of farmers like unemployed youth, ladies etc. to get involved in Animal Husbandry activities.

b) Details of activities

i) Training programmes organized:

- i) Lecture on "goat farming" for Fodder cultivation Training, College of Horticulture – 22-7-08
- ii) Lecture on "goat farming"- Puzhakkal block – 25-2-09
- iii) Orientation training in Agriculture for students-Lecture on "goat rearing"- 24-4-09
- iv) On the job training for 10 days at Goat & sheep Farm, Mannuthy for VHSE students
- v) Internship training for 7 days at Goat & Sheep farm for BVSc & AH students
- vi) One day training programme on rabbit rearing was conducted for the farmers from AHADS during March 2009.
- vii) Traing on rabbit rearing to farmers of Vaniampara Panchayat

ii) Farm Advisory Services

In person	Over Telephone	Through letters
20 Nos.	30 Nos.	25 Nos.

iii) Field Visit

No. of visits	Problem identified	Recommendations
Visited a vechur unit in Nemmara	Repeat Breeding	Recommended intrauterine medication Timely insemination

iv) Radio talks/TV programmes/Audio-video cassettes

Topic	Date	Name of Scientist
Goat farming	11-11-08	Dr. G. Radhika, Assistant Professor
Rabbit Farming	08-09-08	Dr. K.A. Bindu, Assoc. Professor

List of publications

Scientific papers

- i) Radhika,G.,Iype.S and Stephen.M.(2008)Heritability estimates for milk yield and milk composition traits of crossbred cows. *Indian Vet. J.*, 85: 553-554.
- ii) ReejaGeorge,P., Radhika,G., Shibu Simon & Rejani Kesavan (2008) Sources and vocational preferences of a re-settled tribal community. *Studies of Tribes & Tribals* 6 (2): 79-81.
- iii) Dinesh, C.N., Usha, A.P., Anilkumar, K., Radhika, G., Dildeep, V., Ravishankar, C. and Balakrishnan, P.P.(2008) A report on the native cattle and buffaloes reared by the tribals of Kurichiat in North Kerala, India. National Symposium on Redefining Role of Indigenous Animal Genetic Resources in Rural Development.Society for Conservation of Domestic Animal Biodiversity (SOCDAB) and Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar at Veterinary College, Bangalore , February 2008
- iv) Aparna,S., Nimmy George, Radhika,G. and Raghavan,K.C.(2009) Effect of dam's weight on birth weight of kids. National Seminar on recent trends in Animal Welfare and Sustainable Livestock Production. COVAS, Mannuthy, January 2009
- v) Radhika,G., Ajithkumar, S., Raghavan, K.C., Nimmy George and Naicy Thomas. (2009) Effective medical management of neonatal hypoglycemia in kids – a farm report.International Summit on Advancing Veterinary Medical Care – Challenges and Oppurtunities, TANUVAS, Chennai. February 2009
- vi) Amrita Susan Jacob and Aravindakshan T.V. (2008). Genetic Diversity in four South Indian Goat Breeds based on Microsatellite polymorphism *Indian Veterinary Journal* 85: 946-949.
- vii) Aravindakshan T.V. and K.V. Raghunandan (2008). Association of microsatellite polymorphism with production traits in malabari goats. *Indian Veterinary Journal* 85: 272-275.

- viii) Aravindakshan T.V. and James S.P.(2008) Kappa casein gene polymorphism in Vechur and Kasaragod cattle. *Indian Veterinary Journal* 85: 31-36.
- ix) Annual report of the ICAR Scheme for the year 2008. of *Animal Science*, 77(6):500-503.
- x) Reshmi R C and Stephen M (2008). Evaluation of Lactation milk yield and polymorphism of alpha-lactalbumin gene in crossbred cattle of Kerala.Proceedings of the 20th Kerala Science Congress 28-31, January 2008, Thiruvananthapuram, pp 133-135.
- xi) Radhika G, Iype S and Stephen M (2008). Heritability Estimates for milk yield and milk composition traits of crossbred cows. *Indian Vet.J.*85: 553-554.
- xii) Kumar A, Singh U, Mehra M L and Mathew S (2009). Performance of crossbred cattle under field conditions. *Indian Vet. J.*, 86: 43-45.

No. of visitors to the Institution (farmer group/students) : 10-15 farmers
15-20 Student groups

Staff strength

Scientific : 9 Nos.
Administrative : 2 Nos.
Supporting : 5 Nos.
Others (specify)
Total ; 16 Nos.

Details of sale of seeds/Planting materials/bio-control agents etc.

Item	Quantity	Revenue
Broiler Rabbit	557 Nos.	Rs.57,330
Vechur Animals	16 Nos.	Rs.1,28,719
Vechur Semen	84 doses	Rs. 2,380

Finance

Total	Expenditure	Receipts
Non-plan	25,74,291	57,330 (Rabbit)
Plan	11,50,894	1,28,719(Vechur Project)
ICAR	49,06,833	9,040 (FPT scheme)
Other EAPs + Misc.	1,96,734	12,410(AICRP on goat)
Revolving Fund	Nil	Nil
Total	88,28,752	2,07,499

UNIVERSITY VETERINARY HOSPITAL, KOKKALAI

Name of Head of the Station

: Dr. K.V. Athman,
Professor & Head

Finance 2008-09

Head	Expenditure	Receipts
Non-Plan	22,84,638	-
Plan	15,693	-
ICAR Dev. Grant	Nil	-
Other EAPs Anaesthesia & Operation Theatre Management	65,826	-
Revolving Fund	4,87,882	4,93,050

FISHERIES STATION, PUDUVEYPU

Name of Head of the Station : Dr. M. M. Jose, Professor (Aquaculture)

Research Programmes:

- a. Major Research achievements (highlights) (Attached photographs of salient findings)
 - (i) Effective nursery management providing supplementary feed and adequate water exchange enabled to achieve optimum survival of post larvae and fry of *Chanos chanos* (Milk fish- Poomeen), *Mugil cephalus* (Grey mullet – Thirutha) and *Liza parsia* (Mullet – Kanambu)
 - (ii) Polyculture of mud crabs, *Scylla serrata* and *S. tranquebarica* along with brackish water fish species enabled to achieve better production from wet land farming system.
 - (iii) A combination diet of trash fish along with pelleted feed was found to be an efficient diet for achieving better growth and production of mud crab under culture condition.

Extension Programmes

- a) Highlights of extension activities
(Attach Photographs of important activities)

- i) Distribution of fish seed for promoting brackishwater farming:

Though there is immense potential for fish production from vast and varied brackishwater resources, non availability of ample seed remains as the main hindrance for taking up farming endeavours. Since inception of the station, fish seed collection and distribution have been a major activity. Puduveypu, a newly accreted wet land, is located close to Cochin bar mouth and tidal inundation of channels, canals and other low lying water bodies in the area results in recruitment of post larvae and fry of different varieties of fish and shrimps during their respective breeding seasons. They are collected using different gears, segregated and transferred to nurseries for rearing them till fingerling stage. They are then distributed to pisciculturists and research institutions for farming purpose.

In all, 1,19,168 seed of commercially important brackish water fish species were distributed during the report period. This is seen to be the record production of fish seed ever achieved since inception of the Station during 1979. Four photographs depicting the works are attached. (Annexure I - Fig. 1 - 4)

- ii) Distribution of mangrove seed and seedling for coastal afforestation programmes:

Mangroves are a special group of plants that grow in inter-tidal areas, wet land and marshes of the tropical and subtropical regions. Coastal and estuarine mangrove vegetation with its dense growth acts as a bioshield and play protective role against soil erosion, tidal impact, sea surges, cyclones and tsunami. Mangrove swamps support the breeding grounds and rich feeding pastures for several marine and brackishwater fish & shrimps. However systematic destruction of mangrove has been going on for the last several decades for human activities.

In order to create awareness among the people on the importance of this coastal vegetation, known as biological coast guard, Fisheries Station has taken an initiative for its afforestation in Kerala coast and other maritime states. As a result demand for planting material increased considerably and distributed 1.05 lakh seed and seedling of economically important varieties of mangrove during 2008–09.

Details of mangrove seed & seedlings distributed during 2008-09

Species	Number
<i>Rhizophora mucronata</i> (henb I-Å)	15,000
<i>Bruguiera cylindrica</i> (sNdnb I-Å)	45,000
<i>B. gymnorhiza</i> (t)\i-Å)	35,500
<i>Avicennia officianalis</i> (D,q)	5,000
Total	1,00,500

Farm Advisory Services

In Person	Over Telephone	Through Letters
400	850	2

List of Publications: Dr. M. M. Jose, Professor & Head

- (i) Scientific Papers : ---
- (ii) Technical Bulletin:
 - (1) "Pokkaliyodoppam chemmeen krishy" – For distribution among implementing officers and farmers under "Matysakeralam" project.
- (iii) Popular articles:
 - (1) "Kandalkadukal- theeradesha jaivakavajangal" -- Karshakasree (In press)
- (iv) Books : ---

Details of sale of seeds/ planting materials/ bio-control agents etc.

Item	Quantity	Revenue (Rs)
<i>Liza parsia</i> (Mullet – Kanambu)	52,660	56,660
<i>Oreochromis mossambicus</i> (Tilapia)	32,948	1,07,789
<i>Mugil cephalus</i> (Grey mullet–Thirutha)	22,740	1,13,700
<i>Etroplus suratensis</i> (Peasrspot – Karimee n)	5,525	20,440
<i>Chanos chanos</i> (Milk fish – Poomeen)	4,795	14,385
Mangrove seedlings	1,00,500	1,00,500
Total	2,19,168	4,13,474

Finance 2008-09

Head	Expenditure	Receipts
Non-Plan	29,91,294.00	Rs. 6,75,633.00
Plan	8,02,727.00	
ICAR	18,261.00	
Other EAPs RKVY	19,99,655.00	
Revolving Fund	--	
Total	58,11,937.00	

**REGIONAL CATTLE INFERTILITY RESEARCH CENTRE
VELLIMADUKUNNU, KOZHIKODE**

Name of Head of Station : Dr. K. Ramachandran

Research programmes

Research proposals submitted:

a. Fishereies

1. "Prelude to the biodiversity of Kadalundy estuary" Project submitted to the Director of Fisheries, Govt. of Kerala, Vikas Bhavan, Trivandrum
2. "Aquatic bio communities of Kadalundy estuary" Project submitted to the Kerala State Council for Science, Technology and Environment, Pattom, Trivandrum

b. Agricultural Engineering

1. "Studies on the effect of low cost poly house technology, micro-irrigation techniques and organic fertigation on yield and quality of vegetable cultivation in urban area" Project submitted to the Kerala State Council for Science, Technology and Environment, Pattom, Trivandrum

Extension programmes

a. Training programmes.

Topic	No. of trainees	Category	Venue	Date	Name of Scientist In charge
1. Ornamental Fish-culture	50	Practicing Farmers	Areekad	15.01.09 16.01.09	Dr. G.S. Narayanan Associate Professor
2. Homestead Management	50	-do-	Kakkodi	18.02.09 19.02.09	-do-

b. Farm Advisory Service

Subject	In person	Over telephone	Through letters
a. Veterinary	561	721	Nil
c. Fisheries	273	539	Nil

Radio talks

Topic	Date	Name of Scientist.
1.Diseases of ornamental Fishes	08.06.07	Dr. G. S. Narayanan
2.Ornamental fishes varieties	16.11.07	Associate Professor
3.Breeding of egg laying fishes	07.03.08	

List of publication

One book has been submitted for publication

“Fish diseases and control”

Dr. G.S.Narayanan , Dr. K.Ramachandran and Dr. Jagadeesh Kumar

Details of seeds/planting materials (01.04.2008 to 31.03.2009)

Sl. No	Item	Amount
1	Planting materials	Rs. 14830.00
2	Vegetable seeds	99230.00
3	KAU publications	6259.00
4	Processed foods	20564.00
	Grand total	140883.00

Finance

Head	Expenditure	Receipts
Non-Plan		
Plan	Rs. 1952059.00	
ICAR		
Other EAPs		
Revolving fund	Rs. 130994.00	Rs.162177.00

CHAPTER IV

EXTENSION

The extension activities of all the 14 districts of the State was co-ordinated by the Director of Extension. The mandatory activities of all the 14 KVKs in the State, 7 directly under KAU and the rest under ICAR/NGO were monitored and evaluated by the Directorate. Extension activities of all 10 Colleges, 22 Research Stations and 6 RARS of KAU were also under its direct control. The Directorate was also responsible for the co-ordination of the activities of the five satellite units viz. Communication Centre, ATIC, CTI, PRO wing and the KAU Press, through which the extension works of KAU was done effectively. The Director of Extension performed an important role in the conduct of various NSS activities through the colleges under KAU, using funds received from Government and according to the directions of Central and State Government. The various Camps and social awareness initiative taken up through the NSS units was often acknowledged and appreciated by the authorities and the society.

Two public awareness programmes for scientists, extension officers, NGOs and progressive farmers was organized on Indian Act on PPV & FR 2001 sponsored by PPV & FR Authority, Ministry of Agrl., New Delhi at the Directorate. Organizing need-based programmes that reached out to farmers like *Koithulsavam*. Farmer Fields Schools etc. involving students, labourers and scientists of the University was well received by the farming community. International trainings and visitors were encouraged by the active involvement of the Directorate. An International Training on Cashew Apple processing for the delegates of Senegal was organized and the Directorate also received official delegates from the Government of Vietnam to study the Extension

PRO UNIT, MANNUHTY

Timely and defending statements of the University were issued for publication by the PRO Unit of KAU through various print and electronic media, during the period. The major activities taken up by the unit during 2008-09 were as follows.

1. 2075 Press Clippings pertaining to Kerala Agricultural University (KAU) from various news papers were collected and forwarded to the office of Hon'ble Vice Chancellor and Registrar, KAU.
2. 214 Press Releases in Malayalam and 59 Press Releases in English on various research and development activities of the University were issued to various news papers during the period under report.
3. 93 advertisements received from various institutions of KAU had been published through the advertising agency of KAU
4. Extensive news coverage was arranged for various University level functions
5. KAU Diary 2009 (2225 copies) was published by canvassing advertisements for Rs. 2.405 from various government and private agencies
6. Visit of participating journalists of Science Writing Workshop of Kerala Working Journalists Union was arranged on January 24, 2009. 35 Journalists from various

print and electronic media visited the KAU campuses at Kannara, Vellanikkara and Mannuthy. An interaction session was arranged at the KVK, Thrissur on the same day in which the journalists interacted with the Director of Research, Director of Extension and Scientists of KAU on latest developments in agricultural research, education and extension.

7. The Unit acted as a media resource centre by providing necessary information related to agriculture, research and development activities of the University to various print and electronic media.

Communication Centre, Mannuthy

Annual Report (2008-09)

1. Name of Head of the station: Smt. K.K.Santha

2. Academic programmes

Title of the course	No. of the students	Course teacher
Member of the Advisory Committee of the Ph D student	Kumari Deepthi K.B., Ph.D Student (2005)	Dr. S. Estelitta
Pl. Path 3101 (2+1) Crop pests and diseases	Co-operation and Banking students	Dr. S. Estelitta
Centralised evaluation of 1 st year B.Sc.(Ag.) Course <i>Pl.Path 101</i> as per the direction of the Director, Academic and P.G. Studies.		Dr. S. Estelitta
Organic farming and soil health (2+1) SSAC 2103 at College of Horticulture, Vellanikkara	2007 admission students	Dr. Jeyasreesankar
Member of the Advisory Committee of the Ph D student	C. J. Bindu (2006 admission)	Dr. Jeyasreesankar
Centralized valuation of B.Sc. (Hons) Ag. of the course introduction to soil science SSAC 1101 of College of Agriculture, Vellayani, Padannakkad & College of Horticulture, Vellanikkara.	126 answer sheets	Dr. Jeyasreesankar
Major advisor for M.Sc student in Agricultural Extension	G.K. Madhusudhan	Dr. Jose Joseph Assoc. Professor
Major advisor for M.Sc student in Horticulture	Smt. Meghana Davis	Dr. Jyothi Bhaskar, Assoc. Professor
Personality Development (0+1) and Organisational Communication (1+1) for MBA students of the College of Cooperation and Banking, Vellanikkara		Dr. Binoo P. Bonny

3.Extension programmes

a) Highlights of extension activities

1. Organised KAU pavilion in Thrissur Pooram Exhibition 2008 and maintained for 46 days at Thekkinkad maidan, thrissur. Theme: Protected Cultivation (Dr. S. Helen as General Convenor, Dr. C. B. Manomohan, Dr. K. P. Visalakshi and Dr. Daisy Kappen :Joint Convenors))

2. Setting up of KAU Pavilion at Thrissur Pooram Exhibition 2009: Jan 2009 to March 1st week. Preparation of seedlings, blow-ups, collection of exhibits from various centres of KAU. Duration: March 1st – May 24th 2009. Theme “ Food security”. Dr. S. Estelitta served as General Convenor of Thrissur Pooram Exhibition 2009 (KAU Pavilion) Joint Convenors : Dr. P. Nandakumar, Assoc.Prof, Dr. Jyothi Bhaskar, Assoc.Prof, Dr. S. Helen, Asst.Prof, Dr. Sabin George, Asst.Prof
3. Organised Organic Kerala Exhibition at Town Hall, Ernakulam from 15th April-18th April 2008. Dr. S. Estelitta as Convenor and Dr. Jyothi Bhaskar as Joint Convenor.
4. Organised KAU Pavilion at “Niravu” Karshikotsavam conducted at Thekkinkadu Maidan from Oct.16th to 20th 2008. (Convenor: Dr. Jyothi Bhaskar and Joint Convenor: Dr. S. Estelitta)
5. Organised to set the KAU Pavilion at the All India Exhibition conducted at Thriprayar during 14th Novemeber – 24th Nov. 2008. (Convenor: Dr. S. Estelitta, Joint Convenors: Dr. Jyothi Bhaskar.
6. Organised KAU Pavilion at Flower Show 2009 conducted at Town Hall, Thrissur from 24.01.2009 to 30.01.09. (Convenor: Dr. Jyothi Bhaskar and Dr. S. Estelitta as Joint Convenor).
7. Organised KAU Stall at Sangeetha Nataka Academy, Thrissur organized in connection with VIBGYOR film festival Feb 4th to 8th 2009. Convenor: Dr. S. Estelitta, Joint Convenor: Dr. Jyothi Bhaskar)
8. Providing weekly KAU News bulletin to All India Radio, Thrissur. (Dr. S.JayasreeSankar, Professor)
9. Dr. S. Estelitta served as Convenor of KAU Calendar 2008 with technical matters. Twenty thousand calendars were printed and distributed to the farmers of Kerala.
9. 10000 copies of Agricultural University calender-2009 were printed and distributed at the rate of Rs.20/-. (Dr. S.JayasreeSankar as General Convenor)
10. Agricultural University diary-2009 were printed and distributed. (Dr. Jose Joseph as General Convenor)
11. Organised KAU pavilion in the Exhibition conducted by the Chelakkara Panchayat. (General Convenor : Dr.K.K. Santha, Associate Professor & Head, Joint convenor: Dr. S. Helen)
12. Dr. S. Estelitta served as Co-ordinator of ABARD-Bio dale unit funded by Thrissur Corporation.
13. Conducted Agrl.quiz for the farmers at Thathamangalam Karshika Mela organized by KAU, AIR & Paruthikkavu Padasekhara Samithy on 07.03.09
14. Samagra Karshika Vikasana in Tholloor grama panchayath : Participated in the aforesaid programme had the team for soil analysis – collection of sample from the kole lands – analysis was doing at RTL College of Horticulture and the data obtained was communicated to the farmers with appropriate interpretations. Regularly attended the farmers field school for 16 weeks, imparted technical advice to the farmers, involved in cultivating 20 acres of kole lands that were followed for more than 50% and also in the whole kole land programme was initiated by Tholloor grama panchayath under the leadership of Padasekhara Samithy in association with KAU, SIB & Dept. of Agriculture (Krishi Bhavan – Tholloor)
15. Compiled the GC reports and Annual report of the centre. (Dr. S. Helen)
16. In charge of ARIS cell and museum at the centre. (Dr. S. Helen)
17. Developed mobile exhibition unit. (Dr. S. Helen)

ii) Farm advisory Services

In person	Over telephone	Through letters	Kissan call centre	Name of the scientist
216	252	15	52	Dr. S. Estelitta
48	35	5	50	Smt. K.K. Santha
172	310	14		Dr. S. Jayasree Sankar
100	200	10		Dr. Jyothi Bhaskar
15	95	4	3	Dr. S. Helen
24	100	10		Dr. Binoo P. Bonny

iii) Field visits

No. of visits	Problems identified	Recommendations
95	100	To overcome the problems recommendations were suggested.

iv) Radio talks/TV programmes/ Audio-video cassettes

Topic	Type of programme	Date	Name of scientist
Methods to increase fertilizer use efficiency	Interview in Malayalam (AIR, Thrissur)	25.11.08	Dr.S. Jayasree Sankar
Dimensions of Food security	Interview in TV-Doordarshan	20.06.08	Dr. Jose Joseph, Assoc.Prof.
Cultivation of fruit plants in small homestead	Radio talk, AIR, Thrissur	18.03.09	Dr. Jyothi Bhaskar
Orchid cultivation	Video conferencing ATIC, Mannuthy	14.10.08	Dr. Jyothi Bhaskar
Organic Pesticides preparation	Script submitted to Door Darshan	April 21 st 2008	Dr. S.Estelitta

i) List of publications**Kalpadhenu**

The trimonthly publication of KAU is being published from Communication Centre. Dr. Jose Joseph, Editor, Dr. S.Estelitta Associate Editor.

Scientific papers

Jose Joseph (2008) Ensuring the Nations Food Security. In the Hindu Education Plus Hand book for Professional courses. Aspirants – 2008. June 208. The Hindu, Chennai, 600 002. pp 78-88.

Jose Joseph (2009) Agro-biodiversity: WTO and Intellectual Property Rights Green Tech. 09. National Seminar on Ecotechnologies and Evergreen Revolution. St. Mary's College, Thrissur. March 4 to 6, 2009.

Helen, S. 2008. Scope for women groups in the processing of farm produce in homesteads. National seminar on Food Security Through Innovations in Food Processing and Entrepreneurship Development. 29-30th September, 2008. Kerala Agricultural University, Vellanikkara. P.166.

Helen, S., Vasudevan, Rejina, T. and Vinod T. P. 2008. "Changing scenario of coconut based homestead farming in the high rainfall coastal area of Kerala", Indian Farming. 58(12): 3-5. ICAR, Krishi Anusandhan Bhawan I, Pusa, New Delhi.

Technical Bulletins

Popular articles:

S. Estelitta, K.K. Santha, Jyothi Bhaskar (2008) Pests and Diseases of nursery plants – Karshakan, Sept. 2008. p.50-52

Jyothi Bhaskar, S. Estelitta – Nursery production and Management a golden opportunity for unemployed youth.

1. ഡോ. ജോസ് ജോസഫ് മുതലമട കേരളത്തിന്റെ മാമ്പഴക്കൂട. കർഷകൻ ഏപ്രിൽ 2008
2. ഡോ. ജോസ് ജോസഫ് ദോഹവട്ടം ചർച്ചകൾ അവസാനഘട്ടത്തിലേക്ക് കർഷകൻ ഏപ്രിൽ 2008
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5. ഡോ. ജോസ് ജോസഫ് ചക്കയ്ക്ക് മറുനാട്ടിൽ പ്രിയം കേരള മാർക്കറ്റ് മെയ് 2008
6. ഡോ. ജോസ് ജോസഫ് വിത്തു തേങ്ങ പാകാൻ തുടങ്ങാം. വിരിപ്പുകൃഷിയ്ക്ക് പൊടിവിതയും. മംഗളം. മെയ് 24, 2008
7. ഡോ. ജോസ് ജോസഫ് ഇനി ഇവ മലയാളത്തിനു സ്വന്തം. കർഷകൻ മെയ് 2008
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11. ഡോ. ജോസ് ജോസഫ് സുഫല വർഷം മുഴുവൻ വിളവ്
12. ഡോ. ജോസ് ജോസഫ് തിന്നു തീർക്കുന്നതോ ? കത്തിച്ചു കളയുന്നതോ?
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16. ഡോ. ജോസ് ജോസഫ് കർഷകരെ സമൂഹം അംഗീകരിക്ക . ഓർക്കണം അവരുടെ നഷ്ടങ്ങളും സഹനങ്ങളും, മലയാള മനോരമ ജൂൺ 20
17. ഡോ. ജോസ് ജോസഫ് സംഹർദ്ദ് മുസലി തിരിച്ചു വരവിന്റെ പാതയിൽ, കേരള മാർക്കറ്റ്, ജൂലൈ 2008
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20. ഡോ. ജോസ് ജോസഫ് ജൂലൈയിലെ കൃഷിപ്പണികൾ, റബ്ബർ വിത്ത് ശേഖരിച്ചു തുടങ്ങാം. മംഗളം ജൂലൈ 12, 2008
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22. ഡോ. ജോസ് ജോസഫ് കൈതച്ചക്കത്തോട്ടത്തിലെ കളനിയന്ത്രണം.
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24. ഡോ. ജോസ് ജോസഫ് ഭക്ഷ്യസുരക്ഷയ്ക്ക് ഇലസുരക്ഷ
25. ഡോ. ജോസ് ജോസഫ് പച്ചോളി ആദായകരമായ സുഗന്ധ തൈല വിള
26. ഡോ. ജോസ് ജോസഫ് തോട്ടങ്ങളിലെ കളനിയന്ത്രണവും രണ്ടാം ഗഡു വളപ്രയോഗവും
27. ഡോ. ജോസ് ജോസഫ് ഭക്ഷ്യസുരക്ഷ കാർഷിക സർവ്വകലാശാലയ്ക്ക് പ്രത്യേക പദ്ധതികൾ
28. ഡോ. ജോസ് ജോസഫ് ലോകവ്യാപാര സംഘടന വഴിമുട്ടിയ ദോഹവട്ടം ചർച്ചകൾ
ഡോ. ജോസ് ജോസഫ് - ഭക്ഷ്യസുരക്ഷ - കാർഷിക സർവ്വകലാശാലയ്ക്ക് പ്രത്യേക പദ്ധതികൾ - കർഷൻ സെപ്റ്റംബർ 2008.
29. ഡോ. ജോസ് ജോസഫ് - കൃഷിയും ലോകവ്യാപാര കരാറും - കാരൂണികൻ സെപ്റ്റംബർ 2008.
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41. ഡോ. ജോസ് ജോസഫ് - ഗാന്ധിജിയുടെ കൃഷിദർശനം ഗ്രാമശ്രീ, ഒക്ടോബർ 2008.
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49. ഡോ. ജോസ് ജോസഫ് - ആഗോള സാമ്പത്തിക മാനുഷ കൃഷിയിലേക്കും - കർഷകൻ, ജനുവരി 2009.
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Books

- 1 ഡോ. ജോസ് ജോസഫ് ഡോ.എം. കെ.ഷീല (മാർച്ച് 2008) സസ്യയിനങ്ങളുടേയും കർഷകരുടെ അവകാശങ്ങളുടേയും സംരക്ഷണം. വിജ്ഞാന വ്യാപന വിഭാഗം, കേരള കാർഷിക സർവ്വകലാശാല, മണ്ണൂർ, pp 30.
2. Bino P. Bonny. 2008. Inventory of Recent agricultural technologies for Kerala. Directorate of Extension, KAU, Mannuthy

New Books

വിളവരിപാലനം - ശാസ്ത്രീയ ശുപാർശകൾ (Package of Practices Recommendations - Crops മലയാള പതിഭാഷ) - 5000 copies. Edited by Dr. M.K. Sheela and Dr. Jayasree Sankar

Revised books:

1. Estelitta *et al* ജൈവ കീടനാശിനികൾ - 6000 copies - Organic pesticides
2. Estelitta *et al* Biological control in Rice - 1000 copies
3. Estelitta *et al* IPM in Vegetables - 1000 copies
4. Estelitta *et al* - Vegetable Crop Calendar - 3000 copies

Dr. Jyothi Bhaskar: Scientific papers - 2, Popular articles - 7 and Technical Bulletin - 1

Details of sale

Item	Quantity	Revenue Rs.
Publications		847325.00

Finance

Head	Expenditure	Receipts
Non-plan	1,02,62,277.00	7,07,998.00
Plan	6,89,116.00	-
ICAR- PPV & FRA	92,593.00	-
- PDRCH	87,161.00	-

CENTRAL TRAINING INSTITUTE, MANNUTHY

Name of Head of the Station : Dr. Joy Mathew.

Projects Submitted.

1. Proposal for establishing a Farm Transition Network (FTN)- A participatory Technology Facilitation Programme” at an estimated cost of Rs. 36 crores submitted to Planning Board.
2. Proposal for the establishment of “International Research and Development Institute for Human at an estimated cost of Rs.8 crores. Resources in Farm Sciences submitted to ICAR.

Finance

Head	Expenditure	Receipts
Non Plan	4848502	4808245

AGRICULTURAL TECHNOLOGY INFORMATION CENTRE. MANNUTHY

Name of Head of the Station :- Dr. K. Aravindakshan & Dr. C.B.Manomohan,

Faculty position

Cadre	Name of Scientist	Sanctioned post	In position	Vacant
Professor	Dr. C.B.Manomohan	1	1	Nil
Associate Professor	Dr. Sreevalsan J Menon	Nil	On working arrangement from Communication Centre	Nil

a. Details of research projects

i. Completed Projects during 2008-09

Name of Project	Funding Agency	Name of Principal Investigator	Name of Co-PI	Outlay
Video Conferencing Facility through ATIC – An ISRO – KSPB project on VRCs in Waynadu – Phase I	Kerala State Planning Board	Dr. Sreevalsan.J.Menon	Dr.K.Aravindakshan Dr.C.B.Manomohan	1.2 lakhs

ii. Ongoing projects

Name of Project	Funding Agency	Name of Principal Investigator	Name of Co-PI	Outlay
Video Conferencing Facility through ATIC – An ISRO – KSPB project on VRCs in Waynadu – Phase II	Kerala State Planning Board	Dr. Sreevalsan.J.Menon	Dr.K.Aravindakshan Dr. C.B.Manomohan	1.2 lakhs

Extension Programmes

- a) Highlights of extension activities
(Attach photographs of important activities)

1. Details of Lecture sessions as part of video conferencing

The project is an ISRO-KSPB sponsored programme and the video conferencing process is maintained by both ISRO for technical help and KSPB and expert centres for content. Topics are selected based on the feed back and suggestion from the farmers of the five blocks that are collected by the co-ordinators of the VRC's.

KAU ATIC is the expert centre which caters to five blocks in Waynad namely Noolpuzha, Mananthavady, Kapetta, Meppady, Sulthanbathery. Twelve lecture and interactive sessions have been completed during 2008-2009.

Linkage with Grama Panchayaths

KAU is facilitating the developmental activities of Tolur Grama Panchayath for technology dissemination, demonstration and improving overall productivity of the panchayath. ATIC, under the guidance of the Director of Extension co-ordinates the Scientific and Technical staff, students, of KVK, Thrissur, COH, Vellanikkara, Communication Centre, College of Veterinary & Animal Sciences, Central Nursery, BRS, Kannara, Centre for Gender Concerns, RTL and other institutions for handling the various sessions in the Panchayath. Dr. C.B.Manomohan, is the overall co-ordinating officer for the programme. The programme called "Samagra Karshika Vikasana Padhathi" is spearheaded by the Tolur Panchayath Padasekhra Samithi, Krishi Bhavan, Tolur, ATIC and KVK, Thrissur. Twenty acres of fallow land owned by the Panchayath was taken up for rice cultivation. The variety 'Uma' was used for cultivating the entire area. The programme was inaugurated on November 14th 2008 by the Hon'ble Vice Chancellor of KAU and the harvest of paddy is to be held on 26th March 2009. Apart from rice, technological intervention in banana, vegetables, soil testing and other activities and being taken up. Meetings are held in ATIC and the Panchayath *per se* and together with the AIR, Thrissur ATIC has been able to reach out to the needs of the farmers through soil testing, scientific lectures, quiz programmes, formation of self help groups etc.

ATIC has also been involving in technology dissemination related to Animal husbandry, and Tissue Culture Banana in association with Banana Research Station, Kannara for the development activities of Pananchery Panchayath.

This year, many Krishi Bhavans throughout the state procured seeds and planting materials directly from ATIC and this has been beneficial for both the Director of Agriculture and Kerala Agricultural University.

Farm Advisory Services

In person	No. of farmers	Over telephone	Through letters
Sale	70,000		
Medicinal plant advice	500	25-50 / day	20-50 / month
Horticultural crops	950		
Field crops	700		
Egg, Meat & Milk Products	230/ day		

i. Field visit:

- Extensive field visits made by Dr. C.B.Manomohan, ADE & Officer on Special Duty to Tholur Grama Panchayath as part of Samagra Karshika Vikasana Padhathi
- Extensive field visits made by Sri.C.A.Mathew to Parakkadavu, Ernakulam District and Chettiparambu, Kottakkal, Malappuram District for laying out and planting Medicinal Plants.

ii. Radio talks / TV programmes / Audio – video cassettes :-

- Dr C B Manomohan , Co-ordinator of 'Pulmettile Vazhitharakal' – Farm Radio School, AIR, Thrissur

2. No of visitors to the Institution (farmer group/ students)

Sl No.	Category	Number
1.	Farmers	1.5 lakhs
2.	Students	4000
3.	Women SHGs groups	20

Visitors – School students visit at Medicinal Plant unit

ATIC Interaction Hall – A venue for high profile meetings of the University

The ATIC is a chosen venue for all the top level meetings of the University including the General Council, Academic Council, Career Advancement Programme (CAP), Public meetings of MLA's workshops, seminars, POP meetings, major meetings of the Vice- Chancellor and Directorate of Extension to name a few. Simultaneous sessions of 50 members each can be accommodated in the Interaction Hall and the Library Hall. The Video Conferencing hall currently used by the CTI will be handed over to ATIC soon and this will further strengthen the requirements for conducting three sessions simultaneously.

Technical Meetings at ATIC

Sl.No.	Particulars	No. of Meetings	No. of Participants
1.	Seminars	6	100
2.	Workshops	8	150
3.	Meetings	32 Nos.	700

Details of Sale of seeds / planting materials /bio-control agents etc.

The feed back collected from farmers visiting the ATIC was that uninterrupted supply and service facilities to the farming community is required. To facilitate this, incentive linked production and service system has been evolved for the steady supply of finished products and quality material by utilizing the services of trained manpower through co-operative movements under the technical supervision of KAU.

Other details if any

a. Vegetable Cultivation

The area adjacent to the NH-47 was taken up for cultivating cool season vegetables like cabbage and Cauliflower. Other vegetables like Brinjal, Tomato, Chilly, Bhindi and Cowpea are also being cultivated in adjacent plots along the National Highway. Banana varieties are also being grown as demonstration plot adjacent to the vegetable plot.

b. University Café - A Public Private Partnership Initiative

The University café, a public private partnership initiative of the ATIC, started functioning at the Information and Sales counter premises from 6th February 2009. The Indian Coffee House which had a long standing association with ATIC came out of its contract and the sales point did not have a Coffee Shop. The farmers and general public were inconvenienced due to the absence of a hygienic restaurant in Mannuthy. The University invited open tenders and the Management Committee of ATIC approved and awarded the contract to a new firm. It was decided that a new name "University Café" will be given to the Coffee Shop. This is now a boon to visiting farmers and general public. A monthly rent of Rs. 16,500/- is obtained from the Café which is an additional revenue to the KAU.

c. Sramadanam:

Sramadanam was carried out by ATIC staff and members of ABARD and SEPT in the two campuses of ATIC and I&SC. Cleaning the premises, pruning trees, painting of sheds, repotting, arranging the green houses, painting the veterinary counter etc. were taken up. The sramadanam was inaugurated by the Hon'ble Vice Chancellor on October 3rd 2008 as part of 'Gandhi Jayanthi' and was carried out for three days in October and December, 2008.

d. **Reception Counter:** A reception counter was opening at ATIC functioning on 02/02/2009. The visitors will be provided with required information or directed to the concerned scientist / departments. The exact number of farmers visiting the ATIC seeking farm advice

Finance

Head	01/04/2008 to 31/03/2009	
	Expenditure (Rs.)	Receipts (Lakhs.)
Non – plan	Nil	Nil
Plan	26,91,453/-	26,34,000/-
ICAR	Nil	Nil
Other EAPs	Nil	Nil
Revolving Fund	1,67,50,742/-	1,80,29,937/-

KAU PRESS, MANNUTHY

Name of Head of the Station : Press Manager

Introduction

The KAU Press is engaged in Printing quality information materials like Krishi Vignana manjeri, technical bulletins, research journals, annual reports, agenda notes, minutes of different GC meetings, budget estimates, hand outs, catalogues, audit reports, research projects proposals, question papers, miscellaneous items like coupons, bus pass, receipt books, registers, application forms, prospectus, proforma, notices, invitations, writing pads, letter heads, academic record, certificates, course curriculum, syllabus, field note books, note file leaves, current file leaves, practical manuals, kalpadhenu, newsletters, package of practices recommendations (Agri. & Vety). etc. Besides the above, the Kerala Agricultural University Press also undertakes binding works related to files, documents, reports, training notes, workshop and seminar proceedings.

Details of activities

273 printing works were received and altogether 218 works were completed during the period.

Finance 2008-2009

Head of account	Expenditure (Rs)	Receipts (Rs)
Non-plan 404-40-1103	55,46,622	-
Plan 404-40-2278 404-40-3426	13,92,129 1,24,445	26,67,582 (including FT bills)
Total	70,63,196	26,67,582

KRISHI VIGYAN KENDRA, THRISSUR

Name of Head of the station : Dr. Koshy Abraham

Radio talk/TV programme/ Audio – video cassettes

Topic	Date	Name of Scientist
Jack fruit processing	8/2008	Dr. Suman.K.T
Die back disease in fruit trees	10/2008	Dr.Koshy Abraham
Deworming in calves	12/2008	Dr. Sabin George

List of publications

Popular Articles : 11

Sl.No	Title	Month	Author
1	Madhuvakeelintae five star gosala-Karshakasree	May 2008	Dr. Sabin George
2	Pallozhukkan pachuvintae erumakkal_Karshakan	May 2008	Dr. Sabin George
3	Parambaryam kkaividathae – ksheeradhara award jaethaakkal- Kerala Karshakan	May 2008	Dr. Sabin George
4	Kunjikkozhikalku nursery orukkunnna kootaayema- Karshakan	June2008	Dr. Sabin George
5	Chdikal vangikkumbol sradhikenda kaaryangal- Karshakan	June2008	Dr. Sreelatha U
6	Varnameenukalkku veedorukkaam - Karshakasree	August2008	Joemol CBaby
7	Muyalkootil valarna chagaatham- Karshakasree	October2008	Dr. Sabin George
8	Deenanath pullu- Pavapetta ksheera karshakantae thozhan - Karshakan	December2008	Dr. T. N Jagadeesh Kumar Dr. Mary Regina F
9	Jalachinthkalilae vaennal - Karshakan	January2009	Dr. Mary Regina F
10	Muyallukal vazhunna kilikkoodu- Kerala Karshakan	February 2009	Dr. Sabin George
11	Shajuvinu turkey ponmuttayidunna pakshi Karshakasree	March 2009	Dr. Sabin George

No. of visitors to the institution (farmer group/students): 900

ii) Important visitors :

1. Agricultural Minister of Kerala – Shri Mullakkara Ratnakkaran
2. Director of Agriculture – Smt Tinku Biswal
3. MLA,Olur – Shri. Rajaji Mathew Thomas
4. District Panchayat Standing Committee Chair person – Shri . A. N Rajan

Details of sale of seeds/planting materials/bio-control agents etc. (Under ICAR Revolving Fund)

Item	Quantity (Kg)	Revenue
Cowpea - Var - Anaswara	300.0	140000.00
Cowpea - Var - Lola	231.0	132400.00
Cowpea - Var - Bhagyalakshmi	29.0	16600.00
Ash gourd - Var - KAU Local	60.0	114500.00
Pumpkin - Var - Ambili	90.0	185000.00
Bitter gourd - Var - Preethy	106.0	205800.00
Bottle gourd - Var - Arka Bahar	11.0	7700.00
Brinjal - Var - Haritha	100 Gm	120.00
Amaranthus - Var - Kannara Local	15.0	15000.00
Snake gourd - Var - Manusree	43.0	97976.00
Chilli - Var - Anugraha	6.5	16250.00
Bhindi - Var - Arkka anamika	119.0	107100.00
Tomato - Var - Sakthi	3.0	6600.00
Flower Seed (seasonal)	1.0	2500.00
Polybag cuttings Different flowering plants(PB)	5000 Nos	25000
Pepper cuttings Panniyur-2& 5	2500Nos	7500
Muringa seedlings PKM-1	143000 Nos	1001000

Finance

Head	Expenditure	Receipts
Non – Plan	NA	
Plan	NA	
ICAR	5804960	5724000
Other EAPs	1566463	3432000
Revolving Fund	9,24,068.00	20,81,046.00

KRISHI VIGYAN KENDRA, KOTTAYAM

Name of the Head of the Station : Dr. K.J. Joseph

Scientific Papers

Item	Title	Authors name	Number
Research papers	Liver oil of Pharaoh cuttlefish <i>Sepia pharaonis</i> Ehrenberg, 1831 as a lipid source in the feed of giant freshwater prawn, <i>Macrobrachium rosenbergii</i> (De Man 1879).	Shyla, G., Nair, C.M., Salin, K.R., Sherief, P.M. & Mukundan, M.K (2008)	<i>Aquaculture Nutrition 14 in press.</i> Blackwell, UK
	Reservoir fisheries of fresh-water prawn—success story of an emerging culture-based giant freshwater prawn fishery at Malampuzha Dam in Kerala, India.	Kutty, M.N., Nair, C.M. & Salin, K. R. (2008)	Aquaculture Asia 13(2): 40 – 41.
	Rice – prawn (<i>Macrobrachium rosenbergii</i>) farmers changing to organic mode in paddy fields of Kuttanad, Kerala, India.	Salin, K.R. & Nair, C.M. (2008)	Abstract No. 37, World Aquaculture 2008, 19-23 May 2008 (Busan, Korea). World Aquaculture Society, Baton Rouge, USA.
	Freshwater prawn farming in India – facing new challenges.	Nair C.M. & Salin K.R. (2008)	Book of Abstracts, Giant Malaysian Prawn 2008, 28–29 March 2008. Malaysian Fisheries Society, Kuala Lumpur, Malaysia.
	Sustainable rice – prawn system in Kole lands of Kerala, India.	Salin K.R., Nair C.M. & Sebastian, C.D. (2008)	Book of Abstracts, Giant Malaysian Prawn 2008, 28–29 March 2008. Malaysian Fisheries Society, Kuala Lumpur, Malaysia.
	Lethal concentration and physiological effect of paraquat dichloride on common carp (<i>Cyprinus carpio</i> var <i>communis</i>).	Shyla, G., Pillai, D., Salin, K.R., Manoj, C.K. & Nair, C.M. (2007)	p. 297. In: Fisheries and Aquaculture: Strategic outlook for Asia, Book of Abstracts – 8 th Asian Fisheries Forum. Asian Fisheries Society, Indian Branch, November 20-23, 2007, Kochi, India.
	Effect of paraquat dichloride on respiratory rate, enzymatic and hormonal levels of grass carp (<i>Ctenopharyngodon idella</i>).	Manoj, C.K., Shyla, G., Nair, C.M., Pillai, D. & Salin, K.R. (2007)	p. 296. In: Fisheries and Aquaculture: Strategic outlook for Asia, Book of Abstracts – 8 th Asian Fisheries Forum. Asian Fisheries Society, Indian Branch, November 20-23, 2007, Kochi, India.

	Production of quality planting material of tuberose (<i>Polianthes tuberose</i> Linn) var Double through rapid multiplication	Anu G.Krishnan, C.K.Geetha, P.K.Rajeevan	Abstract – Proceedings of WCCA
	Development of an input efficient cropping system in banana var Nendran	Vandana Venugopal, Sheela K.R, Geethakumari V.L	Abstract – Proceedings of WCCA
	AN Ecofriendly management practice for the control of bacterial blight of anthurium	Dhanya M.K, Mary C.A	Abstract – Proceedings of WCCA
	Evaluation of efficiency of vermicompost enriched with rockphosphate on yield and uptake of nutrients in cowpea (<i>Vigna unguiculata</i> L. Walp)	Sailajakumari M.S, Ushakumari	Abstract – Proceedings of WCCA
Technical reports			
News letters			
Technical bulletins			
Popular articles	Turmeric harvesting and processing	Vandana Venugopal	<i>Karshakan</i> Magazine, April 2008.
	<i>Alankara Matsya krishi...</i>	Salin K.R	<i>Karshakan</i> Magazine. July. 2008
	<i>Varunnu Vannamei</i>	C. Mohanakumaran Nair & Salin K.R	<i>Karshakan</i> Magazine August 2008..
	<i>Danthappala</i>	Vandana Venugopal, Anu G.Krishnan	Deepika Daily 2008
	<i>Annual flower beds</i>	Anu G.Krishnan, Vandana Venugopal, Dhanya M.K	Kerala <i>Karshakan</i> February 2009
Extension literature			
Others (Pl. specify)			
Book	<i>Macrobrachium: The Culture of Freshwater Prawns</i>	Michael New, C.M. Nair, M.N. Kutty, K.R. Salin, and M.C. Nandeesh (2008)	Macmillan India Ltd., New Delhi.
TOTAL			

Details of sale of seeds/ Planting Materials/ biocontrol Agents

ITEM	QUANTITY	Revenue (Rs)
Trichoderma	776 kg	38,800
Pseudomonas	4439.5 kg	2,21,975
Aster	4	20
Bougainvillea	3	30
Euphorbia	58	2900
Bush Jasmine	5	25
Pepper	17	85
Vegetable seedlings	9	45

Finance

Head	Expenditure	Receipts
ICAR	36,31,432.00	
Dept.of Fisheries Project	7,03,217.00	
State Planning Board Project	69,911.00	
NFDB Project	55,714.00	
REVOLVING FUND	2,94,795.00	7,89,016.00

KRISHI VIGYAN KENDRA, MALAPPURAM

Name of Head of the Station : Dr. Habeeburrahman P.V

Extension Programmes

Highlights of extension activities

Participatory Rural Appraisal (PRA)

KVK Malappuram as a part of its action plan preparation for the year 2008-09, identified and conducted Participatory Rural Appraisal(PRA) in two panchayats namely Vettom and Tanalur in Tirur and Thanur blocks of Malappuram District. PRA is a tool employed for the identification and prioritization of problems by the scientists with the very active participation of farmers. Here the scientists play the roles of facilitators only.

Students of Kelappaji college of Agricultural Engineering and Technology, Tavanur were also involved as the part of their course curriculum in Extension education.

As an initial step, students went to the village and collected basic details from the panchayat office, Krishi Bhavan. The students went to each ward and collected information from farmers and ward members. Different PRA tools like recourse mapping, institutional mapping, Enterprise mapping, Venn diagram, time line, Inflow-out flow diagram have been used in PRA.

Farmers Field School

KVK Malappuram conducted a one year farmer's field school on integrated farming in coconut farm at Vettom panchayat. This project helped many farmers to resolve pest & disease problems they faced in their farms. The project included trainings in integrated pest & disease management, integrated nutrient management, intercropping, micro irrigation, coconut climber demo, cattle management etc. The training classes are accompanied with field visits and live demonstrations related to the subject. Fungicides and pesticides for prevention of rhino beetle, red beetle, bud rotting etc. were distributed to farmers. Demonstrations of the usage of the given materials were also conducted.

Interface between Students and Farmers

KVK, Malappuram organized an interface of Agricultural Engineering students (III Year), KCAET and farmers on 7th March 2009 at Vettom Panchayat. Students demonstrated the instruments like Tender Coconut Punch and Splitter, Udyanamithra Garden Transplanter, different types of Coconut Climbers, Micro irrigation methods, Brush cutter, Telescopic pruner etc and cleared the doubts of the farmers.

Farmer Scientist Interaction

As a part of strong linkage of KVK Malappuram with ATMA, a farmer scientist interaction programme was arranged at KVK on 29-30 July 2008. Entire district was represented in the programme by progressive farmers from 20 selected Krishi Bhavan areas of the district covering all agro-climatic zones of the district. 31 farmers and 5 extension functionaries attended the interface programme. The forum shared their felt needs with the scientists and was satisfied with the information of scientists. The programme was held in 3 sessions (1) Mechanisation & soil conservation (2) Animal management (3) Crop production, Pest & Disease management, Food processing and Value addition. The programme helped the KVK by throwing light on the various current issues faced by the farmers. The programme became a strong base for the action plan preparation for 2009-10

List of Publications

Scientific papers	- 2
Technical Bulletins-	
Popular Articles	- 7
Books	- 1

12. 1. No. of visitors to the Institution (farmer group/ students) - 198

2. Important visitors : Sri. K.R Viswambharan IAS, V C
Dr. K. Prathapan, SHM Director

13. Staff strength as on 31.3.2009

Scientific	- 6
Administrative	- 2
Supporting	- 1
Others (Specify)	- nil
Total	- 9

Details of Sale of Seeds/ Planting materials/ Biocontrol agents etc.

Item	Quantity	Revenue
Coconut seedlings	1218 Nos	36540.00
Vermicompost	274.50 Kg	2196.00
Azolla	13.25 Kg	662.50
Earthworms(EU)	47425 Nos	23712.00
Mushroom	28.5 Kg	2276.00
Mushroom Spawn	529 Pkt	11109.00
Earthworms(EU SP)	2780 Nos	2000.00

Finance

Head	Expenditure	Receipts
ICAR	57,91,140	
Other EAPs		
S H M - Gardeners Training	8,40,802	
S H M - Farmers Training	82,895	
S H M - Mushroom Spawn Lab	2,48,431	
State Planning Board	29,484	
STEC	79,134	
Revolving Fund	3,900	85,575

KRISHI VIGYAN KENDRA, AMBALAVAYAL

Name and Head of the Station : Dr. A. R. Radhamma Pillai

Extension Programmes

a. Highlights of Extension activities:

Krishi Vigyan Kendra is mainly meant for extension activities to educate the farming community on scientific cultivation aspects of various crops of the district and to cater to various needs of the farming community and the society in general in respect to development of agriculture and allied sectors. Apart from carrying out its regular activities as envisaged by the ICAR, the Kendra was also enthusiastically involved in transferring the technologies of the university and actively participated in the Front Line Demonstration sponsored by the State Planning Board. Further, the Kendra is an active partner in RSVY and RKVY schemes funded by the State Planning Board. Under RSVY, the Kendra has got the following projects to a tune of Rs. 147.79 lakhs. A soil testing lab cum training hall complex has been constructed already at a cost of Rs. 24 lakhs with the financial assistance from RSVY.

1. Technology support services
 - a. Soil testing services
 - b. Plant protection services
2. Input support
 - a. Mass multiplication of quality planting materials
 - b. Mass multiplication of bio-control agents
3. Animal Husbandry and Poultry Development
 - a. Establishment of Commercial layer cum broiler hatchery
 - b. Establishment of backyard poultry units
 - c. Establishment of goat breeding unit
4. Village Resource Expert Centre

The implementation of the all the projects includes the following activities.

1. Renovation and establishment of infrastructural facilities including green houses.
2. Establishment of data storage and processing systems.
3. Purchase of chemicals and glass wears.
4. Procurement of equipments and implements for Bio-control lab, Plant propagation, hatchery, poultry and goat units.
5. Purchase of live stock, poultry and planting materials.

Under RKVY, two projects have been sanctioned to this Kendra for an amount of Rs. 35 lakhs – Rural Bio Resource Complex for Rs. 15 lakhs and Atomic Absorption Spectro-Photometer for Rs. 20 lakhs.

Farm Advisory Services:

In person	Over telephone	Through letters
1307	749	-

List of publications:

a. Popular articles: 12

b. Important visitors:

- Sri. K.R. Viswambharan, Honourable Vice Chancellor
- Sri. Rajaji Mathew, M.L.A., Executive Committee Member
- Sri. Krishnaprasad, M.L.A.
- Dr. Mruthunjaya, Chairperson, National Agricultural Innovation Project

Details of sale of seeds / planting materials/ bio-control agents etc.

Item	Quantity (kg)	Revenue (Rupees)
Trichoderma	8775	658125
Veg. Seeds	16	10 400.00
Vegetables	24	240.00
Pathimugham	50	500.00
Mahagani	831	4155.00
Karingali	75	750.00
Goat	42	39 700.00

Other details if any:

The important mandates of the Kendra are conducting On Farm Trials (OFT) to assess and refine the technologies developed by the University and research station and Front Line Demonstration (FLD) to popularise the successful OFTs and the new / recent technologies of the University and research stations. The following are the OFTs and FLDs conducted by the Kendra during the reporting period.

On Farm Trials (OFT)

Table showing the Abstract on the number of technologies assessed in respect of crops

Thematic areas	Commercial Crops	Fruits	TOTAL
Integrated Crop Management	--	1	1
Integrated Disease Management	2	--	2
TOTAL	2	1	3

Title of OFTs

1. Integrated management of *Phytophthora* foot rot in Black Pepper
2. Management of die-back disease in Coffee
3. Crop geometry with ring rope supporting system for banana

Table showing the Abstract on the number of technologies assessed in respect of livestock enterprises

Thematic areas	Cattle	TOTAL
Disease Management	1	1

Title of the OFT : Infertility management in heifers

Finance

Head	Expenditure (Rs. in lakhs)	Receipts (Rs. in lakhs)
ICAR	33.70	38.52
Revolving fund	4.46	9.40

KRISHI VIGYAN KENDRA, PALAKKAD

Name of Head of the Station : Dr. Shaji James, P

Research programmes:

Dr. Shaji James P., Prog. Coordinator is the Principal Investigator of the KSCSTE funded research project entitled, 'Development of Technology for the use of Agricultural Byproducts as matrix in high rate methane bioreactors.'

Extension programmes

Highlights of extension activities

KVK Trained young farmers leading rice mechanization programme in Pattambi block.

When Krishi Vigyan Kendra – Palakkad organized a vocational training programme in Agricultural Mechanization during February 2008, the young participants were very enthusiastic. The programme covered tillage implements, plant protection equipment, pump sets, threshers, reapers and even combine harvester. Some of the participants were skeptic whether they will be utilizing the acquired skill and knowledge without much delay. This was because most of them could not dream about owning such costly machines.

But, recently the Government of Kerala has launched an intensive rice production programme as part of an effort to attain self-sufficiency in food grain and the Pattambi *Block Panchayat* is reciprocating with the state Government in a big way. In addition, the National Food Security Mission is also operational in Palakkad district. Under the above programmes, a number of agricultural machines especially rice transplanters and reapers are being distributed to farmers groups in several *Grama Panchayats*. Now we observe that the KVK trained farmers and youngsters are leading the machinery operation in most Panchayats of Pattambi block. Sri. Sudeep, Sri. Lookman, Sri. Viswanathan, Sri. Prasanth, Sri. Sasikumar etc. were in the forefront for the inaugural runs of the transplanters in many places. In 'Vallapuzha' Grama Panchayat, Sri. Mullakkara Ratnakaran, Hon. Minister for Agriculture made the inaugural run of the mechanized transplanting operation. Sri. Sudeep, trained by KVK was the operator of the machine.

The training given to young farmers by KVK could facilitate the dissemination of rice farm mechanization technology at a faster rate and this was appreciated by the farmers as well as people's representatives and department officers.

SOME IMPORTANT EVENTS/ PROGRAMS

Chief Minister inaugurates harvest festival in Pattambi Block

Pattambi block panchayat under the able leadership of Sri. V. Ahmedkunji, successfully implemented an Integrated Rice Development Programme, a commendable step in the strengthening of food security mission. KVK Palakkad provided technical assistance in this remarkable programme in which the farmers, field workers and scientists joined hands with the single objective of promoting rice production. The programme was undertaken in 163 hectares extending over 10 grama panchayats. The grand finale of this popular and successful programme, the harvest festival, was inaugurated by Sri. V. S. Achuthanandan, Hon. Chief minister of Kerala on the 18th of January 2009. KVK was an active participant of the exhibition held on that day.

Technology transfer beyond boundaries

The technology of KAU seedling transplanting tool '*Udyanamithra*' was handed over to KVK, Coimbatore (Avinashilingam Deemed University) by Sri. K. Achuthan MLA during the '*Karshaka Dinam*' programme organized at Chittoor on 17th of August 2008. The manufacturing technology of the tool was handed over to *Poongodu* Padasekhara samithi by KVK during March 2008 and the earnest efforts of the *samithi* led by Sri. Mohanan is reflected in its transfer beyond the state boundaries.

Recognition

Dr. Shaji James P., Programme Coordinator received the commendation of the Government of Kerala for individuals in appreciation of the technology dissemination activities carried out by him for in the area of energy conservation on the occasion of the National Energy Conservation Day on 14th December 2009.

Book release

A booklet on rice farm mechanization entitled '*Nelkrishikkulla Enthrangal*' authored by Dr. Shaji James P., Programme Coordinator was released by Dr. M.K. Sheela, Director of Extension on the occasion of the concluding ceremony of the 14 day trainers' training programme on 'Scaling up of water productivity in agriculture' organized in association with AICRP on Water management at Agronomic Research Station, Chalakkudy.

Agromet advisory service

KVK Palakkad is providing Agromet Advisory Service to farmers from February 2009. A weekly Agromet Advisory bulletin is prepared by KVK scientists based on the weather report from IMD. The bulletin is being telecast by the local TV channels during the local news on Wednesdays

Peoples Planning

The Programme coordinator and scientists of the Kendra are supporting the Peoples Planning programmes in Pattambi block panchayat and other local self government bodies as and when required.

RAWE programme

Students of B. Sc. (Agriculture) from Colleges of Agriculture at Vellayani and Padannakkad as well as from College of Horticulture, Vellanikkara were with this Kendra for their Rural Agricultural Work Experience programme. KVK scientists guided them to conduct the Participatory Rural Appraisal and farmers training sessions. They had a good opportunity to get exposed to various activities of KVK

Front Line Demonstrations

Popularisation of high yielding dolichos bean var. *Grace*

Number of farmers : 20

Area : 0.08 ha

Results: An average yield of 14.5T/ha fruits was obtained from the variety Grace which was 29% more than local varieties with B:C ratio 2.21.

Popularisation of Ivy gourd var. *Sulabha*

Number of farmers : 20

Area : 0.24 ha

Results: An average yield of 45T/ha from the var. Sulabha which was 33.33% more than local varieties with B:C ratio 2.77.

Nutrition gardening in homesteads

Number of homesteads : 50

Results: Demonstrations of nutrition garden for alleviating malnutrition and promoting consumption of promoting pesticides free vegetables in homesteads. Plants are in the yielding stage.

Popularisation of Ambalakatadi in homesteads

Number of farmers : 10

Area : 0.04 ha

Results: Plants were established well and the vegetative growth is satisfactory.

Integrated Approach for control of stem bleeding in coconut

Number of farmers : 10

Area : 0.60 ha

Results: Plants are recovering from the disease.

Management of bud rot in coconut.

Number of farmers : 10

Area : 1.125 ha

Results: Plants are recovering from the disease.

State Government funded FLDs

Funds were allotted by the state planning board from the Department of Agriculture for two Front Line Demonstrations implemented by KVK during the *mundakan* and *punja* seasons.

Effective Agronomic package in rice:

An effective agronomic package in rice with respect to the yield constraints was demonstrated in Kondoorkara *padasekharam* in an area of 4 ha. The demonstration consisted of integration of Agronomic technologies that enable sustainable production by improving efficiency of external inputs.

Watermelon & other cucurbits in summer rice fallows:

Effective utilization of residual moisture and inputs applied to the rice crop by short duration vegetables like watermelon, ashgourd and cucumber in summer rice fallows were demonstrated in Vilayur and Anakara panchayats. Farmers testified that they could get good yields with minimum external inputs.

On Farm Testing

Optimum time of pruning and Scientific Nutrient Management in Bush Jasmine

Treatments:

T₁: Farmers practice: Cow dung 6 kg

T₂: Recommended practice: Cowdung 1.2 kg, Urea 265 g, Rajphose 1200 g, potash 400 g per plant in 4 splits

T₃: Alternate practice: Poultry manure 1.2 kg, Neemcake 1.2 kg, farmyard manure 1.2 kg per plant at monthly interval

Result: Preliminary results indicate that pruning during May-June and a mild clipping during September and application of 100 grams each of neem cake, poultry manure and farm yard manure per plant per month is advantageous for yield and enhanced keeping quality of flowers.

Intercropping in coconut with turmeric and Amaranth

Treatments:

T₁ : Farmers practice: No intercropping with turmeric and amaranth in the bunds and basins

T₂ : Recommended practice: Nil

T₃ : Alternate practice: Intercropping with turmeric and amaranth in the bunds and basins of coconut during rainy and summer season respectively

Result: Farmers could get an additional income of Rs10370/- per hectare by growing turmeric in the bunds during the rainy season and amaranth in the basins during summer season.

On-farm production of organic manure in coconut gardens

Treatments

T₁ : Farmers practice: Growing sun hemp in the basin.

T₂ : Recommended practice: Composting of coconut waste.

T₃ : Alternate practice: Growing glyricidia as intercrop in coconut garden.

Result: Experiment is ongoing.

Farmers Field School

The Kendra has organized knowledge intensive farmers field school to bridge the gap of farmer's knowledge on agronomic and engineering techniques in rice cultivation. The programme was implemented during the *mundakan* season at Kondoorkara *padasekharam* in Ongallur panchayath of Pattambi block. Farmers of 'Pulari Karshaka Sangham' lead by Sri. Ummer Varamangalath, were keen in understanding the new techniques like use of light trap and trichocards. The programme covered various aspects of rice cultivation such as scientific nutrient management, field observation, pest management and use of cost saving machinery for scientific rice cultivation.

Extension activities and service rendered

Sl. No.	Title	Numbers
1	Scientist to Farmers Field	60
2	Farmers visited to KVK	311
3	Radio Talks	1
4	Newspaper coverage	10
5	Popular article	4
6	TV coverage	10
7	Exhibition	3
8	Karshakadhinam Celebration	1
9	Field day	4

Farm Advisory Services

In person	Over telephone	Through letters
82 Nos.	95 Nos.	-

List of publications

Scientific:

Allelopathic influence of purple nutsedge on germination and growth of weeds

Booklets:

- 1) Biogas
- 2) Koonkrishi
- 3) Nelkrishikkulla Yanthrangal
- 4) Udhyanakrishi
- 5) Pump sets

Leaflets

- 1) Udhyanamithra
- 2) KAU Puddler
- 3) Mannira Compost Nirmanam
- 4) Samyojitha Sasya Samrakshnam

Popular articles: 4

- 1) Krishiyanthra gaveshanam keralathil- Shaji James, Karshakan July 2008
- 2) Irattavazhkrishikku nettavum iratti- Premalatha.T, Karshakashree, July 2008
- 3) Inchi krishimurakal- Premalatha.T , Kerala Karshakan January 2009
- 4) Kumbhathil chena nataam- Premalatha.T , Kerala Karshakan February 2009

No. of visitor to the Institution (farmer group/students): 5 Farmer group
565 Students

Details of sale of seeds/planting materials/biocontrol agents etc.

Item	Quantity	Revenue
Cowpea Seed	53.25 Kg.	10650
Bhindi Seed	16 Kg.	14400
Cucumber Seed	9 Kg.	9000
Ashgourd Seed	2.25 Kg.	2250
Amaranth seed	9 Kg.	9000
Yard long bean	1.5kg	1350
Earthworm	31000 Nos.	15500
Mango graft	174 Nos.	5220
Medicinal plants	20 Nos.	100
horticulture crops	64Nos.	384
Ivy Gourd	102	510
Arecanut seedlings	1078 Nos.	5390
Glyrecedia	1000 cuttings	1000
Muringa seedling	102	612
Curry leaf	105	1050

Pepper cuttings	203 Nos.	406
Amaranth leaves	75.75 kg.	758
West Indian Cherry	100	1500
Cashew nut	(auction)	250
Arecanut	(auction)	700
Bread fruit	17	85
Grandnane	31.5 kg.	315
Nendran	96 kg	960

Finance

Head	Expenditure	Receipts
ICAR	39,80,825.00	05,346.00
Revolving Fund	00,63,883.00	64,060.00
State Planning Board	01,62,319.00	-

KRISHI VIGYAN KENDRA, KOLLAM

Field Visit

No. of Visits	Problem identified
15.12.2008- Pattazhi	Leaf blight infestation in paddy
15.12.2008-Mylam	Pest and diseases of vegetables
27.12.2008-Myaom	Pest attack in brinjal
3.1.2009-Mylam	Pest attack in brinjal
24.1.2009-Ayur	Bacterial wilt of cowpea
24.3.2009-Thrakkavilvattom	Fruit fly attack in gourds

Radio talks/ TV Programmes/ Audio-Video Cassettes.

Topic	Date	Name of Scientist
Karshakavedi	11.10.2008	Dr.Sheeba Rebecca Isaac

Popular articles

Topic	Name of Scientist	Date/ Publication
<i>Ginger the underground spices</i>	Dr.Sheeba Rebecca Isaac	Spices Issue 2008

Books

Booklet: *Samagra Nelkrishi Vikasanam Suthira krishiyilude* (malayalam)

Dr.Sheeba Rebecca Isaac, KVK, Kollam

Front Line Demonstration in Rice – CRISP (English)

Dr. Seeba Rebecca Isaac, KVK, Kollam

Leaflets

- i. *Mannira compost engane Thayarakkam ?* - Dr.Sheeba Rebecca Isaac
- ii. *Mikacha Vilavinu Valam Cheyyoo-* Dr.Sheeba Rebecca Isaac
- iii. *Krishi Vigyan kendram Kollam-* Dr.Sheeba Rebecca Isaac
- iv. *Vashayude pradana rogangalum keedangalum-* Dr.Regirani O P

Details of Sale of Seeds/ Planting materials/ Biocontrol agents etc.

Item	Quantity	Revenue
Mushroom spawn	1263 pkts	20208
Earthworms	28808	20166
Pepper cuttings(Panniyur-1)	175	350
Vermicompost	1175 kg	7050
Pathimukham	154	2310
Teak	4308	30156
Moringa seedlings	285	4275

Medicinal plants	35	350
Kuttimulla	507	4056
Mango Fruit Fly Trap	279	22320
Azolla	13.25 kg	928
Cowpea seeds (lola)	2235 pkts	22350
Cowpea seeds (anaswara)	791 pkts	7910
Cowpea seeds (sarika)	146 pkts	1460
Cowpea seeds (Jyothika)	330 pkts	3300
Bitter gourd	1893 pkts	18930
Amaranthus (CO -1)	320 pkts	3200
Amaranthus (Arun)	448 pkts	4480
Amaranthus (Kannara Local)	718 pkts	7180
Bhindi (Arka anamika)	364 pkts	3640
Bhindi (Varsha Uphar)	78 pkts	390
Brinjal	252 pkts	1260
Cucumbar	196 pkts	1960
Pumpkin	136 pkts	1360
Tomato	60 pkts	600
Chilli	65 pkts	650
Snake gourd	229 pkts	2290
Brinjal seedlings	158 Nos	790
Chilli seedlings	112 Nos	560
Tomato seedlings	46 Nos	230
Agathi seedlings	76 Nos	1140
Ornamental plants	514 Nos	5140
Mango graft	99 Nos	2970
Rambuttan	67 Nos	670
Champa seedlings	25 Nos	250
Passion Fruit	4 Nos	40
All spice	24 Nos	240
Clove	25 Nos	250
Nutmeg graft	46 Nos	1150
Citrus	17 Nos	255
Neem	76 Nos	760
		207574

Finance

Head	Expenditure	Receipts
ICAR	3,903,638	
Revolving Fund	148,236	284,819

KRISHI VIGYAN KENDRA, KANNUR

Name of Head of the Station : Dr. K. Abdul Kareem

On going projects

Name of project	Funding agency	Name of PI	Name of Co-PI	Outlay
Preparation of Smoking Sticks using coirpith for smoking rubber sheets	NABARD	Dr. K. Abdul Kareem	Dr. Thulasi	Rs. 3 lakhs

Extension Programmes

Highlights of extension activities

- 1) Arecanut Farmers Convention and Honouring Arecanut farmers held on 07-06-08 at KVK Kannur
- 2) Opening of SBI-KVK Loan Window on 02-03-09 at KVK Kannur.

Details of activities

- 1) On Farm trials conducted

No	Title	No. of beneficiaries
1	OFT- Evaluation of upland rice varieties suited to Kannur district	03
2	OFT- Management of coconut stem bleeding using Hexaconazole	15
3	OFT- Management of mahali disease of Arecanut using modified rocker sprayer	05
4	OFT-Balanced nutrition in banana incorporating micronutrients.	03
5	OFT- Evaluation of blended cashew apple drink	05
6	OFT on management of Foot rot of Pepper using Bio control consortium	03

Frontline demonstrations conducted

No	Title	No. of beneficiaries
1	FLD – Popularisation of indigenous medicinal paddy Njavara	03
2	FLD – Farmer participatory Budrot management in coconut	20
3	FLD – Insitu green manuring in coconut using grain cowpea	15
4	FLD – Promotion of pepper cultivation through bush pepper	10
5	FLD – Control of common endo and ecto parasites infesting cattle by subcutaneous injection of ivermectin	50
6	FLD- Cultivation of location specific fodder grass Hybrid Napier (CO-3) in mini dairy units	10
7	FLD- Supplementation of bypass fat in high yielding dairy cows	10
8	FLD- Supplementation of yeast in kids of Malabari goats	10

Farm Advisory Services

In person	Over telephone	Through letters
225	128	45

Radio talks/ TV Programmes/ Audio-Video Cassettes.

a) Radio talks

Topic	Date	Name of Scientist
Krishi jaalakam - Guava	9-04-08	Dr Anu
Krishi jaalakam – Mango Fly	23-04-08	Dr Anu
Krishi jaalakam – Pests and diseases of coconut	29-04-08	Dr Karim
Feature – Paddy Task Force	22-05-08	Dr Ameena Dr Moossa
Talk – Rabbit rearing	24-05-08	Dr Biju S
Talk – Tapioca cultivation	31-05-08	Dr Anu
Talk – Need based fertilizer application into the soil	18-07-08	Dr Moossa
Talk –Pulari	01-10-08	Dr karim
Talk – KVK as a helping hand to Agricultural prosperity	08-10-08	Dr Karim
Talk – Plant Health Clinic	31-01-09	Dr Thulasi
Krishi Jaalakam - Control of pests in Cowpea	11-02-09	Dr Thulasi
Krishi Jaalakam – Control of wilt disease of Brinjal	18-02-09	Dr Thulasi
Interview- Value addition and self employment	06-02-09	Dr karim
Interview- Patenting the innovations	08-02-09	Dr Karim
Vikas Rekha- programme on Loan Window	04-03-09	Dr Karim
Vikas Rekha – programme on KVK led self help Group 'Jai Ho'	15-03-09	Dr Karim
Krishi jaalakam – Seed collection and processing of solanaceous vegetables	28-03-09	Dr Thulasi

TV Programmes

Topic	Date	Name of Scientist
Prog- on Budrot of coconut	05-07-08	Dr karim Dr. Moossa
Tsunami –Haritha – Orientation of People's representatives	22-07-08	Dr Karim Dr. Moosa
Tsunami –Haritha – Orientation to Officers	23-07-08	Dr Karim Dr. Moosa
Weather forecasting and direction to Agrl farmers	18-10-08	Dr Karim
Weather forecasting and direction to Agrl farmers	25-10-08	Dr Karim
Weather forecasting and direction to Agrl farmers	01-11-08	Dr Karim
Weather forecasting and direction to Agrl farmers	08-11-08	Dr Karim
Weather forecasting and direction to Agrl farmers	15-11-08	Dr Karim
Stem bleeding of coconut	20-11-08	Dr Karim Dr Thulasi

Weather forecasting and direction to Agrl farmers	22-11-08	Dr Karim
Weather forecasting and direction to Agrl farmers	29-11-08	Dr Karim
Weather forecasting and direction to Agrl farmers	06-12-08	Dr Karim
Weather forecasting and direction to Agrl farmers	13-12-08	Dr Karim
Weather forecasting and direction to Agrl farmers	20-12-08	Dr Karim
Weather forecasting and direction to Agrl farmers	27-12-08	Dr Karim
Weather forecasting and direction to Agrl farmers	03-01-09	Dr Karim
Weather forecasting and direction to Agrl farmers	10-01-09	Dr Karim
Weather forecasting and direction to Agrl farmers	17-01-09	Dr Karim
Weather forecasting and direction to Agrl farmers	31-01-09	Dr Karim
Weather forecasting and direction to Agrl farmers	07-02-09	Dr Karim
Weather forecasting and direction to Agrl farmers	14-02-09	Dr Karim
Weather forecasting and direction to Agrl farmers	21-02-09	Dr Karim
Weather forecasting and direction to Agrl farmers	28-02-09	Dr Karim
Loan Window inauguration	02-03-09	Dr Karim
Weather forecasting and direction to Agrl farmers	07-03-09	Dr Karim
Weather forecasting and direction to Agrl farmers	14-03-09	Dr Karim
Weather forecasting and direction to Agrl farmers	21-03-09	Dr Karim
Programme on 'Jai Ho'	25-03-09	Dr Karim
Weather forecasting and direction to Agrl farmers	28-03-09	Dr Karim

Audio, video cassettes

Sl. No.	Type of media (CD / VCD / DVD / Audio- Cassette)	Title of the programme	Number produced
1	Audio CD	Vayalkili Vol 2	100
2	Audio CD	Koonpattukal	100
3	Video CD	Organic manures	100
4	Video CD	Handicrafts from banana fibre	100
5	Video CD	Coconut Mite	100
6	Video CD	Value Added Products from Banana	100
7	Video CD	Green Shell Mussel Farming	100
8	Video CD	"Stem Bleeding of Coconut"	100
9	Video CD	Irrigation in Coconut with special emphasis on Micro sprinkler	100
10	Video CD	Nursery Techniques and Management Part I & II	200
11	Video CD	Goat Rearing	100
12	Video CD	Thengikalude Nilavili	100
13	Audio CD	Thenkili	100
14	Video CD	Aaduvalarthal	300
15	Video CD	Kadavalarthal	300
16	Video CD	Mannira Compost Nirmanam	100

Literature developed/published

Item	Title	Authors name	Number/ Magazine, Month & Year
Scientific papers	-	-	-
Technical bulletins	Tsunami - Haritha	Dr K. Abdul Kareem	1000
Popular articles	Kashumanga kolayumayi Tomichan	Dr. Ameena , Dr. Suman	Karshakan April 2008
	Kashumaanga candy	Dr Suman	Karshakan April 2008
	Kurumulakinu venalil raksha	Dr Ameena	Karshakan April 2008
	Nelkrishiyile yanthravathkaranam-saadhyathakal	Dr Ameena Dr Moossa	Kerala Karshakan June 2008
Books	-	-	-
Extension literature	Cultivation of vegetables	Dr Giridharan	
	Drinking water standards	Dr Thulasi	
	Ready reckoner for preparation and use of organic pesticides	Dr Thulasi	

12. Number of visitors to the institution (Farmer group / Students) : 400

ii) Important visitors:

1. . Sri K R Viswambharan, IAS , Vice Chancellor ,KAU
- 2 Smt Ishitha Roy, IAS, District Collector, Kannur

13. Details of Sale of Seeds/ Planting materials/ Biocontrol agents etc.

Item	Quantity	Revenue (Rs.)
Azolla	24.5 kg	1236
Candy	30.1 kg	3612
Coirpith compost	1126.8 kg	5634
Earthworm	1580 no.	3160
Fruit plants	1229 no.	36,870
Honey	23.5 kg	2829
Jackfruit chips	13.2 kg	1320
Mushroom	102.3 kg	10,233
Mushroom Spawn	1337 pkts	28,073
Ornametal plants	250 no.	2571

Pseudomonas	4825 kg	3,22,000
Quail eggs	3593 no.	3593
Trichoderma	7022.5 kg	4,91,580
Vegetable seedlings	185 no	1871
Vegetable seeds	25 kg	20,006
Vermicompost	1047.5 kg	6285
White pepper	27 kg	8115
Plantation crops	280 no.	5600
Spices	1140 no.	2287
Forage plants	290 no.	2900
Tissue culture plants	45 no.	1125
Books	450 no	4507
Audio, Video CD	890 no	22,465
Others	1000	8880
Total		9,96,752

Finance

Head	Expenditure (Rs)	Receipts (Rs)
ICAR	43,26,842	48,88,000
Other EAPs	4,72,127	6,26,543
Revolving Fund	7,55,285	10,57,927

GENETIC VARIABILITY ANALYSIS OF INDIAN ELEPHANTS USING MICROSATELLITE MARKERS

This Project was sanctioned by the ICAR vide sanction order File No.7-23/2003-ASR II dated, 25-10-2004 for a period of three years with a total outlay of Rs.13,59,640 lakhs. The project envisages to tests the extent and character of molecular genetic variation using highly polymorphic microsatellite markers with the following objectives:

1. To establish a gene bank of elephants consisting of DNA samples from at least 300 Indian elephants belonging to different populations.
2. To characterize the different populations of elephants using microsatellite markers.
3. To estimate the allele and genotype frequencies at the polymorphic loci.
4. To analyse the genetic divergence/similarity among different populations of Indian elephants based on microsatellite polymorphisms.
5. To set up a panel of highly polymorphic microsatellite markers for elephants suitable for molecular genetic analysis.

The scheme was concluded during last financial year.

Achievements & Highlights

1. A DNA bank consisting of 337 genomic DNA samples of Indian Elephants established
2. **Determined the number of alleles , allelic size range, heterozygosity, PIC, percentage exclusion probabilities and individualization potential of 18 microsat**
3. A panel of microsatellite markers was set up which could be useful in individual identification , verification of percentage , testing of inbreeding among wild populations and other purposes such as wild life census and forensics

MOLECULAR CHARACTERISATION OF LOCAL PIGS OF KERALA USING MICROSATELLITE MARKERS

Objectives:

1. To establish a gene bank of local pigs of Kerala consisting of DNA samples from 300 – 400 local pigs belonging to different populations.
2. To characterize the different populations using microsatellite markers available from the pig genome map.
3. To estimate the allele and genotype frequencies at the polymorphic loci.
4. To analyse the genetic divergence / similarity among different populations of local pigs based on microsatellite polymorphisms.

The scheme terminated on during June 2009

Highlights

1. Angamali Pigs were found to be different from other indigenous pigs of Kerala on Phylogeny analysis.
2. The local pigs were genotyped using 25 microsatellite markers.

ICAR FIELD PROGENY TESTING SCHEME

The main objective of the scheme is to select best bulls from among highly pedigreed bulls selected by ICAR by conducting artificial inseminations on cows reared by farmers in the field and evaluating the production performance of the female progenies. In addition to this, the scheme also aims at improving the milk yield of the cows in the field. Now the scheme is in operation in six milk societies at Chemapamkandam, Marottichal, Chuvannumannu, Chirackakode, Avannur and Puzhakkal.

During the period under report 3254 insemination using highly pedigreed bulls have been carried out. 3147 animals have been followed up for pregnancy diagnosis out of which 1275 animals were found to be pregnant indicating a conception rate of 40.5%. 405 numbers of females calves born from the scheme has been identified.

ACHIVEMENTS

Dam-daughter comparison for milk production has been done on 101 dam-daughter pairs in the field, to test the improvement in the milk yield. The result has shown that the average first lactation milk yield of the progeny animals born in the scheme was 2447 kg against their dams' average of 1994 kg in different parities. The overall average milk yield of progeny cows calved during 2007 was found to be 2416 kg and their contemporary calvers born to other bulls was 2106 kg. This shows the cows born in the scheme are capable of producing 500 kg more milk than their previous generation and 300 kg more milk than their contemporaries. Every year around 450 female calves are born from this scheme. From these female calves when they mature we can expect 1,20,000 kg (300 kg X 400 females) additional milk giving an additional revenue of Rs 24lakhs. This will have cumulative effect when they calve subsequently.

KAU SCHEMES

2008 – 2009

Vechur cattle conservation project.

This institution has successfully conserved the only native cattle of Kerala which happened to be the smallest breed of cattle in the world studied so far. This precious germplasm is maintained as mother stock and all scientific analysis was carried out to expose the profile of this breed to scientific community

The alpha-LA gene of vechur cattle has been cloned and completely sequenced . The sequence was found to be having homology with that of Bos Taurus and human . The study did not reveal any structural or functional similarity with taat of human

Above all, the visitors and distinguished guests of the University use to visit the unit frequently. Now many VIPs have expressed their interest to visit this farm and see the native cattle of Kerala during the coming months.

A centre was established to multiply and propagate this breed to interested farmers. The farmers interested in Vechur farming were given special training on various aspects of farm techniques and the importance of native germplasm. During last year 21 good vechur animals were supplied to farmers as seed material to establish Vechur farm. A regular contact programme on technical aspects on the farms and necessary semen for insemination were distributed to these farmers whenever necessary. During last year more than 85 doses of semen were distributed to needy farmers.

Research on Rabbit.

The rabbit farm is functioning as a source of seed materials on various breeds of broiler rabbits. 557 Rabbits were supplied to various farmers and a regular contact programme is arranged to clear their problems whenever required.

Diallel crossing experiment was conducted using three breeds of rabbits in order to find out the best suited rabbit meat breed for Kerala. White Giant male X Grey Giant female cross was found to be the best meat producer.

All necessary technical advices and materials were given to the rabbit farmers by the Scientists of this Centre. Four breeds viz., Soviet Chinchilla, New Zealand White, White Giant and Grey Giant are maintained as mother stock.

A project on Genetic Analysis of Rabbits in Kerala was sanctioned from the Directorate of animal Husbandry, Kerala with a financial outlay of 5 Lakhs for 2 years. The project is in progress.

Details of research projects.

Completed projects during 2008-09

Microsatellite markers of Pigs	ICAR	Dr. A.P. Usha	Dr.K.V.Raghunandan D.M.R.Rajan Dr.K.C. Raghavan Dr.K.Anilkumar Dr.T.V.Aravindakshan	3.80
Microsatellite markers of Elephants	ICAR	Dr.T.V. Aravindakshan	Dr.A.P.Usha Dr.K.Anilkumar	3.895

Ongoing projects

Name of Projects	Funding Agency	Name of PI	Outlay
Field Progeny Testing Scheme	ICAR	Dr.Stephen Mathew	26.16
AICRP on Goat improvement	ICAR	Dr.K.C. Raghavan	15.78
Vechur Cattle Improvement Project (Plan)	KAU	Dr. K.V. Raghunandan	7.64
Rabbit Breeding Scheme(Plan)	KAU	Dr.K.A.Bindu	1.95
Genetic Evaluation of Milk Production & Composition Traits of Cross Breed Cattle in Wayanad	AHD	Dr. G. Radhika	2.37
Genetic Analysis of Rabbits in Kerala	AHD	Dr. K.A. Bindu	5.0

The effect of supplementation of deficient nutrients on the production performance of pigs reared in the field was evaluated. A preliminary survey was conducted to evaluate the feeding strategy of pigs reared by farmers in Thrissur District. All farmers were feeding hotel waste as the sole feed which was found to be deficient in most of the macro and micro minerals. A feeding experiment was conducted in three pig farms. Supplementing them with a mineral-vitamin-amino acid mixture during gestation and lactation. Results showed significant improvement in the average number of piglets weaned per litter and average daily gain of piglets. There was a net profit of Rs.855/pig/ farrowing over the control.

A study was conducted to assess the effect of energy supplementation in the form of maize and rumen protected fat in thirty early lactating cows under the field conditions. An overall assessment of the results obtained showed that energy supplementation in the form of either maize or rumen protected fat could not influence dry matter intake, milk yield and 4% FCM yield. There was no change in the composition of milk and blood parameters studied, among experimental animals. But energy supplementation in the form of protected fat could meet the energy requirement of early lactating animals, improved the digestibility of EE,DM, NDF and ADF and positively influenced the first post partum heat.

Consultancy: Farmers and small scale feed manufacturers were given free technical advice with respect to scientific feeding of animals and preparation of balanced feed mixtures. Taken classes to the Veterinary Surgeons regarding scientific feeding and management of different classes of livestock. Classes were given to students from various medical & nursing colleges regarding scientific feeding and management of different laboratory animals.

Extension programmes

- a. High lights of extension activities
(Attach photographs of important activities)
- b. Details of activities (wherever applicable)

Training Programmes organized

Topic	No: of Trainees	Category	Venue	Date	Name of the Scientist
Advanced analytical techniques in quality control of milk and milk products	Six	Veterinary Surgeons	Animal Nutrition Department	18.12.2008	Dr.A.D.Mercy

Farm Advisory Services

In person	Over Telephone	Through letters
10	6	15

Field visit

No. of visits	Problem identified	Recommendations
40	Piglet mortality	Supplementation of minerals

Radio talks

Topic	Date	Name of Scientist
Preparation of a nutritionally balanced cattle feed using locally available feed ingredients	13.10.2008	Dr. A.D. Mercy

List of Publications

<u>Scientific papers</u>	:	370
<u>Technical Bulletins</u>	:	1655
<u>Popular articles</u>	:	68
<u>Books</u>	:	3

Unit wise revenue during the financial year ended on 31/3/09

1. AI Centre, Mannuthy- Rs. 20,035.00/-
2. Ambulatory Clinics- Rs. 5,970.00/-
3. Mobile unit- Rs.2,415.00/-
4. AI Centre, Kokkalai- Rs. 10,905.00/-

Total: 39,325.00/-

Other details if any.

Papers/ Poster Presented in Seminars

1. Asha, A., Maya, S., Harshan, K.R. and. Chungath J.J. (2008). Prenatal histological changes in the spleen of goat. National Symposium of IAVA on Recent Advances in Anatomy of the Domestic Animals with Special Reference to Developmental Anatomy, Veterinary College, HAU, Hisar. November 5-7 .
2. Chungath, J. J. and Kuttinarayanan, P. (2008). Myostructural changes in radiation. . National Symposium of IAVA on Recent Advances in Anatomy of the Domestic Animals with Special Reference to Developmental Anatomy, Veterinary College, HAU, Hisar. November 5-7.
3. Harshad, S. P., Lucy, K. M. and Harshan, K. R. (2008). Histomorphology of spleen in newborn and adult guinea pigs National Symposium of IAVA on Recent Advances in Anatomy of the Domestic Animals with Special Reference to Developmental Anatomy, Veterinary College, HAU, Hisar. November 5-7.
4. Lucy, K. M. and Harshan, K. R. (2008). Histomorphogenesis of corpus callosum in foetal goats. National Symposium of IAVA on Recent Advances in Anatomy of the Domestic Animals with Special Reference to Developmental Anatomy, Veterinary College, HAU, Hisar. November 5-7.
5. Lucy, K. M. and Harshan, K. R. (2008). Histogenesis of deep cerebellar nuclei in foetal goats National Symposium of IAVA on Recent Advances in Anatomy of the Domestic Animals with Special Reference to Developmental Anatomy, Veterinary College, HAU, Hisar. November 5-7.
6. Maya, S., Chungath, J.J., Harshan, K.R. and Ashok, N. (2008). Histogenesis of nucleus proprius in goat foetuses. National Symposium of IAVA on Recent Advances in Anatomy of the Domestic Animals with Special Reference to Developmental Anatomy, Veterinary College, HAU, Hisar. November 5-7.
7. Maya, S., Narayanan, M.K., Rajankutty, K., Devanand, C.B. and Asha, A. (2008). Histology of the nictitans gland in neapolitan mastiff. National Symposium of IAVA on Recent Advances in Anatomy of the Domestic Animals with Special Reference to Developmental Anatomy, Veterinary College, HAU, Hisar. November 5-7.
8. Sumena, K. B. and Lucy, K. M. (2008). Pattern of hair distribution on the skin of Large White Yorkshire pigs. National Symposium of IAVA on Recent Advances in Anatomy of the Domestic Animals with Special Reference to Developmental Anatomy, Veterinary College, HAU, Hisar. November 5-7.
9. Indu, V.R., Chungath, J.J., Harshan, K.R. and Ashok, N. (2008) Immunohistochemistry of bursa of Fabricius in White Pekin duck. National Symposium of IAVA on Recent Advances in Anatomy of the Domestic Animals with Special Reference to Developmental Anatomy, Veterinary College, HAU, Hisar. November 5-7.
10. K. M. Lucy, K.R. Harshan, J.J. Chungath and N. Ashok. (2008). Histogenesis of Purkinje Cell Layer in Goat foetuses. 'International Symposium on Advances in Neurosciences and 26th Annual Conference of Indian Academy of Neurosciences', CUSAT, 12th to 14th December 2008.
11. Maya, S., Chungath, J.J., Harshan, K.R. and Ashok, N. (2008). Prenatal Studies on the Lateral Horn of Spinal Cord in Goat. 'International Symposium on Advances in

- Neurosciences and 26th Annual Conference of Indian Academy of Neurosciences', CUSAT, 12th to 14th December 2008.
12. Chungath, J.J. (2009). Skeletal peculiarities, Biomechanics and the sexual dimorphism in Asian elephants. National Symposium on Elephant health care and managerial practices. Veterinary College, Khanapara Assam. January 19-21, 2009.
 13. Asha, A., Maya, S., Harshan, K.R. and Chungath J.J., Lucy, K. M. and Indu, V.R. (2009). Histogenesis of Thymus in Foetal Goat. National Seminar on Recent Trends in Animal Welfare and Sustainable Livestock Production, Blue Cross Society, Thrissur, on January 20, 2009.
 14. Maya, S., Chungath, J.J., Harshan, K.R. and Ashok, N. (2009). Onset of Myelination in the Spinal cord of Goat fetuses. National Seminar on Recent Trends in Animal Welfare and Sustainable Livestock Production, Blue Cross Society, Thrissur, on January 20, 2009.
 15. Indu, V.R., Chungath, J.J., Harshan, K.R. , Ashok, N., Lucy, K.M. and Maya, S. (2009). Lymphocytes in the pancreas of White Pekin ducks. National Seminar on Recent Trends in Animal Welfare and Sustainable Livestock Production, Blue Cross Society, Thrissur, on January 20, 2009.
 16. Lucy, K. M., Harshan, K. R., Chungath, J. J. and Ashok, N. (2009). Histomorphogenesis of eyeball in goat fetuses. National Seminar on Recent Trends in Animal Welfare and Sustainable Livestock Production, Blue Cross Society, Thrissur, on January 20, 2009.
 17. Harshad, S. P., Lucy, K. M., Harshan, K. R., Chungath J.J., Lucy, K. M. and Maya, S. (2009). Morphology and morphometry of visceral organs in newborn guinea pigs. National Seminar on Recent Trends in Animal Welfare and Sustainable Livestock Production, Blue Cross Society, Thrissur, on Jan. 20, 2009.
 18. Sumena, K. B., Lucy, K. M., Chungath, J. J., Ashok, N. and Harshan, K. R. (2009). Structure and distribution of clear cells in the epidermis of Large White Yorkshire pigs. National Seminar on Recent Trends in Animal Welfare and Sustainable Livestock Production, Blue Cross Society, Thrissur, on Jan. 20, 2009.

Finance 2008-09

Head	Expenditure	Receipts
Non-Plan	6,41,36,587/-	39,92,284/-
Plan	98,38,917/-	
ICAR	47,43,778/-	
Other EAP's	9,30,712/-	

CHAPTER V

CENTRAL LIBRARY AND INFORMATION SYSTEM, VELLANIKKARA

Name of Head of the Station : Mr. K.P.Sathian

Extension programmes

- a) Highlights of extension activities
(Attach photographs of important activities)
Details of activities (wherever applicable)

Central Library is a centre for Apprenticeship Training in Library & Information Sciences., Sanctioned by Board of Apprenticeship Training , Govt. of India. Trainees are selected in the Central Library through an Interview and engaged in Central Library and College Libraries of KAU. Four Apprentice Trainees are being trained at the Central Library in every year.

The Central Library also extends it's support to following KAU Libraries and other Institutional Libraries for Automation , Installation and Customization of various Library Management Softwares.

Books

1110 Books were added during the reported year making the total collection 218165

Journals

61 Indian Journals were subscribed

Central Library has been subscribed e-journals for the year 2009 through science direct and those journals can accessible to the following colleges.

College of Agriculture, Vellayani & Padannakkad

College of Fisheries, Panangad

College of Veterinary and Animal Sciences, Mannuthy & Pookot

College of Dairy Science and Technology, Mannuthy

College of Co-operation, Banking and Management, Vellanikkara

College of Forestry, Vellanikkara. 173 journals from the year 1995 onwards and 3 encyclopedias entitled "Encyclopedia of Applied Plant Sciences", "Encyclopedia of Food Microbiology" and Encyclopedia of Forest Sciences" which are published by Elsevier are available through online in the URL www.sciencedirect.com.

Theses

118 Theses making the total collection 2877

Finance 2008 – 09

Head	Expenditure	Receipts
Non-Plan	Nil	Nil
Plan	26,47,209	23,00,000
ICAR	32,00,000	32,00,000
Other EAPs	Nil	Nil
Revolving Fund	Nil	Nil

CHAPTER VI

DIRECTORATE OF

STUDENTS WELFARE, MANNUTHY

Name of Head of the Station : Dr. Jose John Chungath

Other activities

a) Students Union activities :

- Election to University Union 2007-08 conducted on 30.07.2008.
- University Union Inauguration and KAU Arts Festival was conducted on 2nd to 5th of November, 2008 at Central Auditorium, Vellanikkara.
- Election to University Union 2008-09 has been conducted on 28th February 2009 as per the directions of Lyngdoh Committee.

b) Extra-curricular activities :

- Celebrated Independence Day of 2008 and Republic Day of 2009 in a befitting manner.
- Distributed prizes to the winners and participants of the Quiz competition conducted as part of Golden Jubilee Celebration of Kerala Legislative Assembly.

c) NSS activities :

d) Arts, Sports & Games :

- Conducted Inter Collegiate Badminton and Shuttle tournaments at College of Vety. & Animal Sciences, Mannuthy on 17th and 18th of October 2008.
- Participated in All Indian Inter University Aquatic Championship held at University of Mumbai from 21st to 25th of October 2008.
- KAU team participated in the South Zone Inter University Basketball (Men) Tournament held at Karnatak University, Dharwad from 10th to 15th of November 2008.
- Conducted Inter Collegiate Football tournament on 17th and 18th of April 2008 at College of Agriculture, Padannakkad.
- Conducted Inter Collegiate Cricket tournament from 13th to 17th of May 2008 at College of Fisheries, Panangad.
- KAU Inter Collegiate Athletic Meet conducted on 27th and 28th May 2008 at College of Agriculture, Vellayani.
- KAU team participated in the All India Inter University Athletic Meet held at Mahatma Gandhi University, Kottayam from 20th to 24th December 2008..

- Conducted Volleyball (Men & Women) tournament at College of Agriculture, Vellayani 20th and 21st January 2009.
- KAU team participated in the 10th All India Inter Agricultural University Sports & Games Meet at Jawaharlal Nehru Krishi Viswa Vidyalaya, Jabalpur, Madhya Pradesh from 3rd to 6th of March 2009.
- KAU Team participated in the 10th All India Inter Agricultural University Youth Festival held at University of Agriculture, Bangalore from 5th to 9th of February 2009 and won First prize in Mono Act, Second prize in Poster making, Third prize in Drama and Fourth place in Solo. Out of 32 Universities participated in the Festival, Kerala Agricultural University was in 5th position scoring 18 points.

Anti-ragging activities:

- Strong actions have been taken as per directions of Supreme Court of India to prohibit ragging in the colleges and hostels. Warning has been given exhibiting posters and presenting CDs to the students and parents explaining "Ragging is a Criminal offence" As a result, we could curb ragging from the Colleges and Hostels of Kerala Agricultural University.

University Employment Information & Guidance Bureau:

- This Bureau conducted 46 group discussions in various topics for 309 candidates. Dy. Chief conducted 42 career talks in various institutions for 3418 candidates.
- 561 career informations were collected and kept in the career room for ready reference.
- Two coaching classes were organised by the bureau for those who preparing for various competitive examinations, in which 54 candidates had participated.
- Bureau published twelve career information bulletin during the period.
- The Dy. Chief visited 54 School / Colleges and given educational guidance to students.
- 12 candidates registered in this bureau during the period and Registration guidance given.
- 304 individual information given and 56 old cases reviewed.

NCC activities:

- Sactioned strength of NCC is 200 cadets. Conducted daily Equestrian training in show jumping.
- Celebrated Independence Day 2008 and Republic Day 2009 in a befitting manner.
- Attended Republic Day Camp 2009 January in New Delhi, Army Attachment Camp at RVC Centre & College, from 23.4.08 to 7.5.08 Meerut Cantonment, combined All Wing Annual Training Camp at various places in Kerala and National Integration Camp at Warrangal, A.P. from 13th to 24th January 2009.
- Participated 80 cadets in musketry and firing practice.
- Dr.Prince C. Kurian and Dr.Pramod.U. (Vety. 2001 admission) attended Service Selection Board interview in October 2009 and secured 1st and 2nd position respectively.

- Cpl.Karthika..P. Vety. College won Silver medal in Show jumping and won Bronze medal in Hacks. Sgt.Aswathi.P.B. Vety. College and Cpl.Sreehari.R., College of Forestry received participation awards.
- CSUO Muhammed Shejir (Vety. College) and UO Joice P. Joseph (Vety. College) secured Chief Minister's Scholarship Rs.1,200/- to the best Cadets for the year 2008.
- Conducted World Aids Day Rally at Thrissur on 30.11.2008, Planted seedlings of different tress at Ravi Varma Mandiram, Nellikkunnu on World Environmental Day. Conducted Tree Plantation Programme with association of KFRI, Peechi at the Tsunami hit areas of Vatanappilly..
- Celebrated NCC Day on 24.11.08, Armed Forces Flag Day 2008.

Other activities:

- Rennovated office and Guest House rooms under the custody of DSW utilising ICAR Development Grant.
- Office of the UEI&GB shifted to the DSW office building (1st floor).
- Rescheduled the staff trips and could save about Rs.4.5 lakhs from the annual expenditure.
- Sri.Suraj.C., General Captain of COVAS, Pookot has been nominated to the Kerala Sports Council
- Constituted the University Placement Cell as per Academic Council decisions and allotted funds to various colleges for its strengthening at College level. Conducted various coaching camps for career guidance

Finance 2008-09 (Available in Head Quarters)

Head	Expenditure	Receipts
Non-Plan	(Available in Head Quarters)	-
Plan	(Available in Head Quarters)	-
ICAR	(Available in Head Quarters)	-
Other EAPs	-	-
Revolving Fund	-	-

CHAPTER VII

DIRECTORATE OF PHYSICAL PLANT

Statement of Receipts and Expenditure from February 2009 to May 2009

RECEIPTS			EXPENDITURE		
<u>Suspenses</u>		139829.00	<u>Works</u>		34942090.00
Revenue	139829.00		Plan	14962842.00	
Receipt of fund			Non Plan	3866788.00	
From Comptroller	13614000.00	13614000.00	Deposit work	16112460.00	
FD withdrawal	2543630.00	2543630.00	<u>Suspenses</u>		140267.00
Other Receipts	17494473.00	17494473.00	Revenue	140267.00	

ENGINEERING DIVISION, PANANGAD.

Name of the Head of the Station : Sri. K. Savy Joseph

Finance 2008-09

Head of Account	Provision for the year	Expenditure	Station Receipts
Non Plan	56.935	39,84,827.00	1,93,000.00

ENGINEERING SUB-DIVISION, KOLAHALAMEDU.

Name of the Head of the Station : Sri. M.V. Chackochen

Finance 2008-09

Head of Account	Provision for the year	Expenditure	Station Receipts
Non Plan	Nil	Nil	Nil
Plan	10.930	822393.00	1890.00

ENGINEERING DIVISION, TAVANUR

Name of the Head of the Station : Executive Engineer

Finance 2008-09

Head of Account	Expenditure	Station Receipts
Non Plan	3116829	2375000
Plan	3465378	696951
Non Plan (works)	47033	
ICAR	876322	900000
Other EAPs	3846365	1570000
Revolving Fund	Nil	Nil

CHAPTER VIII

KAU ESTATE, VELLANIKKARA

Name of Head of the Station : K.K. Sadeesan,

8. Other activities (brief outline only) : Production of Rubber latex and disposal

Finance 2008-09 : -

Head	Expenditure	Receipts
Non- Plan	33,60,000	38,74,532
Plan	1,96,002	
ICAR		
Other EAPs		
Revolving Fund		

CHAPTER IX

FINANCE AND ACCOUNTS

Receipts – Details

Receipts	Amount
1) (i) Grant- in-aid under Non Plan	: Rs. 67,37,00,000
(ii) Grant-in-aid under Plan	: Rs. 30,25,00,000
2) i) ICAR Assistance	: Rs. 18,96,17,949
ii) NAIP	: Rs. 1,58,09,900
iii) OEAP (GOL, GOK and Misc)	: Rs. 17,27,03,472
iv) Internal Resources	: Rs. 9,02,24,198

OTHERS

a) NSS Non Plan	: Rs.6,20,000
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BUDGET ESTIMATE - 2008-09

Item	Resources (in lakhs)	Expenditure (in lakhs)
Non-Plan Grant in aid	7212.000	7247.655
Plan	3025.000	5439.630
ICAR	2648.654	1772.746
OEAP	735.633	272.757
Internal Resources	1488.030	-
Institutional Finance	-	-
Foundation fund	5.000	5.000
Pension Fund	11.000	2750.000
Loans and Suspense	1510.500	637.100
Total	16635.817	18124.888
Opening balance/closing balance	630.644	-858.427
Grand Total	17266.461	17266.461

**INTERNAL AUDIT CIRCLE (NR)
VELLIMADUKUNNU**

Name of Head of the Station : Ushadevi.S.

Finance

Head	Expenditure	Receipts
Non-Plan 102-10-0021	30,59,288	-

CAMPUS DEVELOPMENT, VELLANIKKARA

Name of Head of the Station : Dr. K Aravindakshan, Professor

Research programme

a. Major research achievements (highlights)

1. Development of main campus
Beautification, maintenance and upkeep of the entire campus.
2. Development of Botanical Garden and Arboratum
Addition of tree species and establishment of a biodiversity centre
3. Intensive vegetable seed production programme
Large-scale production of important vegetable seeds according to the demand
4. National Horticultural Mission on M & AP
Production of planting materials
5. KSCSTE Project - System of Rice Intensification - a Pilot Study

High production cost and low productivity are the two major constraints confounding paddy cultivation in Kerala. This is mainly attributed to high labour cost, unavailability of labour for timely field operations. The situation necessitates the introduction of agronomically efficient technologies to increase the yield and lower the cost by optimizing the use of nutrients, water, and labour. A set of new crop management technology called system of rice intensification (SRI) is attracting attention by the rice farmers because of the multiple benefit it offers such as high yield and factor productivity with water saving. The present study was conducted to validate and explain the merits/ demerits of SRI under Kerala conditions. Crop management techniques followed under SRI was compared with the Kerala Agricultural University, Package of Practices recommendations for rice crop and farmers practice.

Result of the study indicated that age of seedlings, number of seedlings per hill and spacing recommendations of KAU, POP recommendations was the best treatment to increase the productivity and profitability of rice under our situations. Planting of 20 days old two seedlings per hill and 20 x 15 cm spacing recorded the highest yield and net return compared to planting of 10 days old one seedling per hill and wider spacing of 25 x 25 cm. Intermittent irrigation and conoweeding techniques followed under SRI management was found equally effective to continuous flooding and manual weeding followed under KAU recommendations. With intermittent irrigation we can save almost 50 % water used for irrigation and by employing cono weeding, we can save the labour required for weeding by 35 man days and labour cost by Rs.3125 ha⁻¹ with out affecting the yield. Compared to Farmers practice, SRI management gave higher yield and profit.

Excessive weed growth is one of the major constraints in intermittent irrigation and the productivity is further affected due to the non application of organic manures in view of their high cost and limited availability. Concurrent growing of daincha and its subsequent incorporation at 30 days after sowing by spraying 2, 4 - D was found to be very effective in controlling the weeds and supplying the required quantity of organic manures (12 t ha⁻¹) to rice with minimum investment without any yield reduction.

Farmers perceived SRI farming as an economically feasible technology compared to their conventional method of rice farming. Even though it was economical most of the farmers were discontinuing this practice. In places where farmers following KAU Package of Practices recommendations of rice SRI management techniques were not promising. It was observed that fields which were closely monitored and advised by the scientists / experts have given good results. It implies that sustained extension strategies need to be developed for wide spread adoption of all beneficial technologies.

Planting of 20 days old two seedlings per hill at a spacing of 20 x15 cm with intermittent irrigation and concurrent growing of daincha and its subsequent incorporation at 30 days after sowing by spraying 2, 4 - D can be recommended as a management alternative for high production cost and low yield of paddy under Kerala conditions.

Extension and other activities

a. Highlight of extension activities

Conducted farm trials on concurrent growing of green manure crops in dry seeded rice- at four locations

Conducted farm trials on concurrent growing of daincha in wet seeded rice- at five locations

Conducted sale of planting materials in connection with Thrissur Pooram Exhibition

b. Other activities

Six ABARD training units are functioning in the station.

1. Vegetable seed production
2. Orchid and anthurium production
3. Rapid multiplication of pepper
4. Mixed farming with meat goat production
5. Organic vegetables and vegetable seed production
6. Production of bio control agents and bio fertilizers

ii) Farm Advisory Services :

In person	Over telephone
2500	500

No. of visit	Problem identified	Recommendations
50 nos.	Acidity, K deficiency, mite attack in banana fields	As per POP

No. of visitors to the institution (farmer group/students) : 1000

Finance

Head of A/C		Expenditure	Receipts
Non Plan			
Plan			
383-31-3302	Development of main campus	7394612	
383-31-3305	Development of Botanical Garden	748242	
383-31-3323	Intensive vegetable seed production programme	1425318	
ICAR			
Other EAPs			
383-31-8290	KSCSTE Project – system of Rice Intensification	162894	
383-31-8287	CSS-NHM Spices	200087	
Revolving fund			
A/C No.1112	Station Revolving Fund	3195624	3710668
A/ C No. 1867	Coconut Oil Production	565612	555723

APPENDIX I

LIST OF GENERAL COUNCIL

The Secretary to H.E. the Governor,
Kerala Rajbhavan, Thiruvananthapuram – 695 099.

The Private Secretary to
Hon'ble Minister for Agriculture,
Government of Kerala, Thiruvananthapuram.

The Vice Chancellor,
Kerala Agricultural University,
KAU P.O., Thrissur-680 656.

The Agricultural Production Commissioner,
Government Secretariat, Thiruvananthapuram.

The Secretary to Government,
Department of Agriculture,
Government Secretariat, Thiruvananthapuram.

The Secretary to Government,
Department of Finance (Resources)
Government Secretariat, Thiruvananthapuram.

The Secretary to Government,
Department of Fisheries,
Government Secretariat, Thiruvananthapuram.

The Secretary to Government,
Department of Animal Husbandry,
Government Secretariat, Thiruvananthapuram.

The Director of Agriculture,
Thiruvananthapuram.

The Director of Animal Husbandry,
Thiruvananthapuram.

The Director of Dairy Development,
Thiruvananthapuram.

The Director of Fisheries,
Thiruvananthapuram.

The Principal Chief Conservator of Forests,
Thiruvananthapuram.

The Chairman,
Rubber Board,
Kottayam – 686 002.

The Chairman,
Spices Board, Sugandha Bhavan,
NH By-pass, P.B.No. 2277,
Palarivattom (P.O.),
Kochi – 682 025.

The Chairman,
Marine Products Export Development Authority,
Panampilly Nagar,
Kochi – 682 036.

The Director,
CPCRI, Kasaragod – 671 124.

The Director,
KFRI, Peechi, Thrissur – 680 653.

(Representative of ICAR)

Dr. V.A. Parthasarathy
Director,
Indian Institute of Spices Research, Kozhikkode-

(MLA representing the constituency in which the Headquarters of the University is situated)

Sri. Rajaji Mathew Thomas, M.L.A.,
Member, Executive Committee of KAU
Thenguvilayil House,
Chemboothra, Pattikkad P.O.,
Thrissur – 680652.

ELECTED MEMBERS

(Four members of the Legislative Assembly of whom one shall be a SC/ST)

Sri. C.K.P. Padmanabhan, MLA
Member, General Council of KAU
Chengal, Kizhakkapurayil,
Kunhimangalam, Kovvapuram. P.O.
Kannur-670 309.

Prof. C. Raveendranath, MLA
Member,
General Council of KAU
Lakshmi Bhavan Panthalathu Lane.,
Kanattukara, Thrissur.

Sri.Thomas Chazhikadan M.L.A
(Member, General Council of KAU)
Chazhikkat, S.H.Mount P.O
Kottayam - 686006

Sri.Pallipram Balan, MLA
(Member, General Council of KAU)
Pushpa Nivas, Shri Shilpa Housing Apartment,
Karattuvayal, Kanhangadu P.O., Kasargode-671315.

(One member from the Deans of Faculties of the University)

Vacant

[Four members from the Constituency of Teachers of the University]

Dr. T.Pradeep kumar,
(Member, General Council of KAU)
Associate Professor, Department of Olericulture,
College of Horticulture, Vellanikkara

Dr. K Aravindakshan
(Member, General Council of KAU)
Central Nursery, K.A.U, Vellanikkara

Dr. Jose Joseph,
(Member, General Council of KAU)
Assoc.Professor, Communication Centre,
Mannuthy

Dr. N. Vijayan,
(Member, General Council of KAU)
Professor, College of Veterinary &
Animal Sciences,
Mannuthy

[Two members from the Constituency of students of the University]

Kum. Ayswarya .R. Venu (2005-03-38)
(Member, General Council of KAU)
College of Veterinary & Animal Sciences,
Mannuthy

Sri.Arun .S (05-01-250)
(Member, General Council of KAU)
College of Horticulture,
Vellanikkara

[Two members from the Constituency of Non-teaching Staff of the University]

Sri. Shah.A
(Member, General Council of KAU)
Section Officer, College of Agriculture,
Vellayani, Thiruvananthapuram.

Sri. Sivakumar.N.L
(Member, General Council of KAU)
Section Officer, College of Agriculture, Vellayani,
Thiruvananthapuram

[Two members from the Constituency of Permanent Labourers of the University]

Sri. M.S.Pushpakumar,
(Member, General Council of KAU)
Permanent Labourer,
College of Veterinary & Animal Sciences,
Mannuthy

Sri. Chandran.V.B,
(Member, General Council of KAU)
Permanent Labourer,
Banana Research Station,
Kannara.

Members Nominated by the Chancellor

Four eminent Scientists in the field of Agriculture and allied subjects from the concerned University or from outside.

Dr.A.Anilkumar, Professor
(Member, General Council of KAU)
Dept. of Agricultural Extension,
College of Agriculture,
Vellayani

S.Leenakumari
(Member, General Council of KAU)
Professor, Plant Breeding
Rice Research Station, Moncompu

Dr.S.Balaraman
(Member, General Council of KAU)
SWARAM, Mundakkal, Kollam

Shri.R.Hali
(Member, General Council of KAU)
Former Director of Agriculture
"PEARLHILL" Attingal, Thiruvananthapuram

Four Farmers of whom one shall be a member belonging to SC/ST and one shall be a woman

Shri.Sathyan Mokeri
(Member, General Council of KAU)
Shree Achutham, Mokeri (P.O)
via Anakkattil, Kozhikode

Smt.Bijimol, M.L.A
(Member, General Council of KAU)
Panthaluparambil, Elappara (P.O)
Idukki

Shri.K.Dinesh Babu
(Member, General Council of KAU)
Jilla Panchayat Member, Vattappachayil Veedu
Meeyannur (P.O), Kollam.

Shri. P.V.John Pottas
(Member, General Council of KAU)
Pottas, Machiplavu
Adimali

One member from the Association of Planters of Kerala

Shri.Jose Mampampil
(Member, General Council of KAU)
Pizhak (P.O), Pala, Kottayam

Two Presidents of the Grama Panchayat

Shri. Ravindran Master
(Member, General Council of KAU)
Perumbayil House
Vadanappally, Thrissur

Smt.E.S.Ramadevi Amma
(Member, General Council of KAU)
Mullasseril, Kuriyode (P.O)
Chadayamangalam

Other Members

MEMBER TO REPRESENT UNIVERSITY OF CALICUT

Sri.C.R.Das
(Member, General Council of KAU)
"Vikas", Mannuthy, Thrissur

**MEMBER TO REPRESENT COCHIN UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

Sri.Saju Paul M.L.A
(Member, General Council of KAU)
Panthalingal, Vengoor (PO)
Perumbavoor, Ernakulam - 683 546

**MEMBER TO REPRESENT UNIVERSITY OF
KERALA**

Sri.K.Sunil Kumar,
Senior Grade Assistant,
University of Kerala,
Thiruvananthapuram - 695 034.

LIST OF EXECUTIVE COMMITTEE MEMBERS

Sri. K.R Viswambharan. I.A.S
Vice Chancellor,
Kerala Agricultural University,
Vellanikkara, Thrissur

Sri.Rajaji Mathew Thomas, M.L.A,
(Member, Executive Committee of KAU)
Thenguvilayil House, Chemboothra
Pattikkad P.O,
Thrissur - 680652.

Shri. K. Jayakumar, I.A.S
Agricultural Production commissioner,
(Member, Executive committee of KAU)
Government secretariat,
Thiruvananthapuram.

Dr.V.A.Parthasarathy
(Member, Executive committee of KAU)
Director, Indian Institute of Spices Research,
Marikunnu (P.O), Kozhikkode- 673012

Secretary to Government,
Finance Department,
(Member, Executive committee of KAU)
Government secretariat,
Thiruvananthapuram

Dr. K Aravindakshan
(Member, Executive committee of KAU)
Central Nursery,
K.A.U, Vellanikkara,
Thrissur

Dr.A.Anilkumar,Professor
(Member, Executive committee of KAU)
Dept. of Agricultural Extension,
College of Agriculture, Vellayani
Thiruvananthapuram - 695 522

Prof. C.Raveendranath, MLA
(Member, Executive committee of KAU)
Lakshmi Bhavan Panthalathu Lane,,
Kanattukara, Thrissur.

Shri. Ravindran Master
(Member, Executive committee of KAU)
Perumbayil House, Vadanappally, Thrissur

Shri.K.Dinesh Babu
(Member, Executive committee of KAU)
Jilla Panchayat Member
Vattappachayil Veedu
Meeyannur (P.O),
Kollam.

Prof. S.Leenakumari
(Member, Executive committee of KAU)
Professor, Plant Breeding
Rice Research Station
Moncompu Thekkekara P.O
Alappuzha - 688 503

SUB COMMITTEES OF THE EXECUTIVE COMMITTEE

Finance Committee

Vice-Chancellor - Chairman
Finance secretary to Government - Member
Agricultural Production Commissioner- Member
Sri. Rajaji Mathew Thomas, M.LA - Member
Comptroller - Convenor

Planning, Development & Resource Mobilization Committee

Sri. K.Dinesh Babu - Chairman
Prof. C Raveendranath, M.L.A - Member
Dr. K. Aravindakshan - Member
Dr. A Anilkumar - Member
Prof. S. Leenakumari - Member
Sri. P.V. Ravindran Master - Member
Director of Research - Member
Comptroller - Member
Director of Extension - Convenor

Research & Extension Review Committee

Prof. S. Leenakumari - Chair
person
Sri. Rajaji Mathew Thomas, M.L.A - Member
Prof. C Raveendranath, M.L.A - Member
Dr. A Anilkumar - Member
Sri. K Dinesh Babu - Member
Sri. P.V.Ravindran Master - Member
Dr. K. Aravindakshan - Member
Director of Extension - Member
Director of Research - Convenor

Establishment Committee

Prof. C. Raveendranath, M.L.A - Chairman
Sri. Rajaji Mathew Thomas, M.LA - Member
Dr. K.Aravindakshan - Member
Sri. P.V. Ravindran Master - Member
Dr. A Anilkumar - Member
Sri. K. Dinesh Babu - Member
Prof. S. Leenakumari - Member
Registrar - Convenor

Education, Career Development & Student Welfare Committee

Dr. A Anilkumar - Chairman
Prof. C Raveendranath, M.L.A - Member
Sri. Rajaji Mathew Thomas, M.LA - Member
Sri. K. Dinesh Babu - Member
Sri. P.V Ravindran Master - Member
Prof. S. Leenakumari - Member
Dr. K.Aravindakshan - Member
The Dean, College of
Agriculture, Vellayani - Member
The Dean, KCAET,
Tavanur, Malappuram - Member
The Dean, College of Fisheries,
Panangad, Kochi - Member
The Dean, College of Veterinary
& Animal Sciences, Mannuthy - Member
Director - Member
(Acad & P.G Studies)
Director of Students Welfare - Convenor

Works Committee

Sri. P.V.Ravindran Master	- Chairman
Sri. Rajaji Mathew Thomas, M.L.A	- Member
Prof. C Raveendranath, M.L.A	- Member
Dr. K.Aravindakshan	- Member
Dr. A Anilkumar	- Member
Sri. K. Dinesh Babu	- Member
Prof. S.Leenakumari	- Member
Director of Physical Plant	- Convenor

Legal Monitoring Committee

Dr. K.Aravindakshan	- Chairman
Prof. C Raveendranath, M.L.A	- Member
Dr. A Anilkumar	- Member
Prof. S. Leenakumari	- Member
Sri. P.V. Ravindran Master	- Member
Sri. K.Dinesh Babu	- Member
Sr. Standing Counsel	- (Special Invitee)
Registrar	- Convenor

SUB COMMITTEES OF THE GENERAL COUNCIL**STATUTE SUB COMMITTEE**

Smt. E.S. Bijimol, MLA	- Chairperson
Sri. C.K.P.Padmanabhan, MLA	- Member
Sri. Pallipram Balan, MLA	- Member
Dr. T.Pradeep Kumar	- Member
Sri. C.R.Das,	- Member
Dr. S.Balaraman	- Member
Dr. Jose Joseph	- Member
Sri. A.Shah	- Member
Sri. K.Sunilkumar	- Member
Sri. N.L.Sivakumar	- Member
Registrar	- Convenor

Sri. Sathyan Mokeri	- Member
Dr. T.Pradeep Kumar	- Member
Sri. R.Hali	- Member
Sri. A.Shah	- Member
Sri. M.S.Pushpakumar	- Member
Sri. V.B.Chandran	- Member
Comptroller	- Convenor

ASSURANCE COMMITTEE**ACCOUNTS COMMITTEE**

Sri. C.K.P.Padmanabhan, MLA	- Chairman
Sri. Pallipram Balan, MLA	- Member
Sri. Saju Paul, MLA	- Member
Sri. Thomas Chazhikadan, MLA	- Member

Sri. Saju Paul, MLA	- Chairman
Smt. E.S.Bijimol, MLA	- Member
Sri. Thomas Chazhikadan, MLA	- Member
Sri. John Pottas	- Member
Sri. Jose Manaparambil	- Member
Smt. E.S.Ramadevi Amma	- Member
Kum. Ayswarya R.Venu	- Member
Sri. Arun.S.	- Member
Dr. N.Vijayan	- Member
Registrar	- Convenor

