KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture Department of Agronomy

1. Name of Research Centre: Rice Research Station, Kayamkulam.

2. Project No. : AG 10.6 Agron1(i)

3. Title of the project (this should be indicate the nature of work) : Studies on cultural and Manurial practices for the Multipoded mutant of Kayamkulam-1.

4. Name(s) & Designation of

(a) Project Leader : S. Santha Kumari
Assistant Professor,
(Cil Seed)Rice Res.Station,
Kayamkulam.

(b) Associate : N.K. Sasidharan,
Junior Instructor.

5. Objective : To study the effect of different manurial and cultural practices to enhance the yield of multipoded mutant of Kayamkulam-1.

6. Practical Utility: The yield of multipoded mutant of Kayamkulam-1 is found to be fluctuating depending upon the cultural and Manurial practices. The multipoded expression also depends upon the performance of the crop. Hence studies were undertaken to find out the effect of different manurial and cultural practices to increase the yield of multipoded mutant of Kayamkulam-1.

7. A short review of Literature: A.B. Joshi. 1961(P.58) has reported that those types which bear three pods in their axil may sometimes develop only one or two pods instead of three pods(Multipod) under unfavourable growing conditions. Sri. N.R. Nair and S.Santha Kumari has reported (Science and culture Vol.41.1975) the occurance of a natural multipoded mutant of Kayamkulam-1 at the Rice Research Station, Kayamkulam. Under favourable weather conditions it had reported an yield 682 Kgm/hact. while single poded Kayamkulam-1 reported an yield of 570 Kgm/haet.

(contd...2)

8. Technical Programme

Layout - 6 x 4 RBF

Plot size - 6m. x 4m.

Treatments:

1. NPK recommended dose ie. 30 : 15 : 30 complete Badal
2. NPK 15 - 0 - 15 Basal and 15 - 0 - 15 at interculture
3. NPK 15 - 25 - 15 Cattle manure 5 tons/hect
   NPK 15 - 0 - 15 at interculture.
4. NPK 30 - 15 - 30 Basal and 15 - 0 - 15 at interculture
5. NPK - 40 - 30 - 40 Basal and 10 - 0 - 20 at interculture.
6. NPK 0 - 0 - 0

Observations to be recorded

1. Plotyield - weight of Sesamum seed per plot
2. Percentage of Multipoded plants in a plot

9. Date of start : January 1978

10. Likely date of completion: April 1982

11. Additional facilities required:

12. Approximate cost : Rs.2500/-

Sd/-	Sd/-	Sd/-
Project Leader	Head of Department	Director of Research

Sixth FRC. S.No.655.

KERALA AGRICULTURAL UNIVERSITY

Faculty of : Agriculture Department of: Agricultural Chemistry

1. Name of Research Centre: College of Agriculture, Vellayani.

2. Project No. : AG 10.18 Agron 1(iii)

3. Title of Project (This should indicate nature of the work) : Studies on the effect of potassium and Magnesium on the yield, oil and Protein content of sesamum

4. Name(s) and designation of:

   (a) Project Leader : Alice Abraham, Assistant Professor

   (b) Associate : Dr. M.M. Koshy, Professor, Shri P.A.Korah, Assistant Professor

5. Objective : Separate sheet attached

6. Practical utility : Separate sheet attached

7. A short review of literature : Separate sheet attached

8. Technical programme : Separate sheet attached

9. Date of start : June 1977

10. Likely date of completion: June 1979

11. Additional facilities required : Nil

12. Approximate cost : Rs.1,000/-

13. Signature of :

Sd/-
Project Leader

Sd/-
Head of the Department

Third F R C. S.No.657.

(contd...)

5. Objective

Magnesium is known to have a specific role in the synthesis of oil in plants. At present there is no recommendation regarding Magnesium for sesamum in Kerala. Our soils being generally deficient in Magnesium it is bound to respond to the application of Magnesium.

In the same way, higher doses of potasium is also known to favourably affect the yield and oil content in sesamum.

Hence, the object of the present study is to find out the influence of Magnesium and higher doses of K on the yield, oil content and protein in sesamum.

6. Practical utility

If sesamum shows significant response to application to Magnesium and higher doses of potassium, we will be able to make suitable modification in the present package of practices for manuring sesamum.

7. A short review of literature:-

Studies conducted at the Tamil Nadu Agricultural University have indicated that soild with less than 100 lbs. Magnesium/acre respond to application of Magnesium and gave an increased yield of sesamum. Higher doses of potassium also were found to have a better impact on the yield components. No experiment is seen to be conducted in our State with regard to the application of Magnesium to sesamum. It is also felt that the present recommendation of 30 kg.K_2O/ha may be increased for better yields.

8. Technical Programme

A pot experiment will be conducted on sesamum with different levels of potassium and magnesium. The different treatments will be as follows:-

	N	P	K	
I	30	15	30	+ Cattle manure
II	30	15	30	+ Mg(soil)100 Kg/ha+cattle manure
III	30	15	30	+ Mg(Foliar)1% + Cattle manure
IV	30	15	45	+ Cattle manure
V	30	15	45	+ Mg(Soil)100 Kg/ha + Cattle manure
VI	30	14	45	+ Mg(foliar)1% + Cattle manure
VII	30	15	60	+ Cattle manure
VIII	30	15	60	+ Mg(Soil)100 Kg/ha+ " "
IX	30	15	60	+ Mg (foliar) 1% + " "
X	30	15	75	+ Cattle manure
XI	30	15	75	+ Mg (soil) 100 Kg/ha+ " "
XII	30	15	75	+ Mg (foliar) 1% + " "

Mg will be supplied as Magnesium sulphate.

(contd...)

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture Department of Agricultural Botany.

1. Name of Research Centre: Rice Research Station, Kayamkulam.

2. Project No. : AG.10.6 Agron 2

3. Title of the project (this should indicate the nature of work) : To evolve suitable agronomic method to obtain uniform population in the bulk crop of Sesamum, so as to enhance the yield per hect.

4. Name(s) Designation :

(a) Project Leader : S. Santha Kumari, Asst. Professor, Rice Research Station, Kayamkulam.

(b) Associate : A.E.S. Kurup, Associate Professor, Rice Research Station, Kayamkulam.

5. Objective :- To study the factors affecting the uniform population of Seasamum in 3rd crop season in Onattukara.

6. Practical utility:- During the third crop season uniform population is not observed in the bulk crop of seasamum thereby providing numerous gaps in the field. Probable reasons for these gaps are.

1. The poor percentage of germination of seed due to lack of proper storage.
2. Lack of optimum soil moisture. Excess soil moisture, as well as minimum soil moisture are deleterious for the germination and good performance of the crop.
3. Net sowing at the proper time.
4. Not using suitable sowing methods.

By studying the above factors, in details and thereby adopting suitable agronomic practice for obtain uniform population of Sesamum, the yield of bulk crop seasamum per hect, can be enhanced.

(contd...)

7. A short review of literature:-

No work has been done so far on this aspect. However the available data indicate that the average per heet. yield of Seasamum in the state is decreasing year after year, the reasons being the poor performance of crop in certain areas. Hence the present work is aimed to study the reason for decrease in the yield, and to adopt suitable cultivation methods for increasing the per hectare yield of Seasamum.

8. Technical Programme:-

Part I - To study the effect of proper storing method of Sesamum

Object :- To study whether different storing methods of Sesamum has any effect on germination and yield of Sesamum.

Layour :- 6x 4 RBD

Plotsize :- 4.35 m x 2.85 m.

Spacing :- 15 cm x 15 cm .

Treatments:- 1. Storing in polythene gunny bag. seed bins.
2. Storing in polythene Wooden bins.
3. Storing mixed with BHC
4. " Ash
5. " Sand

Observations to be recorded

1. Germination percentage in each plot
2. Plot yield.

Part II - To study the effect of different sowing methods on the yield of Sesamum

Object:- To study the effect of different cultural methods for sowing on the yield of sesamum.

Layout:- 5 x 4 RBD

Treatments:- 5

Replication : 4 , Plot size:- 10m x 4m.

Treatments: 1. Sowing and ploughing.
2. Ploughing, sowing, harrowing and then planking.
3. Ploughing, harrowing, sowing harrowing and Planking.
4. Ploughing, sowing behind the country plough.

(contd....)

Observations to be recorded.

1. Yield per plot for different treatments.
2. General vigour and performance of the crop in different sowing methods.

Part III - To study the optimum moisture percentage for the germination and high yield of Sesamum.

Object:- To study the optimum moisture level in the sandy soil for maximum germination and yield of Sesamum.

Layout:- 4 x 5

Plotsize: 6 x 5 (30 Sq.m)

Treatments: 4

Treatments:-

1. Sowing sesamum just after second crop harvest of paddy.
2. " 5 days "
3. " 10 days "
4. " 15 days "

Observations to be recorded

1. Moisture percentage of soil for different treatments.
2. Germination percentage.
3. Yield/plot.

9. Date of start : January 1978
10. Likely date of completion : 1981
11. Additional facilities required: Nil
12. Approximate cost : Rs.2000/-

Sd/-	Sd/-	Sd/-
Project Leader	Head of Department	Director of Research.

S.No.658.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Botany

1. Name of Research Centre : Agricultural College, Vellayani.

2. Project No. and Title : No.AG.10.18 Bot.3 Genetic investigations in Sesamum.

3. Objective : Study the genetic basis of economic characters in sesamum such as plant height, habit, number of pods per axil & No. of locules per pod.

4. Name (s) of:

(a) Project Leader : N. Ramachandran Nair, Instructor.

(b) Associate(s) : V.Gopinathan Nair, Assot. Professor.

5. Practical Utility &
6. Review of literature

Genetic studies on economic characters in sesamum have not been undertaken. A thorough knowledge of genetic basis of these characters would help to evolve high yielding varieties.

7. Technical programme : Screening of varieties for selecting contrasting types. Hybridisation and raising the F1, study of the genetic variation in the F2 and its analysis.

8. Date of start : August - September 1977

9. Likely date of completion: 1979 - 80

10. Additional facilities required } Nil

11. Approximate cost : Rs.1,000/- per year

12. Signature of :-

Sd/-
Project Leader

Sd/-
Head of Department

Third FRC. S.No.662.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture : Department of Entomology

1. Name of the Research Institute/Centre : Rice Research Station, Kayamkulam.

2. Project Number : AG. 10.6 Ent-1.

3. Title of the project : Studies on the pest of sesamum and their control

4. Name and designation of the:

   (a) Project Leader : T. Nalinakumari
   Junior Instructor

   (b) Associate : Sri. A.E.S. Kurup,
   Associate Professor.

5. Objectives:- Sesamum is an important crop of Onattukara area. Much damage is caused to this crop especially in certain years due to the pest. No information is available on the different types of pests involved and on their relative importance as pest of Seasamum. Control measures also have been worked out and hence this project is proposed.

6. Practical-utility: The information proposed to be gathered through this project will enable the identification of insects as real constraints of production if any.

7. A brief review of literature: About 25 sp. of insects have been recorded on this crop in India. Of this the major pests are leaf & pod cater pillar Antigastra catalaunalis the spingid cater pillar Acrontia styse and the gall fly Asphondylia sesamii(Nair 1975) No work however has been done on the pest of this crop in Kerala.

8. Technical-programme: The investigations will include

   (1) Collection & identification of the pests of gingelly with reference to the season.

   (2) Studies on the life history, extent of damage caused and natural enemies of the pests of Sesamum.

   (3) Use of insecticides in controlling the more important pest.

(contd...)

9. Date of commencement : January, 1978

10. Likely date of completion: April '79.

11. Facilities required :

12. Approximate cost : Rs.500/-

13. Signature of

Sd/-
Project Leader

Sd/-
For Head of Department

Sd/-
Director
of Research.

Third FRC S.No.666.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture : Department of Agronomy.

1. Name of Research Centre : Rice Research Station, Kayamkulam.

2. Project No. : AG 10.6 Agron.1

3. Title of the project (this should indicate the nature of work) : Manurial Trial on Groundnut.

4. Name(s) & Designation of:-

a) Project Leader : Sri. N.K. Sasidharan
Junior Instructor.

b) Associate/s : 1. Smt. S.Santha Kumari,
Asst. Professor.

2. Dr.A.I. Jose,
Associate Professor,
College of Horticulture.

5. Objective:- To find out the optimum level of N, P_2O_5 and K_2O with reference to the yield and oil content of Groundnut in sandy tracts.

6. Practical utility : Ground nut (Arachis hypogea) is cultivated in a variety of Soil & climatic conditions. In Kerala conditions it can be cultivated as an inter crop in coconut garden or can be rotated with paddy during IIIrd crop season in paddy fields after the harvest of II nd crop. The results of the crop sequence trial conducted at the Rice Research Station, Kayamkulam during 2 years indicate the suitability of cultivating groundnut and blackgram profitability besides Sesamum during the IIIrd crop season in Onattukara. A short duration variety (105 days duration)TMV-2 was used for the trial. Hence as per the instructions studies were undertaken to find out the most suitable manurial recommendations for short duration improved varieties of Groundnut in sandy soils of Onattukara.

7. A short review of literature : Seshadri (1962) has given a brief review of the manurial practices of Groundnut crop in vogue in India. A critical review of the manuring of oil seeds crops was done by Vaidyanathan (1953). More emphasis was placed on the manurial experiments of groundnut than on any

other oil seed crops. BH Katakali and A.L. Banahatti(1965) reported that fertilizer applications differ in minor aspects from state to state but in general agree in specifying low nitrogen and high P_2O mixture. Application of nitrogen was found to increase the yield of pods in Bombay, Madhyapradesh and Madras @ 12 lbs. of pods/lb. of nitrogen. At Akola and Buldena an average response of 7.5 lb. per lb. of P_2O_5 applied as super phosphate at 30 to 40 lb/acre was noticed. Response of Potash at Akola was 4.8 lb. pods/lb. of Potash. Davis (1951) reported that the application of K_2O appears to increase the oil content of groundnut Kernels, excessive amount of K may however disturb the equilibrium of the nutritional medium and have an adverse effect particularly when insufficient calcium is available.

Observations to be recorded:-

1. Plot yield
   a) Pod weight
   b) Haulm weight
2. No. of pods/hill (Average of 25 hills in a plot)
3. Oil content.

8. Technical programme:-

Layout : 33 factorial partially confounded.

Plotsize : 5.1 x 3.9 m^2

Spacing : 15 x 15 cm.

Variety : TMV - 2

Replication: 3

Treatments

N @ 10,20 and 30 kgsm/ha
P @ 30, 40 and 50 Kgm/hact.
K @ 40, 50 and 60 kgm/hact.

9. Date of start : January 1978
10. Likely date of completion: April 1980
11. Additional facilities required (Nil
12. Approximate cost : Rs.3000/-

Sd/-
PROJECT LEADER

Sd/-
HEAD OF DEPARTMENT

Sd/-
DIRECTOR OF RESEARCH

Sixth F R C S.No.668

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Agronomy

1. Name of the Research Centre: College of Agriculture, Vellayani.

2. Project No. : AC.10-19 Agron. 2.

3. Title of Project(This should indicate the nature of work) : Studies on the effect of different levels and time of application of lime and gypsum on the yield and other agromic characters of groundnut.

4. Name and designation of:-

a) Project Leader : E. Tajuddin, Asst.Professor of Agronomy.

b) Associate/s : C. Sreedharan, Assoc. Pfofessor of Agronomy.

5. Objective : To find out the effect of the lime and gypsum and its time of application on the performance of ground nut.

6. Practical utility : The result can be passed on to cultivators for adoption. Practically no work has been conducted so far on the time of application of lime to the groundnut crop. Regarding levels of application of lime studies conducted at the Agricultural College, Vellayani revealed that 1000 lb lime in combination with 500 lb magnesium carbonate gave the highest yield.

7. Technical Programme:- 1. Control (2) Lime 1 Tonne/ha. (3) Lime 2 Tonnes/ha. (4) Ca SO_4 1 Tonne/ha. (5) Ca SO_4 2 Tonne/ha. (6) Lime 0.5 Tonne/ha + ca SO_4 0.5T/ha (7) Lime 1 Tonne/ha + ca SO_4 1 T/ha.

Time of application: (1) Full basal. (2) Full at Flowering (3) $\frac{1}{2}$ basal and $\frac{1}{2}$ at Flowering.

Design: split plot Design
Beptication 3.

(contd...)

8. Date of start : 15. 5. 1977

9. Likely date of completion: 25--8--77

10. Approximate cost : Rs.2000/- (Rupees two thousand only)

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

Second F R C

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture : Department of Agrl. Botany.

1. Name of Research Centre: Rice Research Station, Kayamkulam.

2. Project No. : AG.10.6 Bot.2

3. Title of the project (this should indicate the nature of work) : Varietal trial on Groundnut

4. Name(s) and designation of:

   (a) Project Leader : S. Santhakumari, Asst. Professor.

   (b) Associate : N.K. Sasidharan, Jr. Instructor

5. Objective : To study the performance of different Groundnut varieties in Onattukara condition during the 3rd crop season in paddy fields.

6. Practical utility: Groundnut (Arachis hypogea) is cultivated in variety of Soil and climatic conditions. In Kerala conditions it can be cultivated as an intercrop in coconut garden or can be rotated with paddy during 3rd crop season in paddy fields. The results of the crop sequence trial conducted at the Rice Research Station, Kayamkulam during 2 years indicate the suitability of cultivating Groundnut and Blackgram profitability besides, Sesamum during the 3rd crop season in Onattukara. A short duration variety TMV-2 (105 days duration) was used for the trial. Hence as per the instructions, studies were undertaken to find out the performance of different short duration groundnut varieties during the 3rd crop season in paddy fields in Onattukara condition.

(contd...)

7. A short review of Literature } ..

8. Technical Programme :

Layout	-	5 x 4 RBD
Plotsize	-	6 m x 3 m
Spacing	-	15 cm x 15 cm
Replication	-	4
Varieties	-	5

Varieties

1. TMV - 2
2. TMV - 7
3. Gangapuri
4. Pollachi - 1
5. Pollachi - 2

9. Date of Start : January 1978

10. Likely date of completion: April 1980

11. Additional facilities required } Nil

12. Approximate cost : Rs.2,500/-

13. Signature

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

S.No. 670.

KERALA AGRICULTURAL UNIVERSITY

FACULTY OF AGRICULTURE

Department of Agronomy College of Agriculture

Programme of Research for Ph.D.Degree

1. Name of candidate : M. ACHUTHAN NAIR

2. Date of admission and Admission No : 8. 10. 1977 77-21-01

3. Name and designation of Chairman Advisory Committee : Dr. C.Sreedharan, Associate Professor of Agronomy.

4. Topic of research for thesis : Nutritional studies on Oil palm(Elacis guinconsis Jacq)

5. Objective of the Research :

1. To study the effect N, P.K. Ca and Mg on the growth yield and quality of oil palm.
2. To study the seasonal fluctuation in the nutrient status of the soil and plant.
3. To study the influence of meteorological parameters on growth and yield of oil palm.

6. Brief review of the previous work done on thetopic

The individual factors causing variation on yield of oil palm has been investigated in Africa and elsewhere(Bull 1960 and Hartley 1967). Suarnaaij(1960) in Nigeria reported that bunch yield is determined by frond production, sex ratio, floral abortion etc. According to Turner (1976) climatic conditions at the time of sex differentiation has an extremely important influence on bunch yield. They have reported that change in nutrition of the palm will affect the sex ratio. Differences in soil types and fertility will affect leaf lenght area and longeivity as well as the general nutrient status and yield (Broeshart 1957, Beixnaert 1939, Sparnaaij 1960). Nutrition

(contd...)

plays an important role in bunch weight being operative through soil fertility, fertilizer applications and nutrient status of the palms (Grey 1969, Hainer and Beuziom 1966) Given good agronomic technique, the greatest influence on yield is by a variable climatic conditions (Hartley 1967). The absence of fertilizer trials underthe agroclimatic conditions prevailing in India especially in Kerala poses serious practical problems in cultivating this crop. Therefore this investication is taken up with the objective already mentioned.

7. Scientific and/or practical importance of the Research

Among the oil bearing plants oil palm (Elaeis guinocensis) has the highest yield with per acre yield ranging from 2.5 to 4 tonns/act of oil as against the annual yield of 500 kg to 1.5 tons in the case of groundnut and coconut respectively. The considerable drain of foreign exchange by imparting different kinds of vegetables oils and the increasing demand has induced the Government to start oil palm cultivation. Recently in Kerala, the cutlivation of oil palm started in a commercial scale. The oil palm plantation programme is expected not only to meet the indegenous requirements of vegetable oils but also to save substantial foreign exhcange.

A habitant of West Africa, the oil palm cultivation is new to India and so far no research work has been done on this crop. Informations on the agronomic factors fertilizer requirements nutrient status and meteorological parameters are not available. Viewing the national important in the economy of our country, the agronomic requirements of this crop needs special attention.

(contd..)

8. Technical programme : The studies are taken up in an experiment laid out during the year 1975 by the C.P.C.R.I. Kasaragod in the plantations of the Oil Palm India Limited, Bharathipuram (Anchal).

Design and layout - 3^3 x 2 x 2

Split factorial confounded experiment.

No. of replications 2
No. of blocks/replication 3
No. of plots/Block
Main plots - 9 + 1 Absolute control
Sub plots - 36 + 4
Total No. of treatments - 108+12
Main plot treatment of N, P, K - 27 combination
Sub plot treatments - 4 combination of Ca & Mg.

Nutrients	Levels of nutrients			
	1	2	3	
Nitrogen	400	800	1200	gm/palm/year
Phosphorus	200	600	800	"
Potassium	600	1200	1800	"
Calcium	0	500	--	"
Magnesium	0	500	--	"

Time of application - NP - Two equal splits during May and September. Ca & Mg single application in April.

Duration of the experiment - 2 years

Observations

1. Frends/Palm.
2. Rate of Frond production
3. Number of bunches/palm
4. Sex ratio
5. Periodicity of Female Flower production
6. Extent of floral abortion
7. Weight of fresh fruit bunches
8. Yield of oil
9. Oil extraction rate

The samples of leaves and soils will be taken during the months of April, September and December during 1978 and 1979.

(contd...)

Chemical analysis.

1. Seasonal fluctuations in the nutrient in the plant.
2. Seasonal fluctuation in the nutrient status of soil
3. Quality of oil.

9. Estimate of expenditure and receipts if any — Expenses will be met by the I.C.A.R.

10. Location of research if outside the College campus — Plantations of the oil palm India Limited, Barathipuram.

Sd/-
Signature of Candidate

Place: Vellayani
Date : 15. 3. 1978.

Sd/-
Signature of Chairman,
Advisory Committee.

Sd/-
Signature of Head of Department

Sd/-
Signature of Dean

S.No.671.

KERALA AGRICULTURAL UNVERSITY

	Faculty of Agriculture	: Departmentof Agricultural. Botany.
1.	Name and address of the Research Institute/Centre	: College of Agriculture, Vellayani, Department of Agricultural Botany.
2.	Project No	: AG. 10.18.AGron.1
3.	Title of the Project/ Problem	: Evaluating the prospects of popularising large scale cultivation of castor in Kerala.
4.	Name and designation of:-	
	a) The principal investigator	: K.Gopakumar, Associate Professor in Botany.
	b) Name (s) & Designation of Associate (s) ad establishment on which borne:	: 1, U.Mohamed Kunju, Associate Professor in Agronomy. 2. Luckins C. Babu, Associate Professor in Botany.
5.	Objectives	: To study the scope of popularising large scale cultivation of caster in the garden lands throughout the state. To evolve varieties suited for cultivation on the basis of adapition and superiority in performance through selection.
6.	Practical utility and Review of work	: India is the second largest ,castor growing country in the world, The crop is primarily cultivated for the oil which has considerable industrial value. The demand for the oil is increasing day by day. The crop is cultivated in almost all the districts of Kerala, the maximum area being in the Idukki, District. However, large scale cultivation is not yet resorted to and the crop is seldom grown pure, being suited for mixed cropping no problem

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of making available the required land and giving specialised care in maintenance arises. The crop exhibits considerable diversity and suggests scope for evolving suitable varieties for cultivation under conditions of Kerala through selection. A number of elite strains have already been evolved in other states. It is proposed to collect as many such elite strains as possible, to evaluate their relative merit on the basis of adaptability and superiority in performance, and to evolve suitable types that can be grown under conditions of Kerala through selection. Further, it is hoped that the project will be of relatively great utility for enhancing the returns from crop production in the state.

7 Technical programme : Elite strains of castor will be collected from sources throughout the country, and grown. Data pertaining to adaptability and superiority performance will be collected, tabulated and statistically analysed in ANOVA.

8. Date of starting : 1-4-1978

9. Date of completion (anticipated) : 31-3-1981

10. Facilities required :

Land : 15 cents garden land.
Labour :
Equipment : No additional facility required.
Finance :

11. Approximate cost : Rs.3,000/- for the whole project.

12. Signature of

SD/ SD/ SD/
Principal Investigator. Head of Department. Director of Research.

Fourth FRC. SNO.672.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Botany.

1. Name of Research Centre : Lemongrass Research Station, Odakkali
2. Project No. : Ag.-11.16 Bot. 2
3. Title of Project : Morphological classification of the type collection of lemongrass and palmarosa available in the germplasm bank.
4. Objective : To identify each types of lemongrass and palmarosa based on the morphological characters.
5. Name/s and designation of
   a. Project Leader : K.A. Mariam, Jr. Instructor, in Agricultural Chemistry.
   b. Associates : 1. E.V.G. Nair, Asso. Professor.
      2. K. Chandrasekharan Nair, Assistant Professor.
6. Practical utility : For distributing pure planting materials of improved varieties of lemongrass and palmarosa.
7. A short review of literature : So far no work has been done in India in the morphological classification of different types of lemongrass and Palmarosa.
8. Technical programme : There are 400 types collections of lemongrass and 6 types of palmarosa in the germplasm of this station.
9. Date of start : 1977-78
10. Likely date of completion : 1979-80 2 years
11. Additional facilities required : Nil
12. Approximate cost : Rs.300/-
13. Signature of

Sd/- Sd/- Sd/-
Project Leader Head of Department Director of Research.

Third FRC. S No.678.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture : Department of Botany

1. Name of Research : Agricultural College, Vellayani
2. Project No. and Title : Induction of flowering in American Lemongrass (Cymbopogon citratus Ag. 11.18 Lot. 3
3. Objective : Inducing flowering in American Lemon grass for breeding improved variety of Lemongrass.
4. Name/s of:
a. Project Leader : N. Govinathan Nair, Associate Professor
b. Associates : Luckins C. Babu - Asst.Professor V. Govinathan Nair, Associate Professor.
5. Practical utility & Review of literature : If the American Lemon grass can be induced to flowering, this can be used as a parent in breeding high yielding variety of Lemon grass, since the American Lemongrass yields high percentage recovery of oil.
6. Technical Programme : Spraying the following growth hormones for induction of flowering.
I.A.A.
N.A.A.
2-4-D
7. Date of start : 1978
8. Likely date of completion : 1980
9. Additonal facilities required : Nil
10. Approximate cost : Rs.6,000/-
11. Signature of

Sd/-
Project Leader

Sd/-
Head of Department.

Third FRC. S.No.679.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture : Department of Botany

1. Name of Research Centre: Lemongrass Research Station, Odakkali.

2. Project No. : AG.-11.16 Lot. r (i)

3. Title of Project : Comparative yield trials of promising types screened from the preliminary yield trials.

4. Objective : To find out the comparative merits of the promising types obtained from the germplasm and PYT trials.

5. Names/ and designation of -

a. Project leader : K.A. Mariam, Jr. Instructor.

b. Associates : 1. K. Chandrasekharan Nair, Assistant Professor

2. E.V.G. Nair, Assoc. Professor.

6. Practical utility : To evolve superior variety with higher percentage of oil and citral.

7. A short review of literature:-

From the experiments conducted with different sps. of cymbopogens at Bhubaneswar, Butta et al (1976 have reported that RRL-16 was superior in grass yield over SD-68 and OD-19 RRL-16 has shown double or more than double the oil yields of OD-19 and SD-68. Two years cumulative oil yields of the strains OD-19 and SD-68 was almost similar.

Sobhi et al. (1978 have reported that there is a wide range of variation in oil percentage as well as in constituents of oil of grasses when the seed progeny were grown in germplasm.

From the screening done at Lemongrass Research Station, Odakkali on lane type collections of lemongrass it is seen that very few are promising with regard to oil yield and citral content. So yield trials with various types are very essential to evaluate the merits of different type collections at this station.

8. Technical programme: The promising types obtained from the PYT trials are put under statistical lay out along with OD-19 in RBD with three replications.

contd.....

The types included are OD-150, OD-370, OD-406, OD-410, OD-417 C. pendulus and OD-19.

9. Date of start : July 1977 (1977-78)
10. Likely date of completion : 1979-80 (3 years
11. Additional facilities required : Present facilities are enough
12. Approximate cost : Rs.800/-
13. Signature of :

Sd/-	Sd/-	Sd/-
Project Leader	Head of Department	Director of Research

Third FRC. S. No. 680.

KERALA AGRICULTURAL UNIVERSITY

DEPARTMENT OF BOTANY

1. Location : Lemongrass Research Station, Odakkali.

2. Project No. : AG. 11.16 Bot. 5

3. Project title : Performance studies of the M2 irradiated lemongrass and some superior types of lemongrass available in the germplasm.

4. Name and designation of:-

a. Project Leader : K. Chandrasekharan Nair, Asst. Professor (Chemistry)

b. Associates : 1. E.V.G. Nair, Assoc. Professor
2. Kum. K.A. Mariam, Jr. Instructor.

5. Objectives : An attempt to evolve a high yielding variety of lemongrass.

6. Practical utility : To recommend to the growers of lemongrass.

7. Review of literature: Chaudhary et. al (1976) have reported based on the preliminary studies conducted on the slips of 3 cymbopogen spp. with various doses of X-rays (5, 10 kr) that there is good prospects for utilizing mutation breeding in the improvement of one or more components, of essential oils.

8. Technical programme :

The 10 M2 irradiated plants of lemongrass and 5 superior types of lemongrass in the germplasm will be planted in rows with OD-19 as control. Equal No. of plants from each row will be harvested and distilled to find out their oil content. The citral content, specific gravity optical rotation and refractive index of the oil will be studied. Based on the data the performance of each plant in comparison to control will be judged.

9. Date of start : 1978

10. Likely date of completion : 1980

11. Facilities required : Available facilities in the station

12. Approximate cost : Rs.500/-

13. Signature of Principal investigation

Third FRC S. No.683.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Agronomy

1. Name of Research Centre: Lemongrass Research Station, Odakkali.

2. Project No. : AG. 11.16 Bot. 6

3. Title of Project : Varietal cum manurial trial on Lemongrass

4. Objective : To find out the best variety under Kerala condition and the optimum nitrogen level for that variety.

5. Name and designation of:-

a. Project Leader : E.V.G. Nair

b. Associates : 1. N.P. Chinnamma

2. R. Pushpakumari.

6. Practical utility : To recommend for general cultivation.

7. Review of literature : Dutta et. al. (1976) have reported that at Bhubaneswar it was found that RRL 16 was superior grass yield over SD-68 and OD-19, SD-68 had a marginal lead over OD-19. Two years cumulative oil yields of the strains OD-19 and SD-68 was almost similar. RRL-16 has shown double or more than double the oil yields in both the years.

E.V.G. Nair et. al (1976) have reported that the highest mean yield of lemongrass was obtained from the application of N at the rate of 150 kg/ha whereas the mean yield of oil was obtained by the application of N @ 100 kg/ha in two splits.

8. Technical Programme : Lay out : R.L.D.
Replication - 4
Treatments - 9.

Varieties: 3 : 1. OD-19 (developed at Odakkali'
2. RRL-16 (" at Jammu'
3. SD-68 (" at Lucknow'

contd....

Levels of nitrogen: 3 (0, 50 and 100kg/ha)

Grass yield, oil yield and the physico-chemical properties of oil will be studied at each harvest treatmentwise.

9. Date of start : 1977-78

10. Likely date of completion : 1979-80

11. Facilities required : No additional facilities

12. Approximate cost : Rs.2000/- per year

13. Receipt : Rs.750/- per year

14. Signature of:-

Sd/-
PROJECT LEADER.

Cl[illegible]nd FRC. S.No.684.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture : Department of Chemistry

1. Name of Research centre: Lemongrass Research Station, Odakkali.
2. Project No. : AG.11,16 Che. 1.
3. Title of Project : Studies on the uptake of nutrients by lemongrass.
4. Objective : To find-out the total amount of nutrients removed by the lemongrass in a cropping period.
5. Name/s and designation of
   a. Project leader : K.A. Mariam, Jr. Instructor
   b. Associate/s 1. K. Chandrasekharan Nair, Asst. Professor of Agrl.Chemistry.
      2. E.V.G. Nair, Associate Professor of Agronomy.
6. Practical utility : To give recommendations on the fertilizer schedule of lemongrass.
7. A short review of literature : No such studies has been conducted so far, on lemongrass.
8. Technical programme : The experiment will be conducted for the economical life-period of the crop (5 years). The soil before planting the crop will be analysed for total and available N, P, and K. Fertilizer at the rate 100 kg. N 70 Kg. P and 100 kg.k/hectare per year will be applied. The plant samples as well as soil samples will be collected after each harvest of the crop in an year (5 cuttings in an year). The nutrient residue in the soil will be estimated after completing the 5 harvests Nutrient removal by the crop will be studies.
9. Date of start : June 1977 (1977-78)
10. Likely date of completion : 1981-82 (5 years)
11. Additional facilities required : Laboratory assistance from the Chemistry division of College of Agriculture, Vellayani.
12. Approximate cost : Rs.1500/-
13. Signature of -

Sd/- Sd/- Sd/-

PROJECT LEADER HEAD OF DEPARTMENT DIRECTOR OF RESEARCH.

Third FRC. S.No.685.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Agronomy

1. Name of Research Centre: Lemongrass Research Station, Odakkali

2. Project No. : Ag. 11.16 Agron. 1 (ii

3. Title of the Project : N.P.K. trial on Palmarosa

4. Objectives : To find out the optimum dose of NPK For the Palmarosa crop under Odakkali condition.

5. Name and designation of:-

a. Project Leader : E.V.G. Nair, Assoc. Professor.

b. Associates : N.P. Chinnamma, Asst. Professor
R. Pushpakumari, Jr.Instructor

6. Practical utility : To recommend to the growers

7. Review of literatures : This trial was suggested in the 2nd All India Workshop on Aromatic and medicinal plants conducted by ICAR in November 1976 at Anand. Hazarika J.N. and Boro A.C. (1977 have reported that application of NPK at the rate of 60, 40 and 40 kg/ha was found to be the best for oil yield in the experiment conducted at the Regional Research Laboratory Assam. Virmani et. al. (1977 have reported from the studies conducted at CIMPO that N P & K had to be applied at the rate of 20 kg N, 50 kg P2O5 and 40 kg K2O per ha in each year. But under Kerala condition no studies have been done to determine the optimum dose of N, P & K required with a view to get maximum oil yield. Hence this study is proposed.

8. Technical programme : Lay out : R.B.D.
Replication - 4. Treatments - 12.
N at 3 levels 0, 40 and 80 kg/ha
P at 2 levels 0 & 40 kg/ha.
K at 2 levels 0 & 40 kg/ha
Grass yield, oil yield and the chemical constituent of oil etc.

contd....

will be studied at each harvest treatmentwise.

9.	Date of start	: 1977-78
10.	Likely da te of com-pletion	: 1979-80
11.	Facilities required	: No additional facilities are required.
12.	Approximate cost	: Rs.1500/-
13.	Receipt	: Rs.1200/-
14.	Signature of	:

Sd/-
Project Leader

S.No.690 second RRC.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Botany

1. Name of Research Centre: Lemongrass Research Station, Odakkali
2. Project No. : Ag. 11.16 Bot. 1.
3. Title of the Project : Performance studies of the M2 generation of the irradiated selection of Palmarosa.
4. Objective : To evolve a superior high yielding type of Palmarosa.
5. Name and designation of:-
   a. Project Leader : K.A. Mariam, Jr. Instructor
   b. Associates : 1. K. Chandrasekharan Nair, Asst. Professor of Agrl. Chemistry.
      2. E.V.G. Nair, Assoc. Professor of Agronomy
6. Practical utility : To recommend to the growers.
7. A short review of literature:- : Chaudhary et. al (1976 have reported based on the preliminary studies conducted on the slips of 3 cymbopogon spp. with various doses of X-rays (5, 10kr that there is good prospect for utilising mutation breeding in the improvement of one or more components of essential oils.
8. Technical programme : The 20 selected M2 plants will be planted in rows with the Amaravathi as the control. Distillation studies will be conducted for equal No. of plants from each row at a time. Properties such as sp. gravity, optical rotation and refractive index will be determined for the oil.
9. Date of start : June-July 1977 (77-78)
10. Likely date of completion : 1978-79
11. Additional facilities required : No further facilities are needed
12. Approximate cost : Rs.400/-
13. Signature of

Sd/- Sd/- Sd/-
Project Leader Head of Department Director of Research.

Third FRC S.No.693.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Botany

1. Name of Research Centre: Lemongrass Research Station, Odakkali.
2. Project No. : Ag.14.16 Bot. 1
3. Title of Project : Germplasm studies on vetiver.
4. Objective : To evolve superior variety of Vetiver.
5. Name/s and designation of :-
   a. Project Leader : E.V.G. Nair, Assoc. Professor
   b. Associate/s : K. Chandrasekharan Nair, Assistant Professor.
      2. K.A. Mariam, Jr. Instructor.
6. Practical utility : To recommend to cultivators
7. Short review of literature :

   Sambashiva Rao (1964 have reported that there is considerable difference between the North Indian and the South Indian strains with regard to the yield and aroma of the oil.

   Oil content of Vetiver collected from different places of India varies considerably (Virmani and Datta 1975).

8. Technical Programme : 16 hybrids evolved at IARI are to be compared along with the promising S.Indian type (Nilambur. This project is recommended by the 2nd All India Workshop of ICAR held at Anand in November 1976.
9. Date of start : July 1977 (1977-78)
10. Likely date of completion : 1979-80 (Crop Period 1½ years)
11. Additional facilities required : Present facilities are adequate.
12. Approximate cost : Rs. 750/-
13. Receipt : Rs. 1000/-
14. Signature of

Sd/- Sd/- Sd/-

PROJECT LEADER HEAD OF DEPARTMENT DIRECTOR OF RESEARCH.

Third FRC. S.No.695.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Chemistry

1. Name of Research : Lemongrass Research Station, Odakkali.
2. Project No. : Ag.11.16 Che. 1
3. Title of Project : Studies on the physical properties of various essential oils.
4. Objective : To find out the physical properties of the various essential oils.
5. Name/s and designation of:
   a Project leader : K. A. Mariam Jr. Instructor.
   b. Associates : K. Chandrasekharan Nair, Assistant Professor of Agricultural Chemistry.
   2. E.V.G. Nair, Associate Professor of Agronomy.
6. Practical utility : To make recommendations on the quality of various essential oils.
7. A short review of literature: The Indian standards institution have laid down specifications for the physical and chemical properties of various essential oils for the export purpose as well as indegeneous consumption.

   The physical properties of these oils depends to a large extent the soils and eco-climatological conditions in which the different crops are grown.

   Paslas and Paslas (1967) have reported that altitude, climate and soil conditions profoundly affect the development of lemongrass plant and consequently the physical and chemical properties of oil also various accordingly.

   Virmani and Datta (1975) have reported variation in the physical properties of Vetiver oil produced at different places in India.
8. Technical programme: The physical properties such as specific gravity, Refractive Index, and optical rotation are determined for oil obtained from 30 types of Lemongrass 3 types of Motta, Cinnamon and Eucalyptus for the monsoon and dry season.

contd.....

9. Date of start : July 1977 (77-78

10. Likely date of completion : 1977-78 (one year

11. Additional facilities required : Present facilities are enough

12. Approximate cost : Rs.200/-

13. Signature of :

Sd/-	Sd/-	Sd/-
Project Leader	Head of Department	Director of Research

Third FRC. S.No. 696.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Chemistry.

1. Name of Research Centre: Lemongrass Research Station, Odakkali.
2. Project No. : Ag.11.16 Che. 2
3. Title : Standardise the distillation techniques of various essential oils, using improved techniques.
4. Objectives : To find out the pressure and time for the distillation of the essential oil yielding crops like palmarosa, Eucalyptus and Cinnamon.
5. Name/s and designation of
   a. Project leader : K.A. Mariam, Jr. Instructor.
   b. Associates : 1. K. Chandrasekharan Nair, Assistant Professor of Agricultural, Chemistry.
      2. E.V.C. Nair, Associate Professor of Agronomy.
6. Practical utility : To make recommendations to Lemongrass cultivators.
7. Short review of literature: Guenther (1948) has reported that when high pressure or super heated steam is employed in distillation with direct steam, the condensation of water vapour in the plant material will be greately reduced. This will permita more complete exhaustion of oil from plant material.

Belcher (1965) reported that the rate of extraction of oil is directly proportional to the condensate flow over the normal range of supply of steam. He has also found that the condensate flow of 0.3 lb/hr/lb of clove buds to be economic.

K.C. Nair et al (1976) have reported from the experiments conducted at Lemongrass Research Station, Odakkali, the time taken for the distillation of lemongrass and Motia in steam distillation was 1-1½ hours, whereas for Vetiver it was 36 hours.

contd....

8. Technical Programme : Pressure. 5 different pressure will be given to the steam 10 lbs., 15 lbs., 20 lb 25 lbs and 30 lbs.

Time Eucalyptus and Palmarosa. 1hr., 1½ hr. and 2 hrs. Cinnamon: 1½ hr., 3 hrs., 4½ hrs.

9. Date of start : May 1977

10. Likely date of comple- tion : 1977-78 One year

11. Additional facilities required : Nil

12. Approximate cost : Rs.100/-

13. Signature of

Sd/-	Sd/-	Sd/-
Project leader	Head of Department	Director of Research.

Third FRC. S.No.697.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture : Department of Plant Pathology.

1. Name of the candidate : Santhakumari.P.

2. Date of admission and Admission No : 10-10-1977 / 77-11-25

3. Name and Designation of Chairman, Advisory Committe: Dr. M.Chandrasekharan Nair, Associate Professor of Plant pathology.

4. Topic of research for thesis: "Studies on the fungal diseases of ornamental plants"

Project No : AG.13.18.Path.2

5. Objective of research : Very little information is available on the important diseases affecting the ornamental plants in Kerala, the extent of damage and their control. It is likely that many of the ornamental plants may be acting as collateral hosts of the pathogens causing serious diseases of field and Horticultural crops.

6. Brief review of previous work done on the topic:

No systematic effort has been made to study the diseases affecting the important ornamental plants of Kerala except a few isolated reports recording the occurance of diseases on some of them from time to time. In this laboratory Vasavan (1979) made a detailed study of the fungal diseases of Rose and Jasmine. A preliminary study has revealed that the garden plants grown in the College campus are infected by pathogens which have not been reported earlier from India.

7. Scientific and/ or practical importance of research:

The results of the investigations will enable to evolve suitable control measures of the important diseases of the ornamental plants.

.....

8. Technical programme:

1. Collection and preservation of fungal diseases of important ornamental plants during different season.

2. Isolation, purification and identification of the pathogens.

3. Detailed taxonomic study of the important and common fungal pathogens on annual crops

4. Physiology of parasitism of important diseases caused by members of Coelomycetes (mode of entry, role of toxins, enzymes, growth regulators etc on infection and disease development).

5. Laboratory evaluation of fungicides against the important pathogens.

9. Estimate expenditure : Rs.5000/- (including Rs.2400/- towards followship)

10. Location of research : College of Agriculture, Vellayani.

Vellayani.
7-2-1978

Signature of candidate.

Signature of chairman.
Advisory Committee,

Signature of Head of Department.

Signature of Dean.

Fourth FRC.SNU.719.

KERALA AGRICULTURAL UNIVERSITY

1. Name of candidate : Thomas.J.

2. Date of admission and admission No. : 29th November, 1976. 76 - 11 - 05

3. Name and designation of Chairman of Advisory Committee. : Dr.C.Sreedharan, Head of Division of Agronomy

4. Topic of Research for Thesis. : "Comparative performance of Guinea & Hybrid Napier grasses under varying levels of nitrogen and cutting intervals.

Project No. : Ag.14.18 Bot.2

5. Objectives of Research

1. To find out the production potential of guinea grass and hybrid napier under identical conditions of management practices.

2. To study the effect of Non growth, yield and quality and also to work out the optimum dose of N for the above crops.

3. To investigate the optimum cutting interval to get the maximum green fodder.

6. Brief review of previous work done on the topic (Give reference to important publications/thesis).

Chopra & Singh (1970) found that perennial grasses under rainfed conditions showed yield response to the application of nitrogen upto 90 kg N/ha. Nichas (1971) and Manson et al. (1971) observed an increase in dry matter yield and protein content of grasses by application of N fertilisation. Olsen (1972) showed an increase of dry matter production of grasses almost three fold to N application. The mean crude protein content was also more than doubled using higher rates of nitrogen.

Tomer et al. (1974) reported that 50 days interval of cutting in Hybrid Napier was the optimum for higher green fodderyields. The maximum crude protein was obtained at 50 day cutting interval and minimum at 60 days. A study with three fodder grasses to find out the optimum time of cutting for maximum yield of extractable protein employing three frequencies of cutting viz., 30, 45 & 60 days showed that 30 day frequency gave higher green fodder yield and crude protein in Guinea grass (C.S.Balasundaran et al. 1975).

7. Practical utility - Findings can be transferred to farmers for adoption in their holdings.

8. Technical programme

Design . R.B.D.
Replication .. 3
No.of treatments .. 12
Plot size 4.8 x 4.8 ~~xxxx~~ Mts.

Spacing - Guinea grass 40 x 20 cm
Hybrid Napier 60 x 30 CM

Treatments

1. Guinea grass with 150 kg N/ha at 30 days cutting interval
2. ,, ,, ,, at 45 days ,, ,,
3. ,, ,, 200 kg N/ha at 30 days ,, ,,
4. ,, ,, ,, at 45 days ,, ,,
5. ,, ,, 250 kg/N/ha at 30 days ,, ,,
6. ,, ,, ,, at 45 days ,, ,,
7. Hybrid Napier with 150 kg N/ha at 30 days ,, ,,
8. ,, ,, ,, 45 days ,, ,,
9. ,, ,, 200 kg N/ha at 30 days ,, ,,
10. ,, ,, ,, 45 days ,, ,,
11. ,, ,, 250 kg N/ha at 30 days ,, ,,
12. ,, ,, ,, 45 days ,, ,,

9. Observations

1. Green matter yield of fodder
2. Dry matter yield of fodder
3. Leaf/Stem ratio
4. Growth character
5. Quality characters

10. Estimate of expenditure and receipt if any. - Cost of cultivation alone has already been sanctioned by ICAR - Additional expenditure for carrying out works is Rs.500/=.

11. Location of research if outside college campus - In college campus itself.

Sd/-
Signature of the candidate.

Sd/-
Signature of the Chairman

Sd/-
Signature of Head of Dept.

Signature of Dean.

Fourth FRC S.No.726

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of the Research Centre : College of Agriculture, Vellayani.

2. Project No. : Ag.14.18 Agron.1

3. Title of the Project : Ag.K.4
Response of Bajra Varieties to varying levels of nitrogen.

4. Name and designation of

a) Project leader : Sri.G.Raghavan Pillai

b) Associates : 1.Dr.C.Sreedharan
2.Sri.M.Oommen

5. Objective : To assess the N requirement of Fodder Bajra.

6. Practical utility : The result can be adopted in farmers fields.

7. A short review of literature:

8. Technical programme :

Treatments

a) Varieties; KMF 7264, Rajka, HB3 (F2)

b) Nitrogen levels 0.30, 60, 90 kg/ha.

Split application of N - twice, soil analysis for N.P.K.should be done before the start of the trial.

Design : R.B.D.

Replication : 4

Spacing : 30 cm row spacing

Seed rate : 10 kg/ha

Plot size (gross net) : 4.0 x 3.0 m
3.6 x 2.5 m

Observations : 1. Plant stand count after 15 days of sowing

2. Plant stand before harvest

3. Green fodder yield per plot

4. Dry fodder yield per plot

5. Dry matter percentage

6. Crude protein percentage and yield.

Centres : Hissar, Jhansi, Ludhiana, Vellayani, Durgapura, Rahuri

9. Date of start : 1977

10. Likely date of completion : 1977

11. Additional facilities required : Nil

12. Approximate cost : Rs.1500/=

13. Signature of

PROJECT LEADER HEAD OF DEPARTMENT DIRECTOR OF RESEARCH

Fourth FRC S.No.728

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of the Research Centre: College of Agriculture, Vellayani.

2. Project No. : Ag.14.18. Bot.1

3. Title of the Project : K.B.T. 9 Final Evaluation trial on Bajra

4. Names and designation of
   a) Project leader : Sri.G.Raghavan Pillai

   b) Associates : 1.Sri.M.Oommen

      2.Dr.C.Sreedharan

5. Objective : To isolate the superior variety of fodder Bajra

6. Practical utility : The results can be adopted in farmers fields.

7. A short review of literature

8. Technical programme

   Entries (5)
   1. Nagarjuna (Apau)
   2. Anand Selection
   3. Visakha (APAU)
   4. Joint Bajra (MPKV)
   5. Rajko (Standard check)

Design .. R.B.D.

Replication 4

Plot size (Gross) 3.6 m x 3.0 m
(net) 3.0 m x 2.5 m (1 row on either side and 25 cm at each end of the row to be left as border)

Spacing : Between rows. 30 cm.
Between plants 15 cm.

Fertilizers: N - 40 kg/ha basal - 40 kg/ha top dressing after 25 days of sowing.

P - 40 kg/ha basal
K - 20 kg/ha basal.

Cutting schedule : Single cut at 50% flowering wherever two cuts are possible first cut at 50 days after sowing 2nd cut 40 days after 1st cut.

Observation to be recorded. 1. Plant population per plot

2. Date of 50 per cent flowering.

3. Green fodder yield per plot yield data to be converted to q/ha and q/ha/day.

4. Dry matter yield per plot to be calculated based on dry weight of 500 g composite sample and converted to q/ha and q/ha/day.

5. Observations on accent on use as mixed or sole crop.

7. Reaction to major diseases and pests - scoring 1 (Ressistant) to 5 (Susceptible).

8. Chemical analysis 10 g dry sample after grinding may be sent for invitro analysis.

9. Date of start : 1977

10. Likely date of completion: 1977

11. Additional facilities required : Nil

12. Signature of

PROJECT LEADER HEAD OF DEPARTMENT DIRECTOR OF RESEARCH

Fourth FRC. S.No. 729

KERALA AGRICULTURAL UNIVERSITY

1. Name of candidate : Abraham.C.T.

2. Date of admission and admission No. : 27.11.1976

3. Name and designation of Chairman of Advisory Committee : Dr.C.Sreedharan
Associate Professor of Agronomy
College of Agriculture.

4. Topic of Research for thesis : Performance of Deenenath Grass (Pennictum pedicellatum) as influenced by N and lime under Kerala conditions.

Project No. : Ag.14.18 Agron 1 (i)

5. Objectives of Research

1. To select a suitable deensnath grass (Penniselum pedicellxtum) variety under Kerala conditions.

2. To asses the production potential of the grass under different levels of N and lime

3. To find out the changes in nutritive value of grass as influenced by ~~maximising~~.

6. Brief review of the previous work done on the topic.

In the observational trials conducted at Vellayani, it was revealed that Beenanath grass can grow well under Kerala conditions recording a maximum yield of 65 tonnes/ha (All India Co-ordinated Project for Research on Forage crops - Annual report 1975-76). The trials conducted under All IndiaCo-ordinated Project at Rahuri showed that this crop has responded upto 120 kg N/ha. (Annual report for 1976-77. All India Co-ordinated Project for research on Forage crops, Rahuri). Noxwork on the lime required has been done in the grass either in India as Kerala. But the works on guinea grass at Vellayani has revealed that lime applied to bring the pH to 6.5 will give the maximum yield (Annual report for 1975-76, All India Coordinated Project for research on Forage Crops, Vellayani).

In the observational trials conducted at Vellayani on different varieties, it was seen that some of the promising varieties are PP15, PP_{33}, Pusa, etc. However their manurial requirements has not been assessed under Kerala conditions.

7. Scientific and/or paractical importance of the Research.

From the evaluation trials it was found that Deenanth grass can grow well under Kerala conditions. But ~~a~~variety ~~shifts~~ suited and its manurial requirements in Kerala conditions has not been worked out. So from the results of the proposed work, the most suitable ~~reality~~ and its nitrogen and lime requirements can be recommended to cultivators.

8. Technical programme

Layout .. Confounded factorial experiment

Replication.. 2

Treatments .. 3 varieties x 3 levels of NX 3 levels of lime.

Varieties .. P_{15}, V_2 - pp_{33}, v_3 - Pusa

Levels of N - (1) No - 50 kg N/ha

(2) 27 -100 kg N/ha

(3) M2 - 150 kg N/ha

Levels of line .. (1) lo - o kg lime/ha
(2) l1 -375 kg lime/ha
(3) l2 - 750 kg lime/ha.

No.of treatment combinations - 27

Treatment combinations

v1 mo lo	v2 mo lo	v3 mo lo
v1 mo l1	v2 mo l1	v3 mo l1
v1 mo l2	v2 mo l_2	v3 mo l_2
v1 m1 lo	v2 n1 l_o^2	v3 m1 l_o^2
v1 m1 l_1	v2 m1 l_1	v3 m1 l_1
v1 m1 l_2	v_2 m_1 l_2	v_3 n_1 l_2
v_1 m_2 l_1^2	v_2 m_2 l_o	v3 m2 lo
v_1 n_2 l_2	v_2 m_2^2 l_2^o	v_3 m_2 l_2

Plot size - 4 x 4 M

Spacing .. 50 cms x 25 cms.

Observations

1. Green matter yield.
2. Dry matter yield
3. Leaf/stem ratio
4. Height of plants
5. Time of flowering
6. Tiller No.

7. Plant analysis for

i) D.C.P.
ii) T.D.N.
iii) Calcium
iv) Phosphorus
v) Potash
vi) Ether extract
vii) Crude fibre
viii) Ash
ix) Nitrogen free extract

8. Soil analysis before and after the experiment.

9. Estimate of expenditure and receipt if any : Rs.3,000/=

10. Location of research if outside the college campus. : In the college campus itself.

Place: Vellayani
Date : 2.8.1977.

Sd/-
Signature of the candidate

Sd/-
Signature of Chairman,
Advisory Committee.

Signature of Dean.

Sd/-
Signature of the Head of the Department.

Fourt FRC S.No.730

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of the Research Centre : College of Agriculture, Vellayani.

2. Project No. : Ag.14.18 Agron.1 (ii)

3. Title of the Project : Ag.K.2.
Response of Dinanath grass to varying levels of N and P.

4. Names and designation of

a) Project leader : Sri.G.Raghavan Pillai

b) Associates : Dr.C.Sreedharan
Sri.M.Oommen

5. Objective : To find out N and P requirement of Dinanath grass.

6. Practical utility : The result can be adopt in farmers fields.

7. A short review of literature:

8. Technical programme :

Treatments

a. Variety : One (P.P. - 15)

b. Nitrogen level : 0, 50, 100, 150 kg/ha
c. P_2O_5 level : 0, 30, 60 kg/ha

Nitrogen application: 30%, 40%, 30% in split doses

Spacing : 30 cm x 30 cm

Design : R.B.D. with 12 treatment combinations of N and P levels.

Replications : 3

Plot size (Gross) : 3.6 x 3 ms.
(Net) : 3.0 c 2.5 ms

Seed rate : 5 kg/ha

Observations : 1. Plant stand count after 15 days of sowing.

2. Plant stand before harvest
3. Green fodder yield per plot
4. Dry fodder yield per plot
5. Dry matter percentage per plot
6. Crude protein percentage and yield

Centres : Rahuri, Hyderabad, Kamke, Kalyani, Jorhat, Hjansi and Vellayani.

9. Date of start : 1977

10. Likely date of completion: 1977

11. Addl. facilities required: Nil

12. Approximate cost : Rs.1000/=

13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

Fourth FRC S.No.731

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture : Department of Agronomy

1. Name of the Research Centre: College of Agriculture, Vellayani.

2. Title of Project : Final evaluation trial on 14 varieties of pennisetum pedicallatum.

3. Project No. : Ag.14.18 Bot.1.

4. Names and designation of

a) Project leader : Sri.G.Raghavan Pillai

b) Associates : 1.Dr.C.Sreedharan
2.Sri.M.Oommen

5. Objective : To find out the superior variety of Dinanath grass.

6. Practical utility : The result can be adopted in farmers field.

7. A short review of literature:

8. Technical programme

Entries (14) :
1. 1 GERI - 332 - 1
2. 1 GFRI - 43 - 1
3. 1 GFRI - 852
4. 1 GFRI - 860
5. 1 GFRI - 866
6. 1 GFRI - 869
7. 1 GFRI - 870
8. 1 GERI - 3808
9. PP-3
10. PP-5
11. JP - 12
12. T-15 (Standard Check)
13. P.S.38 white
14. P.S. 3 Red.

Design .. R.B.D.

Replications 3

Plot size (Gross) : 3.6 m x 3.0 m
(net) : 3.0 x 2.5 m (One row either side and 2.5 cm at each end of the row to be left as border)

Fertilizers	:	N-30 kg/ha basal + 49 kg/ha top dressing. ~~60 days after sowing~~ 30 days after sowing + 30 kg/ha top dressubg, 60 days after sowing. P - 50 kg/ha basal K - 20 kg/ha basal P - 50 kg/ha basal K - 20 kg/ha basal
Cutting schedule	:	Single cut at boot stage
Observations to be recorded	:	1. Plant population per plot 2. Date of harvesting 3. Green fodder yield per plot (yield data to be converted to Q/ha and Q/ha/day. 4. Dry matter yield per plot (to be calculated based on dry weight of 500 gm composit sample and converted to ha/and q/ha/day) 5. Observations on accent on use as mixed or sole crop. 6. Reduction to major diseases and pests scoring 1 (Resistant) to 5 (Susceptible) 7. Chemical analysis 10 g dry sample after grinding may be sent for Invitro analysis.

9. Date of start : 1977
10. Likely date of completion: 1977
11. Additional facilities required: Nil
12. Approximate cost : Rs.700/=
13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH.

Fourth FRC S.No.732

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of Research Centre : College of Agriculture, Vellayani.

2. Project No. : Ag.14.18 Agron.1

3. Title of Project : AGK.10. Effect of sowing dates on growth, yield and quality of Koobabool and Desmenthes.

4. Name and designation of

a) Project leader : Sri.G.Raghavan Pillai

b) Associates : 1. Dr.C.Sreedharan

2. Sri.M.Oommen

5. Objective : To find out the effect of sowing dates on growth yield and quality of Koobabool andDesmenthes.

6. Practical utility : The result can be adopted in farmers fields.

7. A short review of literature;

8. Technical programme : Crops 1. Koobabool.
2. Desmenthes
Treatments: 12 (sowing will be done at monthly intervals)

Design - There will be no replications and this will be an observational trial.
Spacing - Between row - 1.5 m.
Between plants 20 cm.

Observations

1. Green fodder yield of 365 days in each case will be compared after one year of establishment.
2. Plant Population
3. Plant height
4. Growth diametre
5. Chemical analysis

Location: Vellayani, Jorhat, Hyderabad, Hjansi, Urlikanchen.

9. Date of start : 1977-78

10. Likely date of completion: 1979-80

11. Additional facilities required: Nil

12. Approximate cost : Rs.3000/= (For 3 years)

13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH.

Fourth FRC S No.733.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of the Research Centre: College of Agriculture, Vellayani.

2. Project No. : Ag.14.18 Agron.1

3. Title of Project : Mixed cropping in fodder crops.

4. Name and designation of

a) Project leader : Sri.G.Raghavan Pillai

b) Associates : 1.Dr.C.Sreedharan
2.Sri.M.Oommen

5. Objective — To find out suitable crop mixture with
1.Daincha
2.Sunhemp

6. Practical utility : The result can be adopted in farmers fields.

7. Short review of literature:

8. Technical programme : Treatments (for separate trials)

I	II
1. Dhaincha	1. Sun hemp
2. Dhaincha+Maize	2.Sunhemp+Maize
3. Chaincha+ Teosinte	3.Sunhemp+ Sorghum
4. Maize	4.Maize
5. Teosinte	5.Sorghum

Note: Crops are to be sown in line 25 cm apart. In crop mixture alternatelly two rows of each crop to be grown.

Replication .. 4
Design .. R.B.D.
Plot size .. 4 m x 3 m
Observations:
1.Green fodder yield
2.Dry fodder yield
3.C.P.Percentage
4.C.P. yielded.

Yield are to be recorded for individual crops

9. Date of start : 1977

10. Likely date of completion: 1978

11. Additional facilities required: Nil

12. Approximate cost : Rs.2000/= (for 2 years)

13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

Fourth FRC S.No.734

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of Research Centre : College of Agriculture, Vellayani.

2. Project No. : Ag.14.18 Agron.1

3. Title of the Project : Effect of foliar spray of urea for improving the quality and or quantity of fodder on Maize/ Sorghum/Teosinte.

4. Name and designation of

   a) Project leader : Sri.G.Raghavn Pillai

   b) Associates : 1.Dr.C.Sreedharan
   2.Sri.M.Oommen

5. Objectives : To find outthe time and dose of foliar spray of ureax in different cereal fodder crops for increasing the crude protein and fodder production.

6. Practical utility : The results can be adopted in farmers' fields.

7. A short review of literature

8. Technical programme.

Treatments: A N - levels (as urea)

1. 60 kg N/ha (Basal soil application - s)
2. 90 ,, (S) Basal soil aplication
3. 120 ,, (s)
4. 30 (S) + 30 (F) - Foliar application
5. 60 (S) + 30 (F)
6. 90 (S) + 30 (F)

B. Time for foliar spray

1. 15 days before the 50% flowering
2. 25 days/before the 50% flowering
3. 35 days before the 50% flowering

Note: P & K to be applied uniformly as a basal dose @ 40&20 kg/ha respectively.
Design . R.B.D.
Replications: 4
Plot size : 4x3 sq.m.
Observations 1. Green fodder yield.
2. Dry fodder yield.
3. C.P.Percentage.
4.C.P.Yield.

9. Date of start : 1977

10. Likely date of completion: 1978

11. Additional facilities required: Nil

12. Approximate cost : Rs. 1000/=

13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

Fourth FRC S.No.735

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of Research Centre : College of Agriculture, Vellayani.

2. Project No. : Ag.14.18 Agron.1

3. Title of the Project : Feasibility of raising tapioca in shade for fodder purposes.

4. Name & designation of

a) Project leader : Dr.C.Sreedharan
b) Associates : G.Raghavan Pillai
M.Gopalakrishnan Nair

5. Objective

1. To find out the maximum yield of fodder obtainable from tapioca plants when raised in shade.

2. To ascertain the intervals of cutting to obtain the maximum production from unit area per unit time.

6. Practical utility : The findings can be adopted by farmers.

7. A short review of literature : No work in this line has been undertaken either in India or abroad.

8. Technical programme (in brief) : Tapioca varieties which produce large quantities of leaves will be selected for this purposes. Also varieties with low HCN content and varieties which produce abundant branches are to be selected. Both local and improved hybrid varieties will be planted with a uniform closer spacing of 45 x 45 cm.

Designs : R.B.D.

Treatments

1. Varieties : 1.M4, 2 H 165, 3. H95, 4.H226.

2. Harvesting (Cutting intervals) : First cutting 60 day after planting, subsequent cuttings at 30, 45 & 60 days interval.

Replication : 3

Plot size : 3 x 3 metres

Fertilizer : K 50, P 50, N 200/ha.

Observations

1. Green matter yield
2. Dry matter yield
3. Heights of plants
4. Height/stem ratio
5. HCN content at different spacings, varieties and cutting intervals.
6. Tuber yield if any at the end of study.
7. D.C.P.
8. TDN
9. Any other useful data will also be collected.

9. Date of start :

10. Likely date of completion : Two years

11. Additional facilities required:

12. Approximate cost : Rs.4,500/= for two years.

13. Signature of

Sd/-	SD/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

Second FRC S.No.736

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of the Research Centre : College of Agriculture, Vellayani.

2. Project No. : Ag.14.18 Agron.2

3. Title of Project : Possibilities of using Tapioca leaves for fodder purposes.

4. Name and designation of

a) Project Leader : Dr.C.Sreedharan, Assoc.Prof. of Agronomy

b) Associates : S.M.Shahul Hameed, Junior Instructor.

5. Objective : To find out whether Tapioca leaves can be harvested and used for fodder purposes without affecting tuber production.

6. Practical utility : Since Tapioca leaves are relished by cattle, farmers can grow Tapioca for fodder purpose in addition to tuber.

7. A short review of literature:

8. Technical programme : Design Rx 19x3 R.B.D.

1.	Retaining in each stem top	10 leaves	from 5th month
2.	-do-	10	-do- 6th month
3.	-do-	10	-do- 7th month
4.	-do-	10	-do- 8th month
5.	-do-	10	-do- 9th month
6.	-do-	10	-do- 10th month
7.	-do-	20	-do- 5th month
8.	-do-	20	-do- 6th month
9.	-do-	20	-do- 7th month
10.	-do-	20	-do- 8th month
11.	-do-	20	-do- 9th month
12.	-do-	20	-do- 10th month
13.	-do-	30	-do- 5th month
14.	-do-	30	-do- 6th month
15.	-do-	30	-do- 7th month
16.	-do-	30	-do- 8th month
17.	-do-	30	-do- 9th month
18.	-do-	30	-do- 10th month
19.	Retaining all the leaves		

9. Date of start : May 1977

10. Likely date of completion : 1980

11. Additional facilities required: Nil

12. Approximate expenditure : Rs.3000/=

13. Signature of

Sd/-	Sd/-	Sd/-
Project Leader	Head of Department	Director of Research

Second FRC S.No.737

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of Research Centre : College of Agriculture, Vellayani.

2. Project No. : Ag.14.18 Agron.3

3. Title of the project : Interplanting fodder crops in Rubber Plantation.

4. Name and designation of

a) Project leader : Dr.C.Sreedharam
Professor of Agronomy

b) Associates : 1.M.Oommen, Junior Instructor
2.M.Gopalakrishnan Nair, Instructor.

5.Objective : 1. To evaluate the feasibility of raising fodder crops in rubber plantations.

2. To assess the best suitable fodder grass for growing under rubber plantations.

6. Practical utility : The findings can be adopted in farmer field.

7. A short review of literature: a) Different varieties of fodder are being grown in coconut gardens and encouraging results have been reported.

b) Experiments using, leguminous cover crops which are also fodder have ~~also~~ been reported from foreign countries.

8. Technical programme:

Design	:	R.B.D.
Replication	:	3
Plot size	:	12 sq.m.
Fertilizer dose	:	P - 50 kg/ha (common to all treatments)
		K - 50 kg/ha
		N - 200 kg/ha
		4 split doses.

Harvesting intervals : 45 days

Grasses : 1. Guinea grass
2. Hybrid napier grass (3 varieties)
3. Setaria
4. Congo signal grass
5. Napier grass
6. Pongola grass
7. Molasses grass
8. Pulippan grass

9. Date of start : 1977 June

10. Likely date of completion : 1980

11. Additional facilities required: Nil

12. Approximate cost :

13. Signature of

Sd/-	Sd/-	Sd/-
Project Leader	Head of Department	Director of Research

Second FRC S.No.738

KERALA AGRICULTURAL UNIVERSITY

1. Name of candidate : H.Mariyappan
2. Dateof admission : 27.11.76
   and Admission No. : 76-11-07

3. Name and designation of Chairman of Advisory Committee : Sri.P.Chandrasekharan Assoc.Prof.(Agronomy)

4. Topic of Research for thesis : Phosphorus nutrition in Stylo santhes gracilis.

   Project No.Ag.14.18 Agron.1

5. Objective of research

   1. To study the effect of graded dozes of phosphorus on the yield of Style Santhes gracilis and to work out the optimum phosphorus level of this crop with and without lime.

   2. To study the variations in the green matter yield of stylosanthes gracilis at different intervals of cutting.

   3. To study the nutritive value of Stylosanthes gracilis (Crude protein, crude fibre, ash, T.D.N., ca, andP as influenced by levels of P and intervals of cutting.

   4. To workout the economics of phosphorus nutrition in Stylo santhes gracilis.

   5. To evaluate the nutrient status of the soil under phosphate application.

6. Brief review of previous work done on this topics

   1. Very limited work are available on the physico chemical properties of soil under phosphate application. The investigation of H.N.Singh revealed that with successive doses of P upto 160 kg/ha, the water soluble aggregates, available N and cation exchange capacity of soil were increased when a stylo sanths crop was raised. (Indian jgurnal of Agronomy 20 (2) 1975, 1976).

   2. Bruce R.C. (1976) reported that application of P increased the dry matter yield in the case of a similar species in stylo santhes guanensis, but at higher levels of P there was no increase in fodder yield. (Herbage Abstract 1976 Vol.46 No.2).

3. Olsen.F.J. and Moe P.G.(1972) reported that in a red soil of PH 5-6, phosphate levels and lime accelerated the rate of establishment and also increased the Dry matter yield of Stylo Santhesgracilis. Herbage abstract (1972) 42 (4).

4. Similar results have also been reported by JAMIESON (1971) from Queensland Herbage abstract 1971 Vol.41 No.2 Abstracts 775-1455 (818). Detailed investigation on the agronomy of stylo santhes gracilis and especially the yield potential in addition to P application, qualitative changes due to P application and the effect of P on the nutrient status of the soil are lacking.

7. Scientific and/or practical importance of the research

All over the world we find that the Dairy Industry is developed in regions where fodders of high nutritive value are available under natural conditions or where there is a scope for their large scale cultivation. The bovine pupulation in Kerala subsists mainly on the scanty supply of rice straw (Nutritive ratio of 1:40 whereas for milk production a nutritive ratio of 1:10 is required).

The most serious difficulty confronting fodder productions in the State is the non-availability of extensive lands which can be spared for its cultivation. As a solution cultivation of fodder grasses like guinea grass and Napier grass as inter crops in coconut garden is recommended at present.

A highly nutritive drought resistant leguminous fodder crop will be of very great advantage in providing green fodder to the cattle of the State as well as reducing the cost of feeding by limiting the quantity of concentrates to be fed.

Preliminary studies on three perennial legumes viz., Stylo senthes humilis, Atylosia species and siratro species have been made for persistance and growth in the College of Agriculture, Vellayani and Stylo santhes species was found to be satisfactorily coming up. Encouraging results were also reported from CPCRI Kasaragod and Indo-Swiss Project Madupatty. Where this crop has been grown both as an intercrop in coconut garden mixed with perennial fodders like guinea and Hybrid Naper or in open leysmixed with Setaira, Congosingal and ginea grass. The agronomy of Stylo santhes gracilis has not been worked out under Kerala condition in the plains. The Kerala Livestock Development and Milk marketing Board has launched a programme to distribute the seeds of stylo santhes

gracilis species among the farmers of Kerala. Hence investigation on this crop with reference to phosphorus which is likely to have an effect on the growth and yield of the crop is highly essential.x

8. Technical programme

Experimental design - Randomised Block Design

Replication - Three

Treatments

Crop - Stylo Santhes gracilis

Manure - Phosphorus levels - 5

P_0	No. P_2O_5
P_1	40 kg P_2O_5/ha
P_2	80 kg P_2O_5/ha
P_3	120 kg P_2O_5/ha
P_4	160 kg P_2O_5/ha

Lime - Levels - 2

L_0	No lime
L_1	500 kg lime/ha

Intervals of Harvest - 2.

C_1	30 days
C_2	45 days

Observations to be recorded

1. Growth characters

a) Height

b) Spread

c) Nodulation.

2. Yields

   a) Total green fodder

   b) Total dry matter

3. Other observations

   a) Leaf stem ratio

   b) Root/green fodder ratio

4. Chemical Analysis

   A. Plant Analysis

      Crude Protein, crude fibre, ether extract.

      T.D.N., ash, Ca and P

   B. Soil analysis for total N, total and available

      P and K_2O

9. Estimate of expenditure and receipts if any :

10. Location of Research : College of Agriculture, Vellayani.

Place: Vellayani.
Date :

Sd/-
Signature of the candidate

Sd/-
Signature of Dean

Sd/-
Signature of Chairman Advisory Committee

Sd/-
Signature of the Head of Department.

Fourth FRC M& S.No. 739

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture Department of Agronomy

1. Name of the Research Centre : College of Agriculture, Vellayani.

2. Project No. : Ag.14.18.Botn1.

3. Title of Project : Evaluation of production potential of grasses/legumes under varying combinations with forage trees.

4. Names and designation of

   a) Project leader : Sri.G.Raghavan Pillai

   b) Associates : 1.Dr.C.Sreedharan

      2.Sri.M.Oommen

5. Objectives : Assessment of the production potential of grass/legume mixtures in combination with forage trees.

6. Practical utility : The result can be adopted in farmers fields.

7. A short review of literature

8. Technical programme : Treatments 18

   A. Forage trees (3) Koobabool, Sesbania grandiflora, sesbania algypteaca

   B. Grasses (2) Cenchrus Setigerus, Cenchrus ciliaris

   C. Legumes (3) Siratro, Velvet, Bean, Dolicoslabbah (Var.Lgnosus)

   Design .. Split dose with forage trees x grasses as main plots and legumes as sub plots.

   Replications 3

   Plot size (sub plot) Gross 11m x 8 m
   Net 9m x 7 m

Spacing

Fodder trees - row to row 3 m, plant to plant 50 m.
For legumes - row to row 50 cm, plant to plant 10 cm
For grasses - rowto row 50 cm, plant to plant 25 cm
Grasses and legumes are to be planted in alternate rows in each plot.

Observations : For trees

1. Plant population
2. High at the time of harvest
3. Grown diameter
4. Green matter yield per plot
5. Dry matter yield per plot
6. Chemical analysis.

For legumes/grasses.

1. Green and dry matter yield per plot separately.

2. Chemical analysis separately.

Centre : Kalyani, Palampur, Kanke, Rahuri, Jorhat, Vellayani, Jhansi, and Urlikanchan.

9. Date of start : 1977-78

10. Likely date of completion : 1979-80

11. Additional facilities required : Nil

12. Approximate cost : Rs.3000/= (for 3 years)

13. Signature of

Sd/-	Sd/-	Sd/-
Project Leader	Head of Department	Director of Research.

Fourth FRC S.No.740

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of the Research Centre : College of Agriculture, Vellayani.

2. Project No. : Ag.14.18. Bot.1

3. Title of Project : K.B.T.5
Final Evaluation trial on Sorghum

4. Names and designation of

a) Project leader : Sri.G.Raghavan Pillai

b) Associates : 1.Dr.C.Sreedharan
2.Sri.M.Oommen

5. Objective : To isolatethe superior variety of fodder Sorghum.

6. Practical utility : The results can be adopted in farmers fields.

7. A short review of literatureL

8. Technical programme

Entries (12)
1. C.10-2
2. J-6
3. J-30
4. P.C-1 check
5. PC-6
6. A1-14-8
7. IGFRI - 452
8. IGFRI - 491
9. S.L.44 Check
10. RS-11-4
11. MSS.1.

Locations (10). Jhansi, Anand, Hissar, Rahuri, Pantnagar, Kenke, Ludhiana, Hyderabad, Coimbatore, Vellayani.

Design .. R.B.D.
Replications 4
Plot size - Gross 3.6 m x 3.0 m
Net 3.0 x 2.5 m (1 row on either side and 25 cm at each end of the row to be left as border)

Spacing : Between rows : 30 cm
Between Plants : 10 cm

Fertilizers : N-40 kg/ha basal + 40 kg/ha top dressing after 25 days of sowing.

P-40 kg/ha basal
K-20 kg/ha basal

Cutting schedule - Only one cut at 50% flowering stage.

Observations to be recorded: 1.Plant population per plot

2.Days to 50% flowering

3.Green fodder yield per plot (yield data to be converted to Q/ha and Q/ha/day)

4.Dry matter yield per plot (to be calculated based on dry weight of 500 g compositive sample and converted to Q/ha and Q/ha/day.

5.Observations on accent on use as mixed or sole crop.

6.Sugar percentage to be measured by refractrometer

7.Reaction to major diseases and pests particularly for red rot disease and shoot borer, scoring 1 (resistant) to 5 (susceptible).

8.Chemical analysis, 10 g dry sample after grinding may be sent for Invitro analysis.

9. Date of start : 1977
10.Likely date of completion : 1977
11.Additional facilities required: Nil
12.Approximate cost L Rs.800/=

13.Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH.

Fourth FRC S.No.741

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1.Name of Research Centre : College of Agriculture, Vellayani.

2.Project No. : Ag.14.18.Botn./

3.Title of the Project : Seed viability of fodder crops

4.Name and designation of

a) Project leader : Sri.G.Raghavan Pillai

b) Associates : 1.Dr.C.Sreedharan
2.Sri.M.Oommen

5.Objective:- To find out the seed viability of important fodder crops.

6.Practical utility: The result can be utilised for future seed production programmes.

7. A short review of literature

8. Technical programme

Crops: Maize, sorghum, Bajra, Teosinte, Cowpea.

Treatments	Months after harvest
1.	One
2.	Two
3.	Three
4.	Four
5.	Five
6.	Six
7.	Seven
8.	Eight
9.	Nine
10.	Ten
11.	Eleven
12.	Twelve

Replication .. 3 (three)

Design ,, RBD

Observations

1. Germination test in laboratory (Germination percentage)

2. Climatological parameters - Temperature, R.H., Rainfall, light intensity.

Note:- 2 sets may be tried separately i.e. one in disicator and the other in open atmosphere.

9. Date of start : 1977

10. Likely date of completion : 1978

11. Additional facilities required: Nil

12. Approximate cost : Rs.500.00

13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF THE DEPARTMENT	DIRECTOR OF RESEARCH.

Fourth FRC S.No.742.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1.Name of the Research Centre: College of Agriculture, Vellayani.

2.Project No. : Ag.14.18 Hort.1.

3.Title of Project : Effect of cycocel on seed production potential of Sorghum.

4.Names and designation of

a) Project leader : Sri.G.Raghavan Pillai

b) Associates : 1.Dr.C.Sreedharan
2.Sri.M.Oommen

5. Objective : To find out the effect of cycocel on seed production potential of Sorghum

6. Practical utility : The result can be adopted in farmers field.

7. A short review of literature:

8. Technical programme

Design — R.B.D.

Replication — 4

Treatments — 9

1.Control - No spray
2.Control - Water spray
3.Spraying . ccc 0.25 a.i/ha
4. ,, ,, 0.50 a.i/ha
5. ,, - ,, 0.75 a.i/ha

Time of spray — 1. 45 days
2. 60 days

Plot size (Gross) — 4 m x 3 m

Row spacing — 25 cm.

Fertilizers — Basal 60 kg. N. 30 kg P_2O_5 and 30 kg K_2O per ha top dressing 30 kg N 21 days after sowing.

Observations

1. Plant height in at the time of harvest
2. Plant population
3. Tiller count
4. Seed yield/plot and per ha
5. Dry matter yield/plot and per ha
6. L/s. ratio
7. Weight of earhead
8. No.of grains per earhead
9. Weight and grains per earhead
10. Thousand grain weight.

9. Date of start : 1977

10.Likely date of completion : 1978

11.Additional facilities required: Nil

12.Approximate cost : Rs.2000/= (for 2 years)

13.Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH.

Fourth FRC Mxx S.No.743.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1.Name of Research Centre : College of Agriculture, Vellayani.

2. Project No. : Ag.14.18. Agron.1

3. Title of the Project : Ag.K.5

Effect of nitrogen levels and low spacing on the yield and quality of hybrid Napier with and without legumes.

4. Namesand designation of

a) Project leader : Sri.G.Raghavan Pillai

b) Associates : 1.Dr.C.Sreedharan
2.Sri.M.Oommen

5. Objectives : To find out the effect of different levels of N and plant density on the yield and quality of Hybrid Napier.

6. Practical utility : The result can be adopted in farmersfields.

7. A short review of literature:

8. Technical programme :

Treatments

a) Row spacing : 1.0mx 0.5, 1.5 m x 0.5m, 2.0m x 0.5 m

i) Control
ii) Intercropping with Kharif velvet been and Rabi with cowpea
iii) ii + 15 kg N/ha per cut
iv) ii + 30 kg N/ha per cut

Basal dose of 30 kg. No. for treatment ii, iii and iv applied 15 days after planting and 60 kg. P_2O_5 + 30 kg K_2O hectare at plant.

Design : R.B.D.
Replications : 4
Plot size : Gross - 10 m x 5 m
Net - 6 m x 4 m.

The different rows to be harvested with the net plot size of 6 m x 4 m	6 rows of 1 m row spacing 4 rows of 1.5 m row spacing 3 rows of 2.0 m row spacing

Observations
1. Plant stand count after 15 days of sowing
2. Plant stand before harvest
3. Green fodder yield per plot
4. Dry fodder yield per plot
5. Dry matter percentage
6. Crude protein percentage and yield.

Centres: Palampur, Anand, Coimbatore, Hyderabad, Pantnagar, Hissar, Jhansi, Dehradun, Rahuri, Jorhat, Vellayani and Kanke.

9. Date of start : 1977-78

10. Likely date of completion : 1979-80

11. Additional facilities required: Nil

12. Approximate cost : Rs.4,500/= (for 3 years)

13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OFRESEARCH.

Fourth FRC S.No.744.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of Research Centre : College of Agriculture, Vellayani.

2. Project No. : Ag.14.18 Bot.3

3. Title of Project : Ag.K.1

Comparative performance of cowpea varieties under different spacing and seed rate.

4. Names and designation of

a) Project leader : Sri.G.Raghavan Pillai

b) Associates : 1.Dr.C.Sreedharan

2.Sri.M.Oommen

5. Objective : To find out the plant population density of fodder cowpea.

6. Practical utility : The result can be adopted in farmers fields.

7. Short review of literature :

8. Technical programme

Varieties	Treatments	B.spacing	C.seed rate
1. Local V1		25 cm S1	30 kg/ha R1
2. HFC -42-1 V2		35 cm S2	40 kg/ha R2
3. Promising variety V-3		45 cm S3	50 kg/ha R3

Fertilizer : Basal application of 15 kg N+30 kg P_2O_5/ha

Design : 3^3 confounded in 9 plot blocks

Replications 2, plot size (Gross) 16.65 x 3.35 m
(net) 15.75 x 3.00 m

Observations

1. Plant stand count after 15 days of sowing
2. Plant stand before harvest
3. Green fodder yield per plot
4. Dry fodder yield per plot
5. Dry matter percentage per plot
6. Crude protein percentage and yield

Centres: Anand, Hissar, Jhansi, Ranchi, Kalyani, Pantnagar, Coimbatore, Jorhat, Vellayani.

9. Date of start : 1977

10. Likely date of completion : 1977

11. Additional facilities required: Nil

12. Approximate cost : Rs.1000.00

13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH.

Fourth FRC S.No.748.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of the Research Centre : College of Agriculture, Vellayani.

2. Project No. : Ag.14.18. Bot. 4

3. Title of Project : K.B.T.1
Final evaluation work on 16 varieties of cowpea.

4. Name and designation

a) Project leader : Sri.G.Raghavan Pillai.

b) Associates : 1.Dr.C.Sreedharan

2.Sri.M.Oommen

5. Objective : To isolate superior fodder varieties of cowpea.

6. Practical utility : The results can be adopted in farmers fields.

7. Short review of literature

8. Technical programme:

Entries (16)
V_1 - UPC - 42
V_2 - UPC - 287
V_3 - UPC - 5286
V_4 - UPC - 9020
V_5 - UPC - 9805
V_6 - C1 4- 20
V_7 - C - 24
V_8 - C - 25
V_9 - C -26-28
V_{10} - C - 30
V_{11} - C1
V_{12} - HFC - 42 - 1 (Check)
V_{13} - FOS - 1
V_{14} - MPKV - 1
V_{15} - Cowpea -74
V_{16} - JC - 21

Localities (14) Jhansi, Vellayani, Rahuri, Ludhiana, Anand, Jorhar, Hissar, Kamke, Coimbatore, Hyderabad, Kallyani, Pantnagar, Dehradun, Jabalpur.

Design : R.B.D.

Replications: 3

Plot size (Gross). 3.6 m x 3.0 m
(net) 3.0 m x 2.5 m (One row on either side and 25 cm at each end of row to be left as border)

Spacing : Between rows 30 cm
Between plants 10 cm

Row length : 3 m

Fertilizers N - 20 kg/ha - Basal
P - 40 kg/ha - Basal
K - 20 kg/ha - Basal

Cutting schedule: One cut at 50% flowering

Observations to be recorded

1. Plant population per plot
2. Days to be flowering
3. Green fodder yield per plot (yield data to be converted in Q/ha and H/ha/day).
4. Dry matter yield per plot (to be calculated based on dry wt. of 500 g. composite sample and converted in Q/ha and Q/ha/day.
5. Observations on account on use as mixed or sole crop.
6. Reaction of major pests and diseases, scoring. 1 (resistant) to be 5 (Susceptible).
7. Chemical analysis 10 g dry sample after grinding may be sent for Invitro analysis

9. Date of start : 1977

10. Likely date of completion : 1977

11. Additional facilities required: Nil

12. Approximate cost : Rs.1000/=

13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH.

Fourth FRC S.No.749

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of Research Centre : College of Horticulture, Vellanikkara.

2. Project No. : Ag.14.18 Agron.1.

3. Title of the Project : Studies on the time of sowing of rainfed fodder maize varieties.

4. Name and designation of

a) Project leader : Dr.M.S.Nair, Fodder Research Officer, Mannuthy.

b) Associate : Dr.R.Vikraman Nair, Associate Professor, College of Horticulture, Vellanikkara.

5. Objectives 1.To arrive at a suitable time of sowing of a few fodder maize for highest forage yield.

~~6x~~ 2.To compare the performance of the available hybrid maise varieties.

6. Practical utility : Fodder maize is at present being cultivated in about 50 ha. in the fodder farm. Yield has been varying widely from year to year. The mean yield of the crop sown in the month of June 1977 was almost half as that of the crop sown during July-August 1976. The most important reason attributable to this year to year variation was the differemee in the time of sowing. (The management practices were identical during the two season). Maize is a necessary ingredient for silage making and its cultivation has to continue. The results of the proposed experiment will be of immediate practical value for the fodder farm in particular and for fodder maize cultivation in the State in general.

7. A short review of literature: Work on this line on this crop has not been done before in the State.

8. Technical programme : I. Treatments: Combinations of 5 varieties and 11 dates of sowing.

A. Date of sowing

1. May 15
2. June, 1st
3. July 15
4. July 1
5. July 15
6. August 14
7. August 15
8. September 1
9. September 15
10. October 1
11. October 15

B. Varieties

No.of varieties .. 5
(The dates are to be extended slightly if soil conditions are not favourable for germination)

Layout - Split plot design

Whole plot - Dates of sowing

Sub plot - Varieties

Replications . 3

Observations:

1. Green yield of fodder
2. Dry weight of fodder

9. Date of start : May, 1978

10. Likely date of completion : December, 1978
11. Approximate cost : Cultivation charges Rs.1,500/=

12. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH.

Fourth FRC S.No.750

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of the Research Centre: College of Agriculture, Vellayani.

2. Project No. : Ag.14.18 Bot.2

3. Title of Project : K.B.T.6
Final evaluation trial on maize.

4. Name and designation

a) Project leader : Sri.G.Raghavan Pillai

b) Associates : Dr.C.Sreedharan
Sri.M.Oommen

5. Objective : To isolate the superior variety of fodder Maize.

6. Practical utility : The results can be adopted in farmers fields.

7. A short review of literature:

8. Technical programme

Entries
1. Comp.A.53-54.
2. Kisan
3. Ganga safed
4. Ganga-5.
5. Vijay composite
6. Teosinte - I
7. Teosinte - II
8. Masinte

Locations: Jhansi, Hissar, Ludhiana, Rahuri, Kanke, Urli-kanchan, Anand, Palampur, Hyderabad, Kallyani, Coimbatore, Jorhot, Vellayani.

Design .. R.B.D.

Replications: 4 Plot size (Gross) 3.6 m x 3.0 m
(net) 3.0 x 2.5 m (i row on either side and 25 cm at each end of the row to beleft as border).

Spacing : Between rows 30 cm.
Between plants 10 cm

Fertilizers: N - 50 kg/ha basal + 50 kg top dressing 40 days after sowing
P - 50 kg/ha basal
K - 25 kg/ha basal.

Cutting schedule .. Only one cut at milk stage.

Observations to be recorded 1. Plant population per plot

2. Daysto 50 per cent flowering

3. Green fodder yield per plot (yield data to be converted to Q/ha and Q/ha/day.

4. Dry matter yield per plot (to be calculated based on dry wt. of 500 g composite sample and converted to Q/ha and Q/ha per day.

5. Observations on accent on use as mixed or sole crop.

6. Reaction to major pest and diseases, scoring

   1. (Resistant) to 5 (Susceptible)

7. Sugar percentage to be measured by refractrometre.

8. Chemical analysis 10 g dry sample after grinding may be sent for In vitro analysis.

9. Date of start : 1977

10. Likely date of completion : 1977

11. Additional facilities required: Nil

12. Approximate cost : 700/=

13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

Fourth FRC S.No.753

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agronomy

1. Name of Res. Centre : College of Agriculture, Vellayani.

2. Project No. : Ag.14.18 Hort.1

3. Title of Project : Effect of growth regulators on seed production of forage crops.

4. Name and designation

a) Project leader : Sri.G.Raghavan Pillai

b) Associates : Dr.C.Sreedharan
Sri.M.Oommen

5. Objective

The objective under seed production aspects of forage crops to synchronise flowering, maturation of pods (cowpea) and to produce maximum seed production in particular varieties where seed setting is a limitting factor.

6. Practical utility : The result can be adopted in farmers fields.

7. A short review of literature:

8. Technical programme

Name of crops: Berseem, Lucerne M.P.Chari and Cowpea (Co-ordination will supply the seeds)

Treatments:
1. Control (Water spray)
2. B.I (600//m)
3. B.I.(1000 ppm)
4. Phosphon (50 ppm)
5. Phosphon (100 ppm)
6. Planofix (10 ppm)
7. Planofix (100 ppm)

Replication .. 3

Design .. R.B.D.

Plot size .. 4 x 4 m.

Observations
1. Date of flowering
2. No.of seeds/capsule/pd.
3. Seed yield/plot
4. Seed yield (V/ha)
5. 1000 grain seed weight.

Special information

1. These chemicals are not available in surplus quantity. Therefore the arrangements may kindly be made by the project Co-ordinator centre where trial will be conducted.

2. Foliar spray should be given at the flower initiation just and spraying should be done 11.30 - 2.30 p.m.

3. Additional care should be taken up for insect, pest and disease control periodically.

4. Address for procurement of the chemicals.

i. M&B Company, Bombay
ii. Cynamicle Company, Bombay
iii. Unifoyal Company, Nayatack U.S.A.

9. Date of start : 1977

10. Likely date of completion: 1978

11. Additional facilities required : Nil

12. Approximate cost : Rs.1000/= (for 2 years)

13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH.

Fourth FRC S.No.759

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

1. Project No. : Ag. 16.18 Ext. 4

2. I.C.A.R. Code No. :

3. Name and address of Agricultural University/Research Station/Centre : Kerala Agricultural University

4. Title of project (Specify the problems) : A study on the correspondence course for farmers on paddy cultivation.

5. Name and designation of principal investigator : Dr. Abdul Rahiman Kunju, Asst.Professor of Agricultural Extension.

6. Name(s) and designation of Associate(s) and establishment(s) on which borne : A.G.G. Menon, Professor of Agricultural Extension.

(a) Whole time

(b) Part time (indicate proportion of time to be devoted and other areas): Part time

7. Location of the research project with complete address (Division/section/sub-station) Department of Agricultural Extension, College of Agriculture, Vellayani, Pin-695522.

8. (a) Objective(Specify briefly the AIMS and GOALS of the project is not more than 5[illegible]

1. to identify the factors that motivated the farmers to join the correspondence course.
2. to findout the level of adoption of improved practices recommended in the lessons by the farmers.
3. to findout reaction of the participants about the syllabus of the course, understandability of the lessons and questions, periodically of despatch of lessons and corrected response sheets to the farmers and
4. to obtain the suggestions of farmers for further improvement of the correspondance course.

(b) Practical utility (not more than 100 words) : The correspondance course is the first of its kind in Kerala and no systematic study to know the effectiveness of course has been conducted so far. The course aims at importing a through knowledge on the cultivation of paddy to the literate farmers who are not in a position to attend an institutional training. These farmers are expected to put into practices the new information gained through the course, in

contd.....

their own field conditions. They can also disseminate the new information to their fellow farmers and act as a source of information. The correspondance course is not only a training programme designed to improve the know how of the literate farmers all over Kerala, but also to develop the participants as sources of information to neighbouring farmers. The study proposed will help the University to find out the lacunia if any, and improve the course further.

9. Technical programme (indicate briefly plan of procedure, techniques, instruments and special material, organism, special environments etc.) : Pretested questionnaires will be prepared and mailed to the 427 participants of the first correspondence course. The responses received back from the respondents will be subjected to statistical analysis and data interpreted.

10. Date of start : 1-6-1977

11. Likely date of completion : 31-3-1978

12. Estimated main months (Scientific personnel only) 9 months.

13. Facilities required
    1) Land : Nil
    2) Labour : "
    3) Special equipment : "
    4) Foreign exchange :
    5) Estimated coast : "

14. If financed by an organisation other than the institute, then give the following information.
    i) Name of the financing organisation
    ii) Title of the project (if the project forms part of a larger project)

15. Approximate cost : Rs.250/-

16. Signature of the Principal investigator

17. Signature of the Head of Division/section/station :

18. Signature of the Director of Research/Dean :

Sd/-
Project Leader

Sd/-
Head of the Department

Director of Research.

Third FRC. S.No.770.

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

Faculty of Agriculture : Department of Agricultural Extension

1. Name of the Research Centre: College of Agriculture.
2. Project No. : Ag. 16.18 Ext. 7.
3. Title of Project (This should indicate the nature of work) : Notivational Patterns of farmers for their participation in farmers training programmes.
4. Name(s) and designation of:
   a) Project Leader : K.I. Thomaskutty, Instructor
   b) Associate/s
5. Objective : To study the farmers motivation for participating in farmers training programme.
6. Practical Utility : The results will be useful for the selection of farmers for the Farmers' Training Programme.
7. A short review of literature:

   Das and Sankar (1970) have reported that higher the economic motivation, the more will be the favourable attitude towards improved farming practices. Singh and Krishna Kumar (1975) reported that levels of achievement motivation vary from the region to region and these variations could be related to the relative development of the region.
8. Technical Programme (in brief) : 50 trained farmers will randamely be selected and interviewed.
9. Date of start : September 1976
10. Likely date of completion : 1977
11. Additional facilities required : Nil
12. Approximate cost : Rs.50/-
13. Signature of:-

Sd/-	Sd/-	
Project Leader	Head of Department	Director of Research.

KERALA AGRICULTURAL UNIVERSITY

Department of Agricultural Extension, College of Agriculture, Vellayani

Programme of Research for Master's Degree (for approval of University)

1. Name of candidate : K. Abdul Samad
2. Project No. : Ag. 16.18 Extn. 8.
3. Date of admission and Admission No. : 10-10-1977, 77-11-19.
4. Name and designation of chairman, Advisory Committee: Dr.G. Thiagarajan Nair, Assoc.Professor of Agricultural Extension.
5. Topic of Research for Thesis: Response of special package programme for agricultural development in Kerala.
6. Objectives :
   1) To study farmers' knowledge and attitude towards the coconut package programme.
   2) To study the effectiveness of programme
   3) To identify the problems of the programme as prescribed by the farmers and extension workers.
7. Brief Review of Previous Work done:

Shouda Pttak and Dargan (1971) in a study for package programme works on jute growers found that the extent of adoption of seeds, fertilizers and implements was found to be significantly higher in intensive zone than neighbouring cultivation and control zone. The adoption of plant protection was also found more or less the same. Subramanian and Lakshmana (1972) in a study on the role of farm practices attributes in the adoption of package of practices found that adoption is likely to be more when the recommended practices gives distinct advantages over the old ones. It is necessary that a recommended practice is in time with the existing values and experiences of the farmers. The packages is likely to be prefered when condition are favourable for adoption of the practices and also when farmers are equiped with adequate knowledge of the practice.

Singh and Babu (1968) in a study of adoption of improved farm practices found that simplicity of adoption is ranked very low The complexity of adoption of a particular improved practice is not so much discouraging to an Indian Farmer. What he needs is high profit and greater productivity.

Narayanan, Srinivasan, Oliver (1973) in a study of different sources and channels utilized by farmers in the adoption of package of practices for sugarcane found that there was no influence of Deputy Agricultural Officer (Sugarcane). But Deputy Agricultural Officer (extension) and village level worker had influenced the farmers to some extent.

contd.....

7. Scientific and Practical importance of the research : This study will bring out the response of the farmers towards coconut package programme and the problems related with it which will be useful for increasing the effectiveness of the programme.

8. Technical programme :

1) Exploratory study: An exploratory study will be under taken to formulate hypothesis for the study before final study is undertaken.

2) Sampling: An appropriate sample of coconut package units in Trivandrum District will be selected.

3) Data Collection: The data pertaining to various parameters will be collected from among the various coconut package units through questionnaires and interviews.

4) Analysis: Suitable statistical methods will be used for analysis.

9. Expenditure: Rs.550/- towards purchase of stencil papers, inks etc. for cyclostyling the interview and schedule.

10. Location : Trivandrum District

Place: Vellayani

Signature of candidate

Sd/-
Signature of Dean

Sd/-
Signature of Chairman
Advisory Committee.

Sd/-
Signature of Head of Department.

S.No.774.

KERALA AGRICULTURAL UNIVERSITY

Department of Agricultural Extension, College of Agriculture, Vellayani.

PROGRAMME OF RESEARCH WORK FOR MASTER'S DEGREE

(For approval of University)

1. Name of candidate : R. Prakash
2. Project No. : Ag. 17.18 Ext. 9
3. Date of Admission and Admission No. : 10-10-1977
   77-11-20
4. Name and designation of the chairman of the Advisory Committee : Sri.O.Abdul Rahiman Kunju, Asst.Professor of Agricultural Extension.
5. Topic of Research for study : "A study of the impact of Agricultural development programmes among the Tribal Community of Kerala".
6. Objectives :
   1) To investigate the extent to which the objectives of the Agricultural Development programmes have been achieved.
   2) To find out the attitude of Tribal people towards settled agriculture.
   3) To find out the correlation between the socio-economic and personal characteristics and role of adoption of improved agricultural practices and attitude towards settled agriculture.
7. Brief review of the previous work done on the topic : The Kerala University have conducted a few studies about the social structure and the social change of tribes in Kerala A study of the socio-economic and personal characteristics of the tribes and their relationship with the adoption of agricultural practices is being taken up for the first time in Kerala, and hence review of previous work would not be provided.
8. Scientific and practical importance of research:

The tribal people as a whole is separated geographically from the rest of the people and hence they have got their own customs, traditions, believes etc. Considering their socio-economic and educational backwardness a number of schemes are being chalked out and implemented by various departments and agencies. The tribal Development Department, Kerala Harijan Development corporation and the Kerala Agricultural University are some of Government departments and agencies involved in the development programme of tribals. Special

contd....

attention is also paid for the population of improved agricultural practices among the tribe. Hence a study of this type will help to understand how for the efforts of various departments and agencies have succeeded in about changes in the cultivation practices of tribes. In the light of the findings changes, if any required in the extension programme can also be suggested for future implementation.

9. Technical programme : Required number of respondents will be selected by purpose sampling and data will be collected by preparing interview schedule. The collected data will be analysed and processed using suitable statistical techniques and results interpreted.

10. Expenditure and receipts if any : Rs.1,000/- for the purchase of stationery

11. Location of research if outside the College campus : Attappady/Chittoor/Pothumavu.

Place:
Date :

Sd/-	Sd/-	Sd/-
Signature of the candidate	Signature of the Chairman Advisory Committee	Signature of the Head of the Department.

Sd/-

Signature of the Dean

S.No.775. fifth FRC.

KERALA AGRICULTURAL UNIVERSITY

DEPARTMENT OF AGRICULTURAL EXTENSION, COLLEGE OF AGRICULTURE.

Programme of Research for Master's Degree (For Approval of University)

1. Name of candidate : AHAMAD FOAD, O.V.
2. Project No. : Ag. 16.18 Ext. 10
3. Date of Admission & Admission No. : 8-10-'77 & 77-11-21
4. Name and Designation of chairman, Advisory Committee : Dr. A.M. Tampi, Assoc.Professor, Department of Agricultural Extension.
5. Topic of Research for thesis : "Study on the impact of the agricultural programme implemented by Small Farmer's Development Agency among farmers in Cannanore District.
6. Objectives :
   1) To assess the extent of achievement of the Agency's objectives towards uplifting the weaker sections of the farming community.
   2) To assess the impact and evaluate the development components of the Small Farmers Development Programmes in bringing about socio-economic changes among the weaker sections of the community.
   a) To study the effect of service component in bettering the production in the farms of weaker sections.
   b) to explor the impact of new technology component in bringing about charges in the community.
   c) to investigate the influence of size of farm holding component in adoption of improved agricultural practices.
   d) to determine the effect of programme implementation component in adoption of improved agricultural practices.
   e) to assess the relationship between the subsidy component and the adoption of improved agricultural practices.
   f) to assess the educational component achieved through the adoption of improved agricultural practices.
   g) to study the relationship of socio-economic status of the farmers and implementation of S.F.D.A. programmes.

contd...

7. Brief Review: of previous work done on the topic:

J.S. Garg and K.N. Panday (1975) of S.F.D.A. on productivity and income of small benefited farmers in Pratapgarh Dt.(U.P.). A detailed study was conducted and the adoption of H.Y.V. paddy and wheat were found to be phenomenal. Page 250 Indian Journal of Agricultural Economics No.3 (1975).

Singh U.K., S.N. Tripathi & R.I., Singh (1975) Income and investment behaviour of small farmers in SFDA and non SFDA areas of Fatehpur (U.P.) - A case study. This study was undertaken to quantity the behavioural changes in income and investment in SFDA and non-SFDA areas.

Chauhan Y.S., R.L. Singh, R. Kumar and D. Singh (1975) A comparative study of the production performance and problems on small farmers as adoption and non-adoption of new agricultural technology in Farakkaded Dt. (U.P.).

Mishra S.P. (1975) SFDA vis-a-vis agricultural development a mid term appraisal in the project area of Ratton, Ujjain Dt.(M.P.). An attempt is made in this paper to evaluate the working of SFDA and its inputs on agricultural development in this area.

8. Scientific or Practical importance of research:

Small Farmer's Development Agency, Cannanore, has been established in 1971 for the agricultural development of small farmers and marginal farmers. In Kerala , Cannanore and Quilon District were the pioneer districts in implementing the programme. The study will help to find out how for the SFDA has achieved its objectives. The research can be utilized as a bench mark survey towards implementing future development programme in this field.

9. Technical programme:

i) Exploratory study: This will be undertaken to formulate a hypothesis, if any for the study.

ii) Sampling : A sample of farmers will be selected by appropriate sampling procedures.

iii) Data Collection : Data will be collected tho' circulation of questionnaire and interview schedule. Data will be analysed using statistical techniques.

10. Estimate of expenditure and receipts if any:

Rs.1500/- towards purchase of stencil paper, for cyclostyling and mailing paper.

11. Location of research, if any outside the College Campus:

Cannanore District.

Sd/-
Signature of the candidate

Sd/-
The Chairman, Advisory Committee.

Sd/-
Signature, Head of the Department.

Fifth FRC. S.No.776.

KERALA AGRICULTURAL UNIVERSITY

DEPARTMENT OF EXTENSION, COLLEGE OF AGRICULTURE

Programme of Research for Master's Degree

(For approval of University)

1. Name of candidate : P. MUTHIAH MANCHARAN
2. Project No. : 16.18 Extn.11
3. Date of Admission and admission No. : 10-10-1977 : 77-11-23
4. Name and designation of Chairman, Advisory Committee : Dr. G. Thiagarajan Nair, Associate Professor of Agricultural Extension.
5. Topic of research for thesis : "Study on the role of leadership in Agricultural Development in Rural Areas in Kerala".
6. Objectives :
   1) To identify local leaders and to study their role perception in agricultural development.
   2) To study the role performance of identified leaders.
   3) To identify the factors associated with the effective role performance of leaders in agricultural development.
7. Brief review of previous work done on the topic :

Dhillon (1953) classified leaders as Primary, secondary and tertiary depending on the relative importance of the individual in the village affairs.

Hitchock (1959) Presented the case studies of two leaders, one traditional and other non-traditional. His observations were that the traditional leaders became out dated and a new dynamic leadership emerged to make the villagers respond to its changing needs.

Rao (1966): Concluded that four types of leaders were existing in all the villages under study. They were institutional, special interest, voluntary and professional leaders. Out of these four types institutional leaders were in the majority and they were considered as the village wide leaders by the villagers.

Reddy (1966): Identified four types of leaders namely traditional leaders, caste leaders, political leaders and functional leaders.

contd.....

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KERALA AGRICULTURAL UNIVERSITY, MANNUTHY

FACULTY OF AGRICULTURE

Programme of Research for Master's Degree

(For approval of University)

1. Name of candidate : N.P. KUMARI SUSHAMA
2. Project No. : Ag. 16-18 Ext. 12
3. Date of admission and admission No. : 10-10-1977
   77-11-24
4. Name and designation of Chairman, Advisory Committee : Sri. A.G.G. Menon, Professor of Agricultural Extension
5. Topics of Research for thesis : "A study on the impact of selected development programmes on the tribals of Kerala".
6. Objectives of the Research :
   1. To investigate the extent to which the objectives of selected development programmes implemented in the tribal areas have been achieved.
   2. To find out the extent of involvement of various agencies in the development of the tribal areas.
   3. To find out the attitude of tribals towards.
      a) settled occupations.
      b) modern practices related to different occupations.
      c) various agencies implementing development programmes.
   4. To find out the correlation between the Socio-economic and personal characteristics of tribals and their attitude.
   5. To find out the job perference of tribals.
   6. To find out the factors affecting different occupations among the tribals.
7. Brief review of previous work due on the topic (give references to important publications/thesis) : Various authors have studied the impact of development programme on the tribals in different parts of the country.

   BAPAT in a study on Voluntary effeort in tribal Welfare concluded that both the voluntary and the governmental agencies must work in close co-operation. Harmony between them will result in sound policies vis-a-vis the problems of tribal development

contd.....

Sahay (1966): Identified three major patterns of leaders in Malar and Santhal tribes of Santal Parganas (Bihar) (ie) traditional emergent.

8. Scientific or practical importance of the research : Local leaders have to play an important part in the agricultural development. The study will bring out the factors associated with the effective performances of local leaders in agricultural development, which can be useful for improving the efficiency of extension work through the leaders.

9. Technical programme :

1. Exploratory study: An exploratory study will be undertaken to formulate hypothesis for the study.

2. Sempling: An appropriate sample of village leaders will be selected by random sampling process.

3. Data collection: Data will be collected through personal interview, with the help of an interview schedule developed and pretested for the study. Approximate quantifying techniques will be used to measure the variabilities in the study.

4. Analysis: Suitable statistical techniques will be used to analyse the data.

10. Estimate of expenditure and receipts if any : Rs.500/- towards purchase of stencil papers, ink, etc., for cyclostyling the interview schedule.

11. Location of Research if outside college campus : Trivandrum District.

Vellayani,
6-6-1978

Signature of Candidate:

Signature of Chairman of Advisory Committee.

Signature of Dean.

Signature of Head of Department.

Fourth FRC. S.No.777.

KERALA AGRICULTURAL UNIVERSITY

Project No.	Ag 16.18.Ext.12
1. Name of candidate	N.P.Kumari Sushama
2. Date of admission and admission No.	10-10-1977 77-11-24
3. Name and designation of Chairman, Advisory Committee:	Sri A.G.G.Menon, Professor of Agrl. Extension.
4. Topics of Research for thesis	A study on the impactof selected development programmes on the tribals of Kerala.

5. Objectives of the Research

1. To investigate the extent to which the objectives of selected development programmes implemented in the tribal areas have been achieved.

2. To find out the extent of involvement of various agencies in the development of the tribal areas.

3. To find out the attitude of tribals towards

   a) settled occupations

   b) modern practices related to different occupation

   c) various agencies implementing development programmes.

4. To find out the correlation between the socio-economic and personal characteristics of tribals and their attitude.

5. To find out the job preference of tribals.

6. To find out the factors affecting different occupations among the tribals.

6. Brief review of previous work ~~done~~ on the topic.

Various authors have studied the impact of development programme on the tribals in different parts of the country.

BAPAT in a study on Voluntary effert in tribal Welfare concluded that both the voluntary and the governmental agencies must work in close co-operation. Harmony between them will result in sound policies vis-avis the problems of trial

development. Government should help voluntary agencies to establish a cadre, of take up trial welfare as a lifelong vocation.

ACHARYA in a study on tribal development agency projects found that the experience gained through the activities of these special projects is going to be guite valuable for determining the policy of economic development of the tribal areas.

MATHUR in a study on the transfer and alienation of trial land and indebtedness in Kerala found that the social net work of the transfer and alienation of land varies from one tribal areas to another. The economy of tribals is closely linked with that of non-tribals who are in a position to influence their occupational pattern and control their economy.

BRAHMA DEV SHARMA EN a study on the economic development of extremely backward tribal regions found that the participation tribals in the industrial and mineral development should be conceived in dynamic terms such as to strengthen their socio-economic base in the process of its transformation from the primitive to the modern.

7. Scientific and practical importance of the research.

This study will yield results which will help to formulate and implement programmes for the alround development of the tribals and to bring them into the main stream of the National life.

8. Technical programme

Tribal area for the study and the number of respondents will be selected by appropriate sampling techniques. Data will be collected with the help of tools developed for the purpose. The data collected will be put to appropriate statistical tests.

9. Estimate of expenditure & receipts if any

Rs.1,000/= towards stationery articles.
Receipts .. Nil

10. Location of Research if outside college campus

Department of Agrl.Extension, College of Agriculture, Vellayani.

Sd/-
Signature of candidate.

Sd/-
Signature of Chairman
Advisory Committee.

Sd/-
Signature of Dean,

Sd/-
Signature of Head of Department.

Fifth FRC S.No.778

KERALA AGRICULTURAL UNIVERSITY

Project No.	AG.16.18 Ext.13
1. Name of candidate	S.Mothilal Nehru
2. Date of admission and admission number	10.10.1977 77.11.23
3. Name and designation of Chairman, Advisory Committee	Dr.A.M.Tampi, Associate Professor of Agrl. Extension.
4. Topic of research for thesis.	To study the effectiveness of Farm broadcasts through Radio in disseminating Agricultural information to farmers of Kerala.

5. Objectives

1. To find out the Farmers preference to nature and content of the programmes put through Farm Broadcasts.

2. To find out the Farmers preference to different types of Farm Broadcasts.

3. To study the listening habits of the listeners of Farm Broadcasts.

6. Brief review of the previous work done on the topic;

1. KHARA, J.S.(1967) I.J.E.E., Vol.III No.1 & 2, p.98: Ranked Radio as the first amongst mass media methods in the adoption of improved farm practices, while studying the relative effectiveness of extension methods which have been used singly or in combination.

2. TRIPATHI, S.L., PANDEY, L.R.(1967) I.J.E.E., Vol.III, No.1 & 2, p.156
classified Radio as moderately effective among the teaching methods for all improved practices.

3. SHARMA, S.K., KISHORE, D.(1970), I.J.E.E. Vol.VI, No.3 & 4, p.12:
concluded that subject matter specialist, farmers and other speakers of A.I.R.should have clear and systematic thinking on the topic, above all timed broadcasts and careful rehearsel are also most important factors for effective broadcasts.

4. SANDHU, A.S; SINGH, K.N.(1972) I.J.E.E. Vol.VIII,p.51. concluded that 71% farmers were listening to Radio daily for 2 to 3 hours.

5. Jalihal, K.A., Jale Srinivasamurthy (1974).

Some aspects of Evaluationof Farm Radio Programmes in Karnataka.

concluded that most farm Radio broadcast listeners were those who educational level was not above the middle school grades.

7. Scientific or practical importance;

Many studies have been undertaken on the effectiveness of individual and group methods of approahh in Extension Education. Very few studies have been conducted on the effectiveness of Mass Media. Within the media Radio plays a very important role in dissemination of Agricultural information. Limited studies have been made on radio programme and no studies have been done on the listener's point of view. Hence the study has been undertaken. The study will deliniate the listening habits of the listeners of the Kerala Farmers.

8. Technical programme

1. Exploratory study: An explorary study will be undertaken to understand the programme content of farm broadcasts given by A.I.R., Trivandrum.
2. Sampling: An appropriate sample of farmers (listeners) will be selected through random sampling process.
3. Data collection: Data will be collectedthrough questionnaire and interview schedules relevant quantifying techniques will be used to measure the variables under study.

9. Estimate of expenditure and receipts, if any — Rs.1,000/= towards mailing charges and duplicating materials to be used for questionand interview schedules.

10. Location of Research if outside the College campus.

Trivandrum District.

Sd/-
Signature of candidate.

Sd/-
Signature of Chairman Advisory Committee.

Sd/-
Signature of Head of Department.

Sd/-
Signature of Dean

Fifth FRC. S.No.779

KERALA AGRICULTURAL UNIVERSITY

1.	Name of candidate	P.Muthiah Manoharan
2.	Date of admission and admissionNo.	10.10.1977 77.11.22
3.	Name and designation of Chairman, Advisory Committee	Dr.E.Thiagarajan Nair, Assoc.Prof. of Agrl.Extension.
4.	Topic of research for thesis.	Study on roll of leadership in Agrl. development in - Rural areas in Kerala"
5.	Objectives	xx

1. To identify local leaders and to study their role perception in Agricultural development.
2. To study the role performance of identified leaders.
3. To identify the factors associated with the effective role performance of leaders in agricultural development.

6. Brief review of previous work done on the topic.

Dhillon (1955) classified leaders as Primary, Secondary and Tertiary depending on the relative importance of the individual in the village affairs.

Hitchock (1959): Presented the case studies of two leaders, one traditional and other non-traditional. His observations were that the traditional leaders became out dated and a new dynamic leadership emerged to make the villagers respond to its changing needs.

Rao (1966): Concluded that four types of leaders were existing in all the villages under study. They were institutional, special interest, voluntary and Professional leaders, out of these four types institutional leaders were in the majority and they were considered as the village wide leaders by the villagers.

Reddy (1966): Identified four types of leaders namely traditional leaders, caste leaders, political leaders and functional leaders.

Sahey (1966): Identified three major patterns of leaders in Malar and Santhal tribes of Santal Parganas (Bihar). i.e. traditional emergent.

7. Scientific or practical importance of the research:

Local leaders have to play an important part in the agricultural development; The study will bring out the factors associated with the effective performances of local leaders in agricultural development, which can be useful for improving the efficiency of extension work through the leaders.

8. Technical programme:-

1. Exploratory study:- An exploratory study will be undertaken to formulate hypothesis for the study.

2. Sampling: An appropriate sample of village leaders will be selected by random sampling process.

3. Data collection:- Data will be collected through personal interview, with the help of an interview schedule developed and pre-tested for the study. Approximate quantifying techniques will be used to measure the variabilities in the study.

4. Analysis:- Suitable statistical techniques will be used to analyse the data.

9. Estimate of expenditure and receipts if any — Rs.500/= towards purchase of stencil papers, ink, etc. for cyclostyling the interview schedule.

10. Location of research if outside college campus — Trivandrum District.

Sd/-
Signature of candidate

Sd/-
Signature of Chairman
Advisory Committee

Sd/-
Signature of Head of Department.

Sd/-
Signature of Dean.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Agricultural Extension.

1. Name of the Research Centre: Department of Agrl. Extension College of Agriculture, Vellayani.

2. Project No. : Ag.16.18.Ext.17

3. Title of the project : Impact of Applied Nutrition Programme on the beneficiaries

4. Name(s) and Designations of:

a) Project Leader : Sri. A.G.G. Menon, Professor

b) Associate(s) : Dr. L. Prema, Assistant Prof.

5. Objectives :
1. To investigate the extent to which the objectives of the programme have been achieved.
2. To find out the factors influencing the implementation of the programme.

6. Practical utility : The results of this study will be helpful to streamline the programme.

7. A short review of literature : Different aspects of the implementation of the Applied Nutrition Programme in Kerala State have been studied by the Department of Agricultural Extension, Kerala Agricultural University and also by the Department of Health Services, Kerala (Mukundan 1972). But a comprehensive study at the state level on this subject has not been conducted so far.

8. Technical Programme : Evaluation of the various programmes will be conducted by using participant samples and shadow samples. Appropriate tools will be developed to collect data. Data will be put to appropriate statistical tests.

(contd...)

9. Date of start : 1--5--1978

10. Likely date of completion: 31--4--1981

11. Additional facilities required : Nil

12. Approximate cost : Rs.1,000/-

13. Signature of :

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

Fifth F R C. S.No.783.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Agrl.Extension

1. Name of the Research Centre: Department of Agrl.Extension, College of Agricutlrue, Vellayani.

2. Project No. : AG.16.18.Ext.18

3. Title of Project : Relative effectiveness of selected extension methods in imparting knowledge of the food and nutrition among the rural and urban beneficiaries of Nutrition Programme.

4. Name(s) and designation of:-

a) Project Leader : Sri. A.G.G. Menon, Professor of Agricultural Extension.

5. Objectives :
1. To determine the most effective combination of selected extension methods for imparting knowledge to the beneficiaries of Nutrition Programme.
2. To find out the association between the socio economic personal characteristics.

6. Practical utility : This study will yield results which will be helpful to select the most suitable combination of extension methods for diffusion of innovations among women.

7. A short review of literature : Various authors have conducted studies on relative efficiency of various extension methods Misra, Singh, Vishnoy, Jalihal and others have reported increased effectiveness in combining different extension methods under different socio-economic situation. But no such studies have been conducted in Kerala.

(contd...)

8. Technical Programme : The study will be conducted among the participants of the ANP camps in Trivandrum District. Selected extension methods will be employed to impart knowledge of food and nutrition. The retension of knowledge will be measured with the help of a pretested structed questionnaire. The data collected will be put to appropriate use.

9. Date of start : May 1978

10. Likely date of completion: May 1979

11. Additional facilities required : Nil

12. Approximate cost : Rs.300/-

13. Signature of:

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

Fifth F R C. S.No.784.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture : Department of Agrl.Extension

1. Name of the Research Centre : Department of Agrl. Extension, College of Agriculture, Vellayani.

2. Project Number : Ag.16.18.Ext.19.

3. Title of the Project : Impact of the Economic programmes of UNICEF at NES Block, Vamanapuram.

4. Name and Designation of
   a) Project Leader : Dr. L.Prema, Assistant Professor.
   Sri. A.G.G. Menon, Professor of Agrl. Extension

5. Objectives :
   1. To investigate the extent to which the objectives of the programme have been achieved.
   2. To find out the attitude of beneficiaries towards the programme.
   3. To find out the influence of socio-economic personal characteristics of the beneficiaries on their attitude towards the programme.

6. Practical Utility : The economic programme is to be started as a pilot project during 1978-79 in Kerala in the NES Block, Vamanapuram. The programme is completely financed by the UNICEF and implemented by the Department of Development. The programme may cover 4,000 rural families in the NES Block, Vamanapuram and the main objectives of the programme is to make the beneficiaries, self sufficient in all aspects. other agencies like NCERTC and Tribal welfare department are also involved in the implementation of the state. Eventually the programme will be introduced in all the NES blocks. An evaluation study of the above programme will be suitably modify the programme ~~will be suitably modify the programme~~ before its introduction in all the blocks in the state.

7. Short review of literature: No review pertinent to this area of study is available.

8. Technical Programme : Various types of surveys, clinical examinations anthropometric studies and bio-chemical studies will be taken upto evaluable the nutritional status of the beneficiaries of the programme. Appropriate measuring tools will be developed to find out the attitude of the beneficiaries.

9. Date of start : 1--5--1978

10. Date of completion : 31--4--1983

11. Additional facilities required : Nil

12. Approximate cost : Rs.2,000/-

13. Signature of:

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Agrl. Extension

1. Name of the Research Centre: College of Agriculture.

2. Project No. : Ag.16.18. Ext.20

3. Title of the Project (This should indicate the nature of work) : Inpact of Popular Agrl. periodicals on the dissemination of improved Agrl. practices among the farmer in Kerala State.

4. Name(s) and designation of:

(a) Project Leader : K.I. Thomaskutty, Instructor.

5. Objective :
1. To study the reading ease and human interest in articles.
2. To estimate overall readability of articles. and
3. To determine the timeliness coverage of subject matter practicability, accuracy of information etc. of the articles.

6. Practical Utility :

7. A short review of literature: Khandekar and Mathur(1975) have conducted a similar study on the effectiveness of "Unnat Krishi" Magazine.

8. Technical programme (in brief) : Data will be collected from a sample of Kerala Karshakan readers. Appropriate tools will be developed to collect data and suitable statistical method will be used to analyse the datas.

9. Date of start : December 1977

10. Likely date of completion: November 1978

11. Additional facilities required:

12. Approximate cost : Rs.100/-

13. Signature of :

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

Third F R C. S.No.786.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture : Department of Agrl.Extension

1. Name of the Research Centre : Department of Agrl. Extension College of Agriculture, Vellayani.

2. Project No. : AG.17.18.Mu+.3

3. Title of Pfoject : Studies on food habits

1) Survey of the food habits of the rural people of Kerala.

4. Names and Designation of:

a) Project Leader : Dr. L.Prema, Assistant Professor

b) Associate(s) : Sri. A.G.G. Menon, Professor of Agrl. Extension.

5. Objectives :

1. To find out the food consumption pattern of rural people.

2. To study the attitude of people towards various foods.

6. Practical utility : The results of the study will be useful when nutrition education programmes are planned.

7. A short review of literature : Dietary studies to find out the food intake and consumption pattern of population in various states including Kerala have been conducted by National Institute of Nutrition in 1940s and 1950s. and by the Department of Health Services, Kerala in 1970. But studies regarding the attitude tastes, preferences and purchasing habits of people in Kerala concerning various local foods have not been conducted in Kerala.

8. Technical Programme : Structured questionnaire/interview schedule will be evolved to collect data. The data collected will be put to appropriate statistical tests.

(contd...)

9. Date of start : 1--5--1978

10. Likely date of completion: 31--4--1980

11. Additional facilities required : Nil

12. Approximate cost : Rs.300/-

13. Signature of :

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

Fifth F R C. S.No.789.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Agrl.Extension

1. Name of the Research Centre : Department of Agrl. Extension, College of Agriculture, Vellayani.

2. Project No. : Ag.17.18.Nut.1(2)

3. Title of Project : A study on the shelf life of preserved tapioca and sweet potato by different indigenous methods in Kerala State.

4. Name(s) and Designation of:

a) Project Leader : Dr. L.Prema, Assistant Professor.

b) Associate :

5. Objectives : To find out the changes in moisture, colour, smell, taste, taxture, presence of Weevils and fungal growth in the processed foods during the shelf life.

2. To find out the acceptability of the processed foods among farming community periodically.

3. To suggest improved methods of preservation ~~of~~ processing these crops.

6. Practical utility : A project on the utilisation of tubers and root vegetables is sanctioned for the University by ICAR and the present project will be taken up when necessary sanction is obtained.

7. Short review of literature : A number of studies on shelf life of tubers have been conducted by CFTRI (Mathur et al Singh et al Kapur et al etc.) to find out the influence of storage on weight loss sprouting, changes in sugar content, discolouration, injuries etc. These studies are with special reference to cold storage. But studies on indegenous methods of storage of tubers have not been conducted in this aspect, so far.

(contd..)

8. Technical Programme : The processed crops will be stored in the common methods adopted by the farm familites in Kerala. The changes in various aspects as mentioned above will be noted periodically (once in a week) and the study will be conducted for 6 months. The palatability and the acceptability of these stored foods will also be tested periodically. Between methods of storage will be recommended.

9. Date of start : 1--12--1978

10. Likely date of completion: 1--12--1979

11. Additional facilities required : Nil

12. Approximate cost : Rs.5,000/- (ICAR funds available for the study)

13. Signature of :

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

Fifth F R C. S.NO.789.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Agrl.Extension

1. Name of the Research Centre : Department of Agrl. Extension, College of Agriculture, Vellayani.

2. Project No : AG.17.18.Nut.2

3. Title of Porject : A study on the current methods of preparation and preservation of tubers by indigenous methods in Kerala State.

4. Name(s) and designation of:
   a) Project Leader : Dr. L.Prema, Assistant Prof.
   b) Associate(s) : Sri. A.G.G.Menon, Professor of Agrl. Extension.

5. Objectives :
   1. To identify the common methods of preparation and preservation of tubers by different indegenous methods.
   2. To find out the defects of the above methods.

6. Practical utility : The results of the study will be the base line data, on the basis of which methods of better utilisation of tubers can be suggested.

7. A short review of literature : Such studies have not been conducted in out state.

8. Technical Programme : A questionnaire covering the aspects will be evolved and sent to the areas where these crops are produced in large quantities. The areas will be finalised with the help of the Central Tuber Crops Research Institute experts in Trivandrum and data will be collected through Block Agencies.

9. Date of start : 1--5--1978

10. Likely date of completion: 31--5--1979
11. Additional facilities required: Nil
12. Approximate cost : Rs.200/-
13. Signature of :

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

Fifth F R C. S. No.788.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agrl.Engineering

1. Name of Research Centre : College of Agriculture, Vellayani

2. Project No. : AG.19.18.Eng.2

3. Title of the Project : Preliminary studies on mechanical control of floating type quatic weeds.

4. Name(s) and designation of

a) Project leader : Dr. Jose Semuel

5. Objectives:

1) To study the physical properties of floating type aquatic weeds particularly Salvinia auriculata relevant to mechanical harvesting.

2) To develop concepts, construct models and select promising approaches for mechanical control of floating type aquatic weeds.

3) To design, fabricate and field test proto type devices for manual as well as mechanical operation.

6. Review of literature:

One of the unique problems faced in Kuttanad, the rice bowl of Kerala, is the menace caused by the floating type aquatic weed Salvinia moleate. The weed locally known as African Payal, has spread to much of the relatively stagnant water surfaces in all districts of the state within the last decade. Capable of prolific growth, it spreads like a blanket over the water surface in paddy fields and canals causing hinderence to cultivation, in land navigation and even fishing.

From some years in the past efforts have been made which are still continuing to eradicate the weeds through chemical and biological methods, although mannual methods of physically removing the plants remain to be the only effective methods. Since manual removal of Salvinia is very expensive and time consuming, mechanical harvesting has been considered as perhaps the best means to harvest weeds economically.

Although mechanical control of aquatic weeds is believed to be a sound management approach. Livermore(1971) has pointed out that the present day equipment available indeveloped countries are too expensive in relation to the benefits derived and those available are mainly meant for harvesting ditch bank weeds and submerged weeds.

....

Some isolated attempts have already been made locally to develop suitable equipment for mechanical harvesting of the weed in Kerala rather than identify and import such machines. Examples of such equipment, are the one developed by the Central Institute of Fisheries Technology, Cochin and the one under development at Kottayam sponsored by the State Agriculture Department. The former appears to be a very expensive machine with a price of tag of about Rs.1 lakh and the latter to still in the initial stages of development.

There appears urgent need for developing a range of equipment for small as well as large scale harvesting purposes andhence the proposal to undertake academic studies as a prelude to large scale development research in this area.

7. Practical Utility:

The Project envisages the study of the problem of mechanical control of Salvinia more on a scientific basis. The results of the study will be made available to a proposed ICAR scheme where detailed design and development work on mechanical equipment will be undertaken leading to more economical methods of controlling the weed.

8. Technical programme:

1. A general survey of origin andspread of the weed in the state.

2, Gather information on the biology and physical properties of the plant.

3. Device tests and equipment to study physical properties and mechanical behaviour of the plant in relation to its harvesting.

4. Develop concepts for devices to harvest the plant using small scale machanical power.

5. Develop concepts for devices to harvest the plant using manual labour.

6. Design and fabricate models and prototype of such equipment and carry out field tests on a limited scale.

7. Prepare a comprehensive report on the work done to guide future development work.

9. Date of start : As soon as the project is approved.

10. Date of completion : Two years from the date of start(1979)

11. Additional facilities required: 1. Field facilities in infested area
2. Engaging short term consultants, draftsman, skilled machanics and research assistants.
3. Equipment such as weighing balance motor bost etc.

12. Approximate cost : Rs. 5,000/=

13. Signature of :

Sd/= Sd/= Sd/=

Project leader Head of Department Director of Research

Third FRC S.No. 791

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agrl. Engineering

1. Name of Research centre : College of Agriculture, Vellayani.

2. Project No. : AG.19.18.Eng.6

3. Title of the Project : Development of a low-cost paddy drier.

4. Name and Designation of
   a) Project leader : Mr.M.S.Thomas
   Lecturer in Agrl. Engineering.

   b) Associates : 1) Dr.Jose Samuel, Head,
   Department of Agrl. Engineering
   2) Sri. Jacob John, Associate
   Professor in Agrl. Engineering.

5. Objective: : 1. To evaluate alternate paddy drier designs available from different sources.
   2. To fabricate and test a few promising designs.
   3. To select and or evolve a design suitable for conditions in Kerala and capable of local fabrication.

6. Literature review and utility : Many institutions in India and abroad have been and are still engaged in developing designs for low-cost paddy drivers suited for use in the developing countries. Such designs, however have not been adopted in Kerala so far in spite of dire need for such equipment for reasons which are yet unclear.

7. Technical programme : 1. To gather information on drying principles used in different types of paddy driers and evaluate their performance and economic of operation.

   2. To fabricate and test a few promising designs.

   3. To select or evolve suitable furnace, blower and bin desings to provide a low-cost paddy drier suitable for conditions in Kerala.

8. Date of start : As soon as the project is approved.

....

9- Date of completion : To years from the date of start

10. Additional facilities required : 1. Provisions to collaborate with persons with innovative ideas.

11. Approximate cost : Rs.5,000/=

Sd/=	Sd/=	Sd/=
Project leader	Head of Department	Director of Research

Third FRC S.No. 795

KERALA AGRICULTURAL UNIVERSITY

1. Name of the Research centre : Department of Agrl. Engineering
   College of Agrl. Vellayani.
2. Project No. : AG.19.18.Eng.7
3. Title of the project : Preliminary studies on equipment and systems for soil excavation for reclamation of Kayal areas.
4. Name and designation of
   a) Project leader : Dr.Jose Samuel
      Associate Professor of Agrl.Engg.
   b) Associate : Mr. Jippy Jacob
      Instructor in Agrl. Engineering.

5. Objectives:

   1) To develop concepts for simple manually and mechanically operated implements and equipment for excavating soil from below standing water.
   2) To construct models and conduct field trials to select promising approches.
   3) To design and fabricate prototypes and carryout field tests of such equipment.
   4) To develop concepts handling the extracts soil to reduce drudgery and improve efficiency of the work.

6 & 7 Litereture review & practical utility:

At present the work is done manually using small scops. This is laborious and time consuming. It is proposed that implements could be developed to lighten this work and make it more efficient.

8. Technical programme:

   1) Several innovative concepts for extraction of mud from below standing water will be developed.
   2) Models of promising design concepts will be fabricated and trials conducted at Vellayani.
   3) Based on promising concepts and trial results, prototype design of soil extracting tools will be undertaken and theunits field tested in Kuttanad area.
   4) Alternative systems for soil extraction and handling will be investigated.
   5) Trial studies on the few promising systems will be taken up and field tests carried out.
   6) A report on the findings will be prepared with recommendations for future development work.

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9. Date of start : As soon as approved.

10. Date of completion : Two years from the date of start.

11. Additional facilities required :
    1) Facility for engaging short term research assistants, consultants, design draftsmen and skilled machanic.
    2) Engaging hiring boats and special conveyance in the absence of official transport to facilitate speedy execution of the project.

12. Approximate cost : Rs.5,000/=

13. Signature of:

Sd/-	Sd/-	Sd/-
Project leader	Head of Department	Director of Research.

Third FRC. S.No. 796

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agrl. Engineering

1. Name of the Research Centre : College of Agriculture, Vellayani

2. Project No. : AG.19.18. Eng. 8

3. Title of the Project : Development of low-cost garden tractor.

4. Name(s) and Designation of:

a) Project leader : Dr.Jose Samuel,
Head, Department of Agrl.Engineering.

b) Associates : 1. Sri. Jacob John,
Associate Professor of Agrl.Engg.

2. Sri. Jippu Jacob,
Instructor in Agrl. Engg.

5. Objectives : To evolve a design for a garden tractor which would be of:

1)Low-cost.

2) Light weight, etc.

6. Literature review : Power tiller produced in India are available only in horse-power range of 5-12-H.P. In many instances the sophisticated designs makes the equipment heavy and of high-cost. Consequently they cannot be effectively used in highly undulating garden lands of Kerala where multiple cropping is common. Tillage and weeding operations are therefore carried out manually which in fact add heavily to the cost of production and as a result there areas cannot adequately cultivated. There is therefore considerable scope for the development of garden tractor of light weight and low-cost.

Some initial work in the development of such atractor was initiated some years ago by the project leader at Vellayani which would not be persued owing to unavoidable reasons. It ishoped to continued this project from where it was left off earlier.

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7. Technical programme :

   1. Design and fabricate an improved version of the basic design evolved earlier.

   2. Carry out trial tests on the proto-type

   3. Modifications and retesting until a satisfactory design, is developed.

8. Date of start : As soon as the Project is approved.

9. Date of completion : Two years from the date of start.

10. Additional facilities : 1. Equipment to serve as prime mover and also for testing.

    2. Provision to engage services of skilled personnel.

11. Approximate cost : Rs. 5,000/=

Sd/-	Sd/-	Sd/-
Project leader	Head of Department	Director of Research.

Third FRC S.No. 797

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Agrl. Engineering

1. Name of the Research centre : Agricultural College, Vellayani.

2. Project number : AG.19.18.Eng.9

3. Title of the project : Design and Fabrication of a wind powered water pump.

4. Name(s) and designation of :

   a) Project leader : Jippu Jacob, Instructor in Agrl. Engineering.

   b) Associate(s) : 1. Mr. M.S.Thomas, Lecturer in Agrl. Engg.

   2. Mrs. A.N.Rema Devi, Asst. Professor in Agrl. Engineering.

5. Objective : To harness the wind power available along the coastal line of Kerala and utilise it for water lifting.

6. Practical utility : 1. Water lifting from shallow sources without additional running coast.

   2. Mechanism could be fabricated with locally available skill.

7. Technical programme : 1. Model of the same isto be designed, fabricated and tested in the laboratory.

   2. A prototype isto be designed, fabricated and tested in the field conditions.

   3. Necessary modivations and redesigns.

   4. Final product fabrication and testing.

8. Date of start : As soon as the project is approved.

9. Likely date of completion : On year from the date of start.

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10. Additional facilities required : All the fabrication work of different elementsof the machine will have to be done at local workshops.

11. Approximate cost : Rs. 3,000/=

12. Signature of:

Sd/-	Sd/-	Sd/-
Project Leader	Head of Department	Director of Research

Third FRC S.No. 798

KERALA AGRICULTURAL UNIVERSITY

Scheme for Application of Jet Pumps for Low-Lift Irrigation

Faculty of Agriculture — Department of Agrl. Engineering.

1. Name of Research Centre : College of Agriculture, Vellayani.

2. Title of the Project : Application of jet pumps for low-lift irrigation.

Project No. : AG.19.18.Engg.10

3. Name(s) and designation of :

a) Project leader : Dr.Jose Samuel,
Associate Professor and Head,
Department of Agrl. Engineering.

b) Associate : Mr. M.S.Thomas,
Lecturer in Agricultural Engineering.

4. Objectives : 1. To design and install a jet pump attachment to an existing high pressure pump to sutdy the feasibility of such systems for low lift as well as high lift pumping operations.

2. To design and develop a self propelled canal pumping unit for supplementary irrigation of rice.

5. Literature review and practical utility : The concept of centrifugal jet pump combination for low lift application has been successfully develped by present project leader during 1975-76 while working at the International Rice Research Institute, Philippines. The application of this principle for specific pumping requirements requires additional design and development work. Two typical situations of pumping confronted in Kerala are the use of high pressure pumps for sprinkler irrigation in coconut gardens, and canal pumping operations for supplementary irrigation of rice fields. At present, it is uneconomic to utilize these high pressure pumps for paddy pumping in the valley bottoms. Similarly, for canal pumping the equipment used at present are manually operated water wheels and

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: power operated centrifugal pump sets. These equipments are quite heavy and once installed in a paddy field, it is difficult to move them about and hence the utilization of such equipment remains limited to the same paddy field only. This in turn makes the equipment increased cost of operation. It is hoped that the use of a jet attachment will make the pumping operations of both situations more efficient and flexible and thereby contribute lower costs of production and higher profits.

6. Technical programme:

a. Studies on jet pump attachment for an existing high pressure pump.

1. Survey of locations where combinations of low lift and high lift pumping can be beneficial.

2. Identification and collaboration with a co-operating owner-farmer who already possesses a high pressure pumping unit. It is envisaged that he should be willing to make available his facilities for the study in return for an agreement that the experimental equipment will be donated to him on completion of the present study for continued use and periodical reports on the working of the system.

3. Design and fabrication of the attachment to match the existing pumping unit and low lift pumping requirements.

4. Installation of the device and testing including modifications until satisfactory matching is achieved.

5. Studies on the performance of the systems and economics of its operation.

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b) Studies on self-propelled canal pumping unit.

1. Repairing and reconditioning two engine driven pumpsets available in the department for possible use and alternative prime movers for the proposed self-propelled unit.

2. Design of a floating platform and a jet pump attachment for the centrifugal pump to make the unit self propelled.

3. Additional design to use the attachment for high volume pumping to the paddy fields.

4. Fabrication and testing of the units including modifications until satisfactory design performance is achieved.

5. Study the performance of the unit in the fields of co-operating farmers and work out the economics of operation of such units.

7. Date of start - As soon as approved.

8. Date of completion - Two years from the date of start.

9. Additional facilities - 1. There is lack of supplementary staff for speedy implementation. The engagement of apprentice diploma or graduate engineers may, therefore, be permitted to assist us in this work.

10. Approximate cost - Rs.5,000/=(Rupees Five thousand) only.

11. Signature of:

Sd/	Sd/	Sd/
Project Leader.	Head of Department.	Director of Research.

Fifth FRC. SNO.799.

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

Faculty of Agriculture - Department of Agricultural Engineering.

1. Name of the Research Centre - College of Agriculture, Vellayani.

2. Title of the project - Utilisation of Filter point wells for high volume pumping.

Project No - Ag.19.18.Eng.II

3. Name(s) and designation of -

a) Project leader - Dr,Jose Samuel.
Associate Professor and Head.,
Department of Agrl.Engineering.

b) Associates - 1.Sri,Jippu Jacob.
Instructor in Agrl.Engineering.

2.Apparentics Engineer.
(To be selected and appointed)

4. Objectives: - 1. To study the pumping characteristics of representative filter point wells installed in coastal and sandy areas of the state.

2.To study the water table variations in such locations without well.

3. To install and study alternative combinations and systems of Filter point wells to utilize them for high volume pumping.

5. Literature review:

The lowering of the pressure within the well, by a pump for example, is accompanied by a lowering of the water level in and around the well. Under some conditions the construction of a single large well may be either impractical or very costly while the installation of a group of small wells may be readily and economically accomplished. The grouping of wells, however, presents problems due to interference among them when operating simultaneously. Interference between two or more wells occurs when their cones of depression overlap thus reducing the yield of the individual wells. But these problems can be circumvented by striking the wells to the correct spacing for which it is necessary to carry out studies to determine the correct spacing for a particular area or field. By doing so it is possible to obtain high discharge of water

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at a time for irrigation from all the wells. It is not known whether work of this nature has been done in Kerala.

6. Technical programme

- 1.Study the physical properties of soil.
- 2.Study the aquifer, functions like storage and conduit functions. Storage functions include porosity and specific yield while conduit function includes permeability.
- 3.Study water table variations of the area with an without wells.
- 4.Study the effects of pumping on well characteristics.
- 5.Study on interference of wells to determine the correct spacing for multiple wells.
- 6.Study on recirculation of pumped out water through irrigation and percolation.

7. Date of start - As soon as the scheme is sanctioned and an apprentice Engineer (Research Associate) is appointed.

8. Date of completion - Two years from the date of start.

9. Additional facilities required

- 1.Appointment of an apprentice engineer (research associate)
- 2.Transportation facilities for field work.
- 3.Provision to engage temporary labourers.

10. Approximate cost - Rs. 5,000/-

Signature of

Sd/ Project Leader. Sd/ Head of Department. Sd/ Director of Research.

Fifth FRC: SNO: 800.

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

Faculty of Agriculture - Department of Agricultural Engineering.

1. Name of the Research Centre - College of Agriculture, Vellayani.

2. Project Number - Ag.19.18.Eng.13

3. Title of the Project - Adaptive design and developmental work on innovation in Agricultural Engineering from Kerala and Elsewhere.

4. Name and Designation of:

a) Project leader - Dr.Jose Samuel.
Head Department of Ag.Engg.

b) Associates - 1. Sri.P.Jacob John.
Associate Professor in Ag,Engg.
2. Sri.M.S.Thomas,
Lecture in Ag.Engg.
3. Sri.Jippu Jacob,
Instructor in Ag.Engg.

5. Literature Review:

Several Institutions like IRRI,ITDG,IITA and MARDI have been and are still actively engaged in developing appropriate technological applications for rural development. Much of their machinery development work is of considerable interest in Kerala, but little adaptive design work has been done to introduce those equipment to the state (The liquid injector originally designed at IRRI and now being tested in Kerala is an exception)

6. Technical programme

1. Scan and select promising concepts and designs from international institutions for adoption and adaptation in Kerala.

2. Procure design drawings and other technical advise on the fabrication or purchase of such equipment.

3. Procure of fabricate such equipment and carry out adaptive design to made them suitable for use in Kerala.

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4. Search, study, encourage and associate as well as assist in the development of innovative ideas and equipments, developed by both professionals and non-professionals applicable for modernization of Kerala Agriculture.

Note: Examples of such work are:

1. Modification of Japanese thresher as a drum thresher and.
2. Fabrication of and testing of mini thresher originally carried out at IRRI.
3. Assessment of aquatic weed harvester, rice huller, and tapioca puller reparted from Kerala and their improvement.

7. Date of start - As soon as the project is approved.

8. Date of completion - Conceived as a continuing project.

9. Additional facilities:

1. Need to engage draftsmen and skilled mechanic on short-term or long term basis.
2. Provision to visit innovators and assess their ideas and equipment to make recommendations on the steps for their development.
3. Establishment of agenaral policy on the procedure to follow in the assistance, patenting, and grant of royalty to innovators.

10. Approximate cost - Rs. 5000/- for one year.

11. Signature of:-

Sd/	Sd/	Sd/
Project Leader.	Head of Department.	Director of Research.

Third FRC:.

KERALA AGRICULTURAL UNIVERSITY

1. Name and address of the University/Institution : Kerala Agricultural University, Mannuthy, Banana Research Station, Kannara.

   Project No. : AG.22-15.Agron.2

2. Actual location where the research work will be carried out : Vellanikkara Rubber Estate.

3. Name of scheme : The control of Eupatorium Odaratum with the aid of herbicides in rubber plantation.

4. Information regarding the principal investigator :

   Name and designation : Dr.M.N.E.Nayar
   Associate Professor(Plant Physiology)
   Banana Research Station, Kannara.

5. Objective:

   a. To study the effect of weedicides on the control of Eupatorium.
   b. Economics of weed control with herbicides.

6. Practical/Scientific utility: Control of Eupatorium by normal cultural operations is very difficult and expensive. Hence it is imperative to find out a suitable herbicide or herbicidal combination that can control Eupatorium thereby to reduce the cost of cultivation considerably.

7. Review of Research Conducted/being conducted in India and abroad : No work ~~has~~ seems to have been carried out in India.

8. Technical programme : A slash weeding will be given in june- July. After weeding, when the regulator has attained at least a foot and half in height the first spraying will be carriedout in the month of September. A spotting will be given after 15 days if found necessary.

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Treatments:

1. Gramaxone 600 ml. + 500 gm 2-4 Na salt/acre in 200 lit of water/acre
2. Gramaxone 600 ml. + 750 gm 2-4 Na salt/acre in 200 lit of water/acre
3. Gramaxone 600 ml. +1000 gm 2-4 Na salt/acre in 200 lit of water/acre
4. No weeding
5. Slash weeding

Replication : 4
Plot size : 10 m x 5 m

9. Date of start :
10. Likely date of completion : One year
11. Facilities : The Imperial Chemical Industries will be supplying the required chemicals free of cost for the project and KAU
12. Approximate cost : Rs. 150/=
13. Signature of Principal Investigator :

Sd/-	Sd/-	Sd/-
Project Leader	Head of Department	Director of Research

Fourth FRC S.No. 835

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

Faculty of Agriculture : Department of Agril. Statistics.

1. Name of the Research Centre : Department of Agril.Statistics, College of Agriculture, Vellayani, Trivandrum- 695522

2. Project No : AG.25.18.Stat.4

3. Title of Project. (This should indicate the nature of work) : study of the meteorological data of all the reporting stations in Kerala State, South of Ernakulam District.

4. Name (s) and designation of :

a) Project Leader : Sri.M.P.Abdurazak, Instructor, College of Agriculture, Department of Agricultural statistics, Vellayani.

5. Objectives : Data on weather elements are being reported from a large number of stations in Kerala State. The data are used only to find the normals over a number of years. These same data can be utilised to form estimates for future periods. It is intended to utilise the data to predict weekly and monthly rainfall so that cropping patterns can be suitably oriented.

6. Practical Utility : Study of the variability of the weather elements gives an estimate of the reliability of the normals obtained. Further the prediction of rainfall and number of rainy days will be useful for planning Agricultural operations. A similar study for regions north of Ernakulam District (including Ernakulam District) is being undertaken by the Department of statistics, College of Veterinary & Animal Science, Mannuthy.

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7. A short review of literature: The National Commission and Agriculture has pointed out the lacunae in the publications of meteorological data. They have recommended publications of the standard errors of means of weather elements along with the means (normal) studies in the Orissa University of Agriculture, have brought out a probabilistic analysis of weekly rainfall at Bhybaneswar. In Haryana similar studies have been utilised for demarcating the state into 14 soil climatic zones. Data from Pattambi Research Station have been analysed to arrive at the expected monthly rainfall and number of rainy days during a normal year.

8. Technical Programme : Data from 44 weather reporting stations in Kerala State are to be collected. To start with data on rainfall and number of rainy days will be collected. Weekly and monthly means and standard deviation will be computed. Point and interval estimates of weekly and monthly rainfall and number of rainy days will be computed. Attempt will be made to classify the stations into clusters having the same weather elements.

9. Date of start : June 1977.

10. Likely date of completion : June 1978.

11. Additional facilities required : Nil

12. Approximate cost : Nil

13. Signature of

SD/	SD/	SD/
Project Leader	Head of Department.	Director of Research.

Third FRC. SNO. 875.

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

Faculty of Agriculture - Department of Agrl Statistics.

1. Name of the Research Centre : Department of Agrl. Statistics, College of Agriculture, Vellayani.

2. Project No : AG 25.18.Stat.5

3. Tile of the Project : Futurology studies.

4. Name and designation of

a. Project Leader : Sri.E.J.Thomas, Professor, Department of Agril. Statistics, College of Agriculture, Vellayani.

b; Associate :

5. Objectives : Around 2000 Ad, India's population will have doubled compared to what it was in 1971. Projections or futurology studies for the whole of India are way in many institutions. This study aims at obtaining projections on population, requirements of necessities of life, requirements of agricultural inputs. agricultural production etc for the year 2000 AD based on the existing trends of values and also on the declared objectives of planning.

6. Practical utility : The results of the study can be utilised as a guide line for preparing perspective tives in planning for Kerala State, so that the quality of life of the population can be improved and the rate of economic development can be maximised.

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7. A short review of literature

: Futurology studies have been attempted for India by different groups of workers, the most noted contribution being from the Ford Foundation sponsored group which has the following publications.

1. Population - Jaipal P. Ambannavar. V.M.Rao

2. Food - V.M.Rao

3. Water - M.C.Chaturvedi.

4. Economy - F.A.Mehta

5. Energy - Kirit Parikh

6. Industry - Hannan Ezekiel.

7. Services - Hanan Ezekiel and Madhoo Pavaskar.

(Published by Macmillan.

As far as Kerala State is concerned no futurological studies have been done, eventhough the Plan proposals contain the objectives and proposed targets of the Plant.

8. Technical Programme --Data regarding population, area under crops consumption goods, consumption of agricultural inputs, agricultural production and related aspects will be collected for the available periods and methods of Projection will be utilised assuming various alternative paths for develop. ment, for getting the estimates for the year 2000 AD.

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9. Date of start - April 1978

10. Likely date of completion - 1980

11. Additional facilitities required - Nil

12. Approximate cost - Nil

13. Signature of:

Sd/
Project Leader.

Sd/
Head of Department

Sd/
Director of Research.

Fifth FRC. SNO: 876.

KERALA AGRICULTURAL UNIVERSITY

PROJECT PROPOSAL

Institute code No :

Project No : AG.25.20.Stat.9

1. Name of the Research Centre : College of Veterinary and Animal Sciences, Mannuthy.

2. Title of the Project : Research on Miscallaneous items-Statistics.

3. Title of the Problem : Estimation of Meterorological factors in various centres of Kerala to the north of Ernakulam (including Ernakulam .

4. Name -s- and designation of:-

a. Project Leader : Sri.K.V.Sunny.Instructor.

b. Associate : Dr.F.U.Surendran, Professor of Statistics.

5. Objectives : To estimate the magnitude of certain factors influencing climate viz. rainfall, humidity, temperature, wind velocity etc. in various centres of Kerala to the north of Ernakulam- including Ernakulam- on the basis of data collected from such centres, as far as possible from their incention. As these centres are found to be collecting only information on rainfall, we are constrained to confine the study to rain fall only.

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6. Practical utility : Agricultutal operations in Kerala, to a large extent depend upon climate. Hence advance information about the climatic condition and an estimate of the various factors for different periods of the year at desired confidence leaves will certainly help farmers in planning their agricultural operations accordingly.

7. Technical Programme : Basic data on rainfall at the various centres will be collected from the records maintained at the office of the Director, Bureau of Economics and Statistics, Trivandrum. The data collected will be analysed according to a method developed by the Department of Statistics College of Veterinary and Animal Sciences, giving estimates of weekly rain fall for each of the centres.
At attempt will be made to identify centres with similar climatic conditions. The results will be brought out in the form of a Hand book which will be useful for reference.

8. Date of starting : July 1977.

9. Date of completion : December 1978.

10. Additional facilities required : Nil

11. Approximate cost : Travelling Allowance -Rs.1000.00
Printing charges and Misc -Rs. 500.00
Total Rs.1500.00
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12. Signature of

SD/
Project Leader.

SD/
Head of Department.

SD/
Director of Research.

Third FRC. SNO: 880.

KERALA AGRICULTURAL UNIVERSITY

1. Institution code No -

2. I.C.A.R.Code No - AG.25.20 .Stat.10

3. Name and address of Research Institution/ Centre - College of Veterinary and animal Sciences, Mannuthy.

4. Title of the project --Research on Misceallaneous items Statistics.

   Title of the problem - Pattern and intensity of cropping in a village.

5. Name and designation of the Principal investigator - Dr. P.U. Surendran, Professor of Statistics,

6. Name -s- and designation -s- of associates - Nil

7. Location - Department of statistics College of Veterinary & Animal Sciences, Mannuthy.

8. Objectives:-

It is generally felt that the cultivators do not put the land in their possession to maximum use thereby accentuating unemployment or under employment in rural areas. The practice also causes fall in production and productivity. The scheme envisages the estimation the extent of these phenomena in a village in Trichur District.

b. Practical utility:-

The extent to which agriculture can provide additional employment and increase in production and productivit y in a village can be studied.

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9. Technical programme - From the agricultural holdings of a rural village in Trichur District a total of 120 holdings will be randomly selected with probability proportional to size. Data needed for the study will be collected from those who are in possession of these holdings by detailed interviews. A questionnaire will be used to help the interviews.

10 Date of start --1977-78

11. Likely date of completion - March 1978

12. Estimated man months - 12

13. Facilities required - An investigator, preferably an agricultural graduate will have to be engaged as an investigator for a period of two months for taking the sample and collecting the information

14. Financing organization - Kerala Agricultural University.

15. Approximate cost - Rs. 1300/-

16. Signature of:

SD/ SD/ SD/
Project Leader. Head of Department. Director of Research.

Third FRC : SNO: 881.

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

1. Faculty of Agriculture : Department of Plant Pathology, Microbiology section.

2. Project No : AG.25.18.Microbiol.I

3. Title of the Project- This should be indicate the nature of work- : A scheme for the studies on preservation of neera.

4. Name -s- and designation of:-

a. Project leader : Ignatius D.Konikkara Assistant Professir '

b. Associates : P.V.Paily, Associate Professor, Dr. Dr.K.P.Rajaram, Associate Professor.

5. Objectives:

To study microbes associated with fermentation and spoilage of neera and to evolve a suitable process to preserve neera.

6. Practical utility:

Neera, preserved in an unfermented state would be an excellent beverage containing no alcohol. Presence of easily assimilable sugars, Vitamine and minerals in it makes such preserved neera highly nutritious.

7. A short review of literature:

Neera is the sweet toddy collected by tapping the inflorescence of common palms like Borasus, Coconut and Caryota. Neera from Borasus, is now marketed and produced in large quantities in most of the South Indian States. The fermentation of neera today is prevented by adding excess of slaked lime. This is an age old practice. The addition of slaked lime prevents the fermentation for a short period-a day or two- and further storage is conducted under refrigerated conditions. Various attempts to prevent fermentation by adding various chemicals inhibiting yeasts and bacteria have not been successful hitherto a commercial scale.

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8. Technical Programme:

Preservation of neera from coconut palm will be studied.

The present proceedute for collecting neera involves the use of earthen pots and it is difficult to ensure their sterility due to the extra-porous nature. Use of polythene containers will be tried as a better substitute. The microbial population leading to spoilage of neera in polythene and earthen containers will be compared.

The use of clay on the tapping cut is practiced, probably to prevent desicoation of the cut surface. Clay is likely to contain high counts of microbes and this may add to the spoilage of neera. A substitute for preventing the delydration of the tapping out has to be worked out eg. sterile clay.

Chemical analysis:

Detection of different sugars, starch etc and their assimilability by the resident microbes.

Microbial analysis:-

Qualitative and quantitative extimation of actinomycetee, bactoria and fungi and their role in neera spoilage, both synergistic and individual and ordered dominance of different microbes during spoilage will be studied.

Chemical preservation:

Susceptibility of microbes resident in neera to different food preservatives like Name tabisulfite, sulfur-dioxide etc.

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Physical Preservation:

Study of temperature susceptibility of different organisms in neera and efficacy of physical processes like pasteurization, autoclaving tyndallization and concentration by dehydration in improving the self life of neera.

Combination of the above mentioned chemical and physical methods is also to be studied for preserving neera.

9. Date of start : June 1977

10. Likely date of completion : One year from the date of start.

11. Additional facilities required : One or two toddy tappers to be engaged on daily wages, sanction for tapping 10 to 25 coconut palms in the farm at the College of Agriculture, Vellayani.

12. Approximate cost : About Rs.10,000/-

13. Signature of:

SD/	SD/	SD/
Project Leader.	Head of Department.	Director of Research.

Fifth FRC. SNO: 882.

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

Faculty of Agriculture : Department of Plant Pathology.

1. Name of Research Centre : Rice Research Station, Moncompu, College of Agriculture, Vellayani.

2. Project No : AG. 25.18 .Microbiol 2

3. Title of the Project : Studies on the microbial populations of kuttanad soils in relation to the crops cultivated.

4. Name & Designation of:

a. Project leader : Ignatius Knokkara, Assistant Professor, College of Agriculture, Vellayani. Till a regular hand is recruited.

5. Objectives:

The aim of the study is to assess the spectrum of microbial flora in relation to the types of crops and also to determine seasonal variations in microflora.

6. Practical utility:

The results of the studies will reveal the variation in the microbial population in the ecosystem where in saline water has been excluded by the construction of the barrier. It will reveal the type of microbes which are antagonistic to presently predominant plant pathogens of the region. Comparison with previous data could yield information on a possible change in such an antagonistic microflora. Based on the results of the studies on the activities of the resident microflora on various agrochemicals used, it will be possible to recommend suitable agronomic and cultural practice to modify the soil texture and to enchance the soil fertility.

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7. Short review of literature:

The bacterial population is least in the highly acidic Kari soils of Kuttanad. Sulphur oxidation and reduction have been reported to be significant. Thiobeillus thiocidans is the important sulphur bacterium involved in increasing the acidity of the soil. The application of Ammonium sulphate to the Kari soils enchanced the production of hydrogen sulphide. The soil facoured abundant growth of blue green algae. Liming was seen to increase blue green algal population. Technical Bulletin of Directorate of Extension Education, Kerala Agrl. University by N.S.Money and K.M.Sukumaran- 1973.

8. Technical Programme:

The study will be conducted in three regions of Kuttanad Viz. Karappadam, Kayal and Kari lands. Soil samples will be collected at fortnightly intervals from selected sports at different depths and subjected to the following analysis procedure. Color & PH will be recorded. On microscopic examination, if the population of microbes is found to be too low adequat cenrifungation of a soil suspension will be done to obtain a suitable concentrate. A suitable quantity of concentrated will be inoculated on plates of zaehcks agar Nutrient agar and Glucose yeast extract agar for isolation and enumeration of Fungi, bacteria and actinomycetes respectively. The Blue green algae will be scored by a similar technique using illuminated Allen No.3 medium. Attempts will be made to isolate microbes involved in various conversion processes of the soil. Once isolated in pure form, the predominent microbes will be preserved for conducting other studies.

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9. Date of start : September, 1977

10. Likely date of completion : September, 1980 (3 years in the first instance.

11. Additional Facilities : As per sheet attached.

12. Approximate cost : Rs.20,000/-

13. Signature of:

SD/	SD/	SD/
Project Leader.	Head of Department.	Director of Research.

Fifth FRC : SNO. 883.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture : Department of Plant Pathology.

1. Name of the Research Centre : College of Agriculture, Vellayani.

2. Project No : AG.25.18.Microbiol 3

3. Title of the Project : Studies on different strains of Rhizobia

4. Name (s -designation of :

a. Project Leader : Microbiology Unit, College of Agriculture, Vellayani.

b. Associate :

5. Objectives:

To isolate different strains of Rhizobia and assess its efficacy in nitogen fixation and also suitability for mass culturing purpose.

6. Practical utility:

Efficients strains of Rhizobia are required for legume inoculation.

7. Short review of literature:

The beneficial effects of efficient st rains of Rhizobia for legume inoculation is now an accepted fact and research for strain improvement is being carried out in many leading laboratories in India and abroad.

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8. Technical programme in brief : Strains of Rhizobia will be isolated from different legume plants growing in different tracts of Kerala and their efficacy tests (on cowpea Stylosanthes. Phaseolus and Pueraria etc. The sutability of efficient strains for mass production will be assessed. The suitability of peat available in Kerala State for preparing peat based cultures will be investigated. Field performance of the mass produced. Peat based cultures will be tested in cultivators field or in the villages adopted by the University.

9. Date of start : 1978

10. Likely date of completion : ----

11. Additional facilities required : One Instructor to be posted.

12. Approximate cost : R s.25,350/-

13. Signature of:

SD/	SD/	SD/
Principal Investigator.	Head of Department.	Director of Research.

Fifth FRC : SNO : 884.

KERALA AGRICULTURAL UNIVERSITY

FACULTY OF AGRICULTURE

Department of Plant Pathology - College of Agriculture Agriculture.

PROGRAMME OF RESEARCH FOR MASTER'S DEGREE

1.	Name of Candidate	- Ramachandran.K.
2.	Date of Admission and Admission No	- 10-10-1977 - 77-11-29
	Project No	- Ag.25.18.Microbiol.4
3.	Name & Designation of Chairman of Advisory Committee	- Sri.P.V.Paily, Associate professor of Microbiology.
4.	Topic of Research	- "Studies on Cowpea rhizobium with special reference to standardization of mass culture technique using indigenous carriers.
5.	Objectives of Research	- 1.To select a suitable Rhizobial strain (cowpea group) for acidic lateritic soil of Kerala suitable for mass culturing. 2.To test the suitability of peat/lignite available in Kerala State as a carrier for the preparation of rhizobium cultures.
6.	Brief review of previous work done on the topic (give reference to important publication/thesis)	- Studies on symbiotic Nitrogen fixation has only been recently initiated in Kerala State. Raju (1977) M.Sc.(Ag) thesis submitted to Kerala Agricultural University evaluated the efficiency of different strains of Cowpea rhizobia and also attempted to exploit their efficiency to maximum. Strain variation was not seen between strains obtained from T.N.A.U, I.A.R.I and a local isolate from Vellayani. All the rhizobial strains were highly influenced by soil reaction and application of Ca, Mg, and K.

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7. Scientific and practical importance - Studies will be helpful in the large scale production of rhizobial inoculants for leagums inoculation purpose in Kerala State.

8. Technical programme - 1. Isolation of Cowpea group rhizobial strains from cowpea and other legume plants from different parts of Kerala state with a view of slect the efficient ones for mass culturing purpose.

2. The nitrogen fixing ability of efficient strains will be tested initially under pot culture conditions and promising ones will be evaluated under field conditions.

3. Suitability of peat/ lignate available in Kerala State for mass culturing of rhizobia will be assessed.

9. Estimate of expenditure - Rs. 12,400/-(including Rs-2400/- towards fellowship)

10. Location of Research if outside college campus - ------

Place: Vellayani.
Dated: 7-2-1978

Signature of Candidate.

Signature of Chairman.
Advisory Committee.

Signature of Head of Department.

Signature of Dean.

SNO : 885.

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

Faculty of Agriculture - Plant Pathology.

1. Name of Research Centre - Department of Plant Pathology, College of Agriculture, Vellayani.

2. Project No - Ag.25.18.Microbiol.5

3. Title of the project - Studies on edible species of Pleurotus and standardisation of techniques for its large scale cultivation.

4. Name and designation of:

a) Project leader - To be posted.

b) Associated - 1.Dr,M.Chandrasekharan Nair, Associate Professor of Plant Pathology.

2.Dr.M.Ramanatha Menon, Professor of Plant Pathology,

3.L.Rema Devi,Assistant Professor of Plant Pathology.

5. Objectives:

Mushrooms provide an excellent source of nutritious and delicious food. In many countries mushroom growing has been developed into a large scale industry. The success of mushroom cultivation depends on selection of suitable species for each locality and development of agro-techniques utilising the locally available waste materials as substrate. Species of Pleurotus which are lignicolous mushrooms are found to be suitable for cultivation under tropical conditions. The studies carried out at the Tamil Nadu Agricultural University, Coikbatore have shown that P; Sajor -caju can be successfully cultivated on various kinds of farm wastes. The present project envisages development of techniques suitable for the artificial cultivation of species of Pleurotus, especially, P.Sajor-caju under Kerala condition. It also aims to produce spawns of the mushrooms for distribution among the farmers and public at cheaper rates-

The success of the project will help to popularise the cultivation of suitable strains of Pleurotus in Kerala. Species of pleurotus are known to contain nearly 30 percent of protein, which is of high quality. When easy to follow methods of cultivation are developed and high quality spawns are made available, the farm and industrial wastes in Kerala, can be utilised profitablly to yield this mushroom. This will help in a long way to improve the nutritional quality of food of the mural people as well as provide apportunities for employment in the farms during off-seasons. Unlike other cultivated mushrooms, pleurotus can easily be dehydrated and can be transported to big cities and towns, where they will fetch good prices. This will provide an excellant opportunity to start some small unit for the commercial production of this mushroom. The spent materials after cultivation is reported to contain more nitrogen and this will be a better mannure.

7. A short review of Literature:

Species of pleurotus are well known edible fungi and are utilised for that purpose in many countries. In many parts of Northern India, pleurotus growing wildly are collected and marketed under the name 'Dhingri'. Among its species P.ostreatus was first artificially cultured by liese, in 1934 on Beech tree trunks. In India, about 20 species of pleurotus are known to occur and a number of them were first collected and identified by Berkeley in the 19th centuary, from the Himalayan Region. Cultivation of P. Ostreatus was first attempted in Jamu, in India by Kaul and Janardhanan in 1970. Singer, who is considered to be a world authority on edible mushrooms has remarked as early as 1961 that it will be worth while to explore the possibility of cultivation of P.sajor-caju in the tropics. But attention was focussed on this fungus in India only after it has been brought into pure culture by Jandaik and Kapoor in 1974, from a collection made from the Himalayas. Jandaik (1974) successfully cultivated this fungus on a variety of substrata including banana pseduostem and chopped paddy straw. Summarising the results of studies carried out at Tamil Nadu Agricultural University,Rangaswamy et al (1975) reported that it can be cultivated on such farm wastes like paddy straw, hulled maize cobs. vegetable waster etc. It was also reported to grow on soft wood pieces, sawdust, etc by Jandaik (1976) and on rice medium by Rexon and Jong (1977). In a pepper presented by Dr.G.Rangaswamy, Vice-chancellor, Tamilnadu Agricultural University, at the International conference on Global impacts on applied Microbiology held at Bankok, during November,1977 stressed the importance of cultivation of P. Sajor-caju on a large scale to solve the protein deficiency in the diet of the average man, in developing countries.

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In Kerala a species of pleurotus found associated with mango trees is known to be utilised by local people for edible purpose. No work has been carried out so far to study the pleurotus flora of this State, nor attempted to artically cultivate them.

8. Technical programme:

1. Collection, identification and preservation of species of pleurotus native to Kerala.

2. Cultural studies of edible species of pleurotus to determine its nutritional requirements.

3. Standardisation of techniques for spawn production.

4. Studies on the suitability of various substrate (Paddy, Straw, Banana, Pseudostem, Sawdust, tapioca waste, coconut waster etc) for culturing pleurotus species.

5. Studies on the nutritional values of Pleurotus species.

6. Studies on dehydration and other methods of preservation of pleurotus species.

9. Date of start - January 1978

10. Likely date of completion - 1980

11. Additional facilities required -

1. Thatched sheds for the trial cultication of pleurotus.

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2. A culture room with arrangements for temperature and humidity control for spawn production and for detailed laboratory studies of the fungus.

3. Special wooden trays, pots , bottles, tins baskets etc.

4. Chemicals required for media preparation and spawn production.

5. Purchase of Agricultural and Industrial wastes like sawdust, coirpits, wood shavings, paddy straw etc.

12. Approximate cost -

Contingencies	-	Rs.30,000
T.A	-	Rs. 2,000

13. Signature of:

Sd/	Sd/	Sd/
Project Leader	Head of Department.	Director of Research.

Fifth FRC: SNO: 886.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Entomology

1. Name of the Research Centre: Rice Research Station, Moncompu
2. Project No. : Ag.23.5(Ent.)
3. Title of the Project : Population dynamics of different species of rats attacking paddy in Kuttanad tract.
4. Names of the Project Leader: G.M.George, Jr.Instructor.
   Associate: Dr. K.V.Mammen, Assoc.Prof.
5. Objective : The Rodents have become major pests of rice in Kuttanad. The information available in the different species involved, their biology and habits and control is meagre and scanty. Being a burning problem of the region, the present project is propsed with a view to studying their identity and the population fluctuations.
6. Practical utility : The information gathered on the population of rats will help in timing the campaigns and control programme.
7. Review of literature : No work has been done so far to study the different rat species and then population dynamics in Kuttanad rice tract.
8. Technical programme : The rats will be collected using the mud pot trap throughout the year at fortnightly intervals. Number of rats collected on each occasion will be recorded, the species will identified and sex ratio determined
9. Date of start : May, 1977
10. Likely date of completion: March 1983.
11. Addl. facilities required: Muds poli trap have to be made
12. Approximate cost : Rs.1500/-

Sd/-
SIGNATURE OF THE PROJECT LEADER

Sd/-
SIGNATURE OF THE HEAD OF THE DEPARTMENT.

Third F R C. S.No.837.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Entomology

1. Name of Research Centre: Rice Research Station, Moncompu.
2. Project No. : Ag.23.5. Ent.2
3. Title of the Project : Bait preference shown by different species of rats attacking paddy.
4. Name of the Project Leader: C.M. George

   Associate: Dr. K.V. Mammen
5. Objective : One of the important and effective methods of rat control is by using poison baits. The success of poison baiting will depend upon the acceptability of the bait base to the rats. This project is proposed for finding out the acceptability of the different locally available materials to the rats.
6. Practical utility : Rodents are a serious menace to paddy cultivation in Kuttanad and this problem$ is aggrevated due to the cultivation of an additional crop of paddy. Different types of baits are used by the cultivators to control the field rats. The result of the present studies will help in finding out the best accepted baiting base for controlling the rats.
7. Review of literature : No work has been taken up so far to study the acceptability of different locally available bate materials to rats.
8. Technical programme : The experiment will be conducted in the paddy fields and nearly garden lands.

   Layout:- RBD with 10 replications.

   Treatments: The following baiting bases will be used for preparing baits.

   a) fried powdered paddy.

   b) fried powdered wheat.

   c) Coconut kernol

   d) dried fish

(contd..)

e) raw tapioca

f) Lime sheel flesh.

g) Ripe plantain fruit.

5-10 gms of poison baits will be placed at different points in the paddy field and garden land. The baits taken by the rats will be recorded on the next day and the amount of each material consumed also will be recorded.

9. Date of start : May, 1977

10. Likely date of completion: March, 1979

11. Addl. facilities required: Nil

12. Approximate cost : Rs.250/-

13. Signature of:

Sd/-
SIGNATURE OF THE PROJECT LEADER

Sd/-
SIGNATURE OF THE HEAD OF DEPARTMENT.

Third F R C. S.No.838.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Entomology

1. Name of Research Centre: College of Agriculture, Vellayani.

2. Project No. : Ag.23.18.Ent.5

3. Title of the Project : Studies on the adaptability of sericulture in Kerala

4. Name & Designation of

a) Project Leader : Dr. N.Mohandas, Professor of Entomology.

b) Associate : Sri. K.Sasidharan Pillai, Asst. Professor.

5. Objectives:-

To assess the feasibility of adopting sericulture under different ecological conditions of Kerala as a Village Industry.

6. Practical utility: -

The findings of this project will enable to understand the disease and parasite problems that may arise as serious limiting factors in rearing mulbury silk worm in Kerala and also to evaluate the feasibility of introducing this as a cottage industry in the villages of Kerala.

7. A short review of literature:-

There is no previous work in this line in Kerala

8. Technical Programme:-

Mulbury will be grown in ½ acre plots and adequate number of lines will be maintained in the laboratory. A detailed study of the disease and parasitic complex will be studied. The rearing methods will be standardised under local conditions. This will be done at 3 centres viz. Vellayani, Ambalavayal and Pampadumpara.

9. Date of start : July/August 1978

10. Likely date of completion: July/August 1980

11. Approximate cost : Rs.20,000/- for each centre

12. Addl.facilities : --

13. Signature of :

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

Sixth F R C. S.No.841.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture / Department of Entomology,

1. Name of Research Centre: College of Agriculture, Vellayani.
2. Project No. : Ag.23.18. Ent.7
3. Title of the project : Plant parasitic nematode fauna of the garden land ecosystem in the Agricultural College, Farm, Vellayani.
4. Name and designation of:
   a) Project Leader : T. Nalina Kumari, Jr.Instructor
   b) Associates : Dr.T.S.Venkitesan, Assoc.Professor
5. Objectives:

No information is availanle at present on the plant parasitic nematode fauna complex associated with the multicrop agroecosystem typical of the garden lands of Kerala. These ecosystems are characterised by perennial trees like coconut, jack, mango, arecanut, cashew, standards of pepper and annuals or seasonal plans such as vegetables, grasses, weeds and banana. The present studies are aimed at ascertaining the occurance of different species of plant parasitic nematodes associated with the above crops. The crop growth and degree of population density of parasitic nematodes will be observed and recorded.

6. Practical utility:

The proposed project will help in understanding the plant parasitic nematode fauna occuring in the particular agro-ecosystem and their inter relationships. The observation gathered can be further utilised for evolving suitable management criteria.

7. A brief review of literature:

The nematodes observed in the Agricultural College Farm include Root-knot nematode on vegetables and banana, Helicotylenchus carabensis on canna and Radopholus similis on banana(Reports of the Scheme on plant parasitic nematodes, College of Agriculture 1969-77) Apart from these records, no efforts have been made to understand the nematode fauna complex related to the agro ecosystem.

8. Technical Programme:-

1. Soil and root samples will be collected from rhizosphere of the above crops at monthly

(contd..)

intervals and screened for plant parasitic nematodes, following standard soil and plant sampling techniques.

2. Wet collection of nematode extract will be maintained.

3. Counting of different parasitic nematodes in soil and plant tissues will be done.

4. The nematodes will be identified upto species level.

5. The relation between the population density of major species and the crop loss, if any, preference will be assessed.

9. Date of commencement : August 1977

10. Likely date of completion: August 1979

11. Additional facilities required : Nil

12. Approximate cost : Rs.1,500/- (To meet the cost of labour and other contingent expenditure)

13. Signature of :

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

Fifth F R C S.No.843.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Entomology

1. Name of Research Centre: College of Horticulture, Vellanikkara.

2. Project No. : AG.23.19 Ent.9

3. Title of the Project : Studies on rats and rat traps of Kerala.

4. Name(s) and Designation of:

   (a) Project Leader : C. M. George

   (b) Associates :

5. Objectives:

   Collection and identification of rat species in Kerala. Studies on the different types of indigenous traps and comparison of efficiency of traps and studies on bait preference.

6. Practical utility :-

   Rat problem has been a serious meance in the rice growing areas of Kerala especially Kuttanadu. This programme is intended to survey the rat species prevalent in Kerala so as to formulate an effective rat control programme. Various types of indigenous traps are also found in Kerala and a survey of it will be helpful to locate the most efficient traps which can be profitably utilised for rat traping.

7. A short review of literature:-

   Not much work has been done on the rats and rat traps of Kerala. Various aspect of ecology and control of rats have been studied by Iswar Prakash (1969) and Barnett (1958). Srinivasa Char (1972) studied the general characters and classification of rats and Channa Basavanna (1972) studied the food and feeding habits of rats. Studies on rat traps include those of Ali (1958) Abraham (1958) Davis (1970) Srivastava and Nigam (1958) and Batra (1966)

8. Technical Programme:-

   (a) Collection and identification will be collected from different parts of Kerala, both from wet land and garden land and they will be got identified.

   (b) Studies on rat traps will be done by making a collection of the indigenous traps prevalent in Kerala and comparing the efficiency of these traps.

(c.

(c) Bait preference studies will be done by using different types of carriers such as tapioca, dry fish, sea shell, plantain and coconut.

9. Date of start : 1977

10. Likely date of completion: 1979

11. Additional facilities required }

12. Approximate cost : Rs.6,600/-

13. Signature of :

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

S.No.845.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture

Department of Entomology, College of Agriculture, Vellayani.

PROGRAMME OF RESEARCH FOR MASTER'S DEGREE

(For approval of University)

1. Name of candidate : Babu. M. Philip

2. Date of admission and admission No. : 27--11--1976 / 76--11--17

3. Name and designation of chairman : Dr. Abraham Jacob, Associate Professor, Dept. of Entomology.

Project No. : Ag.23.18.Ent.11.

4. Topic of Research for thesis : "Studies on the granulosis virus of Pencallia ricini(Fab) (Lepidoptera - Arctidae)

5. Objective of the research: To gather detailed information in the nature of the pathogen and disease and to assess its utility as a microbial control agent.

6. Brief review of previous work done on the topic (give refernece to import- and publications/the sis) : Tecob et al (1972) have reported the occurrence and symptomatology of a granuloses an p.ricine

7. Scientific and/or practical importance of the research : The study will bring out basic information on the disease and nature of the pathogen which will help to assess its utility as a microbial control agent.

8. Technical programme (give outline) : The following aspects will be studied.
1. Symptomatology 2. Histopathology. 3. Physico-chemical characteristic of the Pathogen 4. Field trails to assess the effectiveness of the pathogen in controlling the pest.

9. Estimate of expenditure and receipt if any : Rs.2,000/-

10. Location of research if outside College Campus

Place : Vellayani
Date : 5. 7. 78

Sd/-
SIGNATURE OF THE CANDIDATE

Sd/-
SIGNATURE OF THE DEAN

Sd/-
SIGNATURE OF CHAIRMAN ADVISORY COMMITTEE

Sd/-
SIGNATURE OF HEAD OF DEPARTMENT

S.No.847.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture

Department of Entomology College of Agriculture.

PROGRAMME OF RESEARCH FOR MASTER'S DEGREE

(For approval of University)

1.	Name of candidate	: Suma Kuruvilla
2.	Date of admission and admission No.	27--11--1976 76--11--18
3.	Name and designation of the Chairman, Advisory Committee	Dr. Abraham Jacob, Associate Professor, Department of Agricultural Entomology.
4.	Topic of Research for the thesis	Studies on Entomogenous fungi of Brown Plant Hopper.
	Project No.	: AG.23.18.Ent.12
5.	Objective of the Research	To undertake detailed studies on fungal pathogen/s of Bøown plant Hopper.
6.	Brief review of previous work done on the topic (Give references to important publications/ thesis)	In India very few studies have been conducted on fungal pathogen of insects (Missra, 1952, Nirula 1957, Nenc,1972) Recently Balakrishnan (1974) has conducted detailed investigations on the parasitism of Paecilomyces farinosus (Dickson ex Fries) Brown and smith on Bemisia tabaci. Preliminary studies at Vellayani has revealed the occurrence of fungal disease on Brcwn Plant Hopper.
7.	Scientific and/or practical importance of the research	The study will bring out basic information which will be useful in utilising the pathogen for the control of Brown Plant Hopper
8.	Technical programme (give outline)	: 1. Testing the pathogenicily of the organism. 2. Cultural and morphological studies of the pathogen. 3. Symptomatology 4. Factors affecting the pathogenicity, of the organism. 5. Mass culturing of the pathogen 6. Practical utility of the fungus for the control of Brown Plant Hopper.

9.	Estimate of expenditure and receipts if any	Rs.2,500/-
10.	Location of research if outside College Campus	--

Sd/-
SIGNATURE OF THE CANDIDATE

Place: Vellayani
Date : 5--7--78.

Sd/-
SIGNATURE OF CHAIRMAN
ADVISORY COMMITTEE.

Sd/-
SIGNATURE OF DEAN

Sd/-
SIGNATURE OF THE HEAD OF THE DIVISION.

S.No.848.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Entomology.

1. Name of Research Centre: College of Agriculture, Vellayani.

2. Project No. : AG.23.18.Ent.14

3. Title of the Project : Investigations on the nuclear polyhedrosis of rice swarming caterpillar, Spodoptera mauritia (Boisduval).

4. Name(s) and Designation of:

(a) Project Leader : K.P. Vasudevan Nair

5. Objectives:-

Rice swarming caterpillar, S.mauritia is a major pest of rice in Kerala. Though it is known that natural enemies play a great role in its natural control no effort has been made to study the types of bio-control agents involved. Recently a polyhedrosis virus has been observed causing disease among the caterpillars. The present project is proposed to undertake detailed basic studies on the virus including its utilisation for applied biological control of the pest.

6. Practical utility:-

The basic information collected from the proposed studies will be useful in utilizing this virus for the field control of the pest.

7. A short review of literature:-

A nuclear polyhedrosis of the rice swarming caterpillar Spodoptera mauritia was first reported from Hawai by Binachi (1957) and later described by Tanada (1960). In India it s occurrence was first reported by Jacob et al (1973). Some preliminary investigations on this disease were carried out by Lathika (1973) But much of the basic information required for the successful utilisation of the virus in practical pest management is lacking.

8. Technical Programme:-

Investigations will cover the following aspects:-

(i) Effect of nuclear polyhedrosis virus infection

(contd..)

on the growth characters of the larvae.

ii) Effect of NPV on the food consumption of the larvae.

iii) Effect of NPV on the metamorphosis

iv) Studies on the hereditary transmission of the virus.

v) Histopathology:- the course of virus infection in the various tissues such as hypodermis, fat body, blood cells etc.

vi) Studies on the efficiency on the virus for field use

(a) Bio-assay of the larval instars of the pest.

(b) Persistence of the virus in the foliage and in the soil.

(c) Field application of the virus and standardisation of technique.

9. Date of start : 1977

10. Likely date of completion: 1979

11. Additional facilities required:

12. Approximate cost : Rs.6,000/-

13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

S.No.850.

PROFORMA FOR RESEARCH PROJECT PROPOSAL

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT.

Faculty of Agriculture : Department of Entomology

1. Name of Research Centre : College of Agriculture, Vellayani.
2. Project No. : Ag.23.18 Ent.15
3. Title of the Project : Studies on the Nuclear polyhedrosis of rice case worm Nymphula depunctalis
4. Name(s) and Designation of
   (a) Project Leader : S.Devanesan.
   (b) Associate (s) :
5. Objectives:-

   The present project aims at collection of basic information of the NPV of rice case worm and to assess its utility in micrbial control of the pest.

6. Practical Utility:-

   These studies will bring out basic information necessary to assess the utility of pathogen in the microbial control of the case worm.

7. A short review of literature:-

   Very little information is available on the microbial diseases of rice case worm and their utility in microbial control. Recent studies at Vellayani have revealed the occurence of a Nuclear polyhedrosis on this pest.

8. Technical Programme:-

   This includes the studies on:-

   (a) Symptomatology;
   (b) Nature of pathogen.
   (c) Susceptibility of different pathogen.
   (d) Persistence of virus under different conditions.
   (e) Cross transmission.
   (f) Trials to assess the utility in the field.

9. Date of start : 1977
10. Likely date of completion : 1979
11. Additional facilities required: -
12. Approximate cost : Rs.3,000/-
13. Signature of

Sd/- Sd/-

PROJECT LEADER HEAD OF DEPARTMENT DIRECTOR OF RESEARCH.

PROFORMA FOR RESEARCH PROJECT PROPOSAL: KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

Faculty of Agriculture — Department of Entomology

1. Name of Research Centre : College of Agriculture, Vellayani.
2. Project No. : Ag.23-18 Ent.16
3. Title of the Project : Studieson the entomagenous fungi associated with the lady bird beetle Epilachna vigintioctopunctata.
4. Name(s) and Designation of
   a) Project Leader : Naseema Beevi, S.
   b) Associate(s) :

5. Objectives:-

Epilachna beetles are serious pests of vegetable crops like cucurbits and brinjal. Residue hazards and instances of phytotoxicity reduce the choice of chemicals for their control. In this context microbial control especially using fungal pathogens appears to be a feasible approach. Recent studies at Vellayani have indicated the occurrence of few fungal pathogens on grubs of Epilachna vigintioctopunctata Fabr. The present project aims at detailed studies on fungal pathogens of Epilachna beetle.

6. Practical utility:-

The studies will bring out basic information on the practical utility of the pathogenic fungi for the control of the pest.

7. A short review of literature:-

Studies on fungal pathogens of insects and their use in insect control have been rather limited in India (Misra, 1952; Nirula, 1957; Nene, 1972; Balakrishna 1974) Asari et al 1977 reported the occurrence of Paecilomyces faribosus on larvae of the mango leaf webber Orthaga exvinacea.

8. Technical Programme:-

This includes the studies on -

1. Pathogenicity of the fungi to the different stages of the pest.
2. Cultural and morphological studies of the pathogens.
3. Symptomatology.
4. Mass culturing of the pathogens.
5. Field evaluation of the promising fungi for the control of Epilachna beetles.

9. Date of start : 1977
10. Likely date of completion : 1979
11. Additional facilities required :
12. Approximate cost : Rs.3,000/-
13. Signature of:

Sd/-
PROJECT LEADER

Sd/-
HEAD OF DEPARTMENT.

DIRECTOR OF RESEARCH.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Entomology

1. Name of Research Centre: College of Agriculture, Vellayani

2. Project No. : Ag.23.18. Ent.17

3. Title of the Project : Joint action of insect pathogens insecticide mixtures in the control of crop pests.

4. Name of the Post-graduate student: Susamma Mathai, Junior Instructor (on leave)

   b) Name and designation of the Chairman, Advisory Committee: Dr. Abraham Jacob, Assistant Professor, Department of Entomology, College of Agriculture, Vellayani.

5. Objectives:-

Integrated control of insect pests is one way of lessening the adverse impacts of pesticides on the ecosystem. Recent studies have shown that microbial pathogens of insects can be utilised as a controlling agent for decimmation of noxious pests. In many cases it has also been found that combinations of insect pathogens and insecticides manifest synergistic or additive effects. In such combinations the pesticide concentrations can be kept low so as not to disrupt the agro-ecosystem. In India very little work has been conducted in this line. Work done at the College of Agriculture, Vellayani has revaled the occurrence of six viruses and three fungal diseases on different crop pests. The present project is proposed to undertake studies on the utility of combinations of these pathogens as well as of B. thuringlensis with insecticides in the control of crop pests.

6. Practical utility:-

i. These studies will bring out basic information on the joint action of the insect pathogen and insecticides.

ii. Combinations of insect pathogens with low doses of chemical insecticides if proved effective would help in reducing the use of pesticides and will be a step towards the integrated control concept.

7. A short review of literature

The concept of using combinations of insect pathogen and insecticides is based on the

(contd..)

observation made by the insect pathologists that insects like other organisms are more susceptible to disease when under the influence of stress produced by cowdung, malnutrition, and other environmental factors (Steinhaus 1958; Vago 1959). It has been reported that chemical insecticides might act as stressors and thus promote contration or activation of infectious diseases or make insects more susceptible to the action of 'microbial toxins' (Doane and Wallis 1964; Ignoffo and Montoya 1966, Genung 1960). A number of workers have reported cases of synergism between insect pathogens and insecticides (Dyadeckko, 1959; Fankhaenel 1962; Kovacovic 1958, 1962, Genung 1960; Ignoffo and Montoya 1956). Laboratory studies undertaken at I.A.R.I., New Delhi have shown additive supplemental or potentiation effects in combination of DDT, lindane and pyrethrum with nuclear polyhedrosis of Spodoptera litura Malathion was antagonistic to the virus (Komolpith and Ramakrishnan 1977)

8. Technical Programme:

1. Dosage-mortality relations between microbial pathogens and crop pests. Following pathogens and pests will be used.

   Pathogens — Bacillus thuringionis
   Nuclear polyhedroses
   Granuloses.

   Crop pests — Spodoptera litura
   S.mauritis
   Pericallia ricini
   Chaphalocrocis madinalis

2. Dosage-mortality relations between a few common insecticides and the above crop pests.

   Insecticides: Quinalphos
   Endosulfan
   Carbaryl
   Methyl parathion
   Phosphamidon.

3. Joint action of the pathogens and the insecticides. This will be assessed in terms of dosage-mortality relations between the graded mixtures of the pathogens themselves and with insecticides.

9. Estimate of expenditure : Rs.4,500/-

10. Location of Research if outside College Campus : --

Signature of candidate:-

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH
S.No.853		

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Entomology.

1. Name of Research Centre: College of Agriculture, Vellayani.

2. Project No. : Ag.23.5. Ent.18

3. Title of the Project : Fate of insecticides applied in the rice crop environment.

4. Name & Designation of

a) Project Leader : GEORGE KOSHY, Assistant Prof.

b) Associate : Smt. A.Visalakshy, Asst. Prof.

5. Objectives:

Insecticides of various types and modes of action are used to control pests of paddy. They are applied as foliar sprays and dusts and the granules in soil. The insecticides may be absorbed within the plaspr may remain on plant surface. They may get into soil, water in the field, weeds, soil organisms and also in the grains as well. The different insecticides may behave differently in these respects depending upon their nature and time of application. There is no precise information available on these and hence this project is proposed to study these objectively.

6. Practical utility:-

Results of the studies proposed will help in selecting such insecticides which will minimise the toxic hazards to human beings, animals birds and also to beneficial insects as well as to soil organism. In addition disruption of the ecosystem also can be prevented.

7. Review of literature:-

Persistence of many insecticides both in plants and in soil has been studied in India by many workers. But the work carried out in Kerala in paddy is limited to that of K.Asaf Ali, N.M. Das and M.R.G.K. Nair1969) where the persistence of residues of endrin on paddy plant was studied.

8. Technical Programme:-

The residues of the insecticides in the different components of the rice field ecosystem will

(contd..)

be estimated by micro bioassay or by chemical methods (Colorimetry, G.L.C. or T.L.C.) The different recommended insecticides will be applied at 3 occasions and the residue determination done as follows:-

(1) Occasion: I - 15 days after transplantation. Residues will be determined at weekly intervals on or in plants, weeds, soil field water, soil inhabiting organisms such as earthworm, if any, till no residues are detected.

(2) Occasion - II : Boot leaf stage. Residue analysis as above.

(3) Occasion-III : On earheads (to control rice bug) Residue analysis on grains and in husked rice.

Insecticides to be used:

(1) Thimet (Phorate)
(2) Furadan (Carbofuran)
(3) Cytrolane (Mephosfolan)
(4) Lebaycid (Fenthion)
(5) Dimcorod (Phosphamidon)
(6) Ekalux (Quinalphos)
(7) Sevin (Carbaryl)
(8) Fenitrothion
(9) Nuvacron (Monocrotophos)
(10) BHC
(11) Metacid (Methyl parathion)
(12) Disulfoton.

9. Date of start : 15. 6. 1977

10. Likely date of completion: 31- 3- 1989

11. Additional facilities: Rearing jars.
Glasswares and other equipments.

12. Appn. cost : Rs.1800/-

13. Signature of:-

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

1. KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture: Department of Entomology

1. Name of the Research Centre : Department of Entomology.
2. Project No : Ag 23-18. E-K 19
3. Title of the Project : Studies on the persistance and dissipation of systemic insecticides in Banana when used for the control of banana aphid.
4. Name & Designation of:

(a) Project Leader : Smt. A.Visalakshy, Asst. Prof.

(b) Associate : 1. Dr. N.Mohandas, Assoc. Prof.

2. T.Nalina Kumari, Jr.Instructor.

5. Objectives:

Systemic insecticides like phorate, disulpton and carbo furan when applied to soil are observed to control the banana aphid effectively. The present recommendation is application of the insecticides twice, first in the planting and second 75 days after planting. Since the life span of banana is about 10 months these two applications will not be adquate to give complete protection to the plants from aphid infestation throughout its life. The present project is hence proposed to find out the minimum number of application of systemic insecticides needed to give protection to banana from aphid infestation and thus from the bunchy top virus throughout the life of the plant. The presence of insecticide residues in the fruit will be ascertained.

6. Practical Utility

The information gathered from these studies will be useful in evolving a schedule of insecticide application to protact the plants from aphids and the disease.

7. A short review of literature:

Menon and Chistudas (1966) reported the efficacy of some contact insecticides on the control of banana aphid, Nair et al (1973) reported the effect of thiodemeton, lindane, dimethoate and phorate granules on the control of banana aphid and found that all the insecticides were effective in keeping the aphid population under control.

8. Technical Programme:

1. Persistent toxicity of systemic insecticides to Banana aphid:- To study this the insecticide granules will be in 3 ways:- (1) in the pits, (2) in the axils and (3) the rhizome dipped in insecticide slurry at the time of planting. The persistence of the insecticides within the plants will be ascertained by exposing banana aphids to plant parts collected from the treated plants at regular intervals. When residual toxicity is seen not to cause 100% mortality the 2nd application of the insecticides will be made and the process continued.

2. Chemical assay of the insecticidal residues:

The residues of the insecticides within the fruits after the last application of the insecticides will be assessed chemically.

9. Date of start : July 1977

10. Likely date of completion : July, 1979

11. Additional facilities : Nil

12. Approximate cost : Rs.1,000/-

13. Signature of:

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH.

Third F R C. S.No.855.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture	Department of Entomology
1. Name of Research Centre	College of Agriculture, Vellayani.
2. Project No.	Ag.23.18.Ent.20
3. Title of the Project	Effect of application of systemic insecticide granules at the booting stage of paddy on grain setting and residues of the insecticides in grain and straw.
4. Name and designation of	
a) Project leader	Smt.A.Visalakshy, Asst.Professor
b) Associates	1.Dr.N.Mohandas, Assoc.Prof. 2.Smt.K.Santha Kumari, Instructor.

5. Objectives

The granular insecticides are being widely used for paddy pest control particularly for the control of brown plant hopper. Preliminary studies have shown that mephospholan, carbofuran andphorate when applied at field doses at bootleaf stage significantly reduce grain setting in paddy. The effect of the insecticides under field condition has not yet been investigated so far. The present project is proposed with a view to finding the adverse effect if any of the insecticidal granules applied at boot-leaf stage of the paddy on the grain setting.

Further the residues of the insecticides in the grain and straw when applied at boot-leaf stage has also not been studies so far and hence it is proposed to initiate studies on this also.

6. Practical Utility

The results from the studies will help to reveal the bad effect of granular insecticides in grain setting of rice if any and residue hazards involved in the use of these systemic poisons.

7. A short review of literature

Visalakshy et al. (1976) while investigating effect of application of some pesticides on grain setting in rice found that mephospholan and carbofuran granules suppressed grain setting significantly.

8. Technical programme

Carbonfuran, thimet and cytrolane will ~~xxx~~ be applied in 2 doses at the boot-leaf stage. The percentage of grain setting and the incidence of pests will be recorded. The residue of the toxicants in the grain and straw will be assessed at the time of harvest by colorimetry.

9. Date of start : June, 1977

10. Likely date of completion : September, 1978

11. Additional facilities : Nil

12. Approximate cost : Rs.750/= (Contingency)

13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH.

Third FRC S.No.856

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture — Department of Entomology

1. Name of Research Centre — College of Agriculture, Vellayani.

2. Project No. — Ag.23.18 Ent.20

3. Title of the Project — Evaluation of a novel insecticide Diflubenzuron (Dimilin) for the control of the rice swarming caterpillar

4. Name(s) and Designation of

a) Project leader : S.Pathummal Beevi

b) Associates :

5. Objectives

Diflubenzuron is an insecticide presenting a new mode of action. A juvenile insect that has eaten this insecticide fails to ecdyse successfully and death follows slowly. Diflubenzuron is specific to leaf feeding insects and is having a very low mammalian toxicity. The compound has not yet been tried in India. The objective of this project is to evaluate diflubenzuron (Dimilin) against the rice swarming caterpillar of paddy and to study its physiological effect on the pest.

6. Practical utility

Due to pollution of environment by the indiscriminate use of insecticides many countries including India discourage their use on food stuffs and even on crops. A search for newer compounds with less impact on the environment has now been intensified. Dimilin on insect growth regulator, if found effective for the control of crop pests in our country, can replace many of the conventional insecticides.

7. A short review of literature

Duphar B.V.Netherlands discovered a new group of insecticides one of which is diflubenzuron (Dimilin). It acts as a mounting inhibitor in lepidopterous insects. The studies abroad have clearly indicated that the insecticide acts as a stomach poision with a

novel mode of action. It is reported effective against various leaf feeding insects (Flint et al. 1977); Ganyard et al. 1977 and Harrison et al. 1977).

8. Technical programme

The following aspects of insecticidal action will be worked on the test insect.

a) dose effect relationship.
b) stage speaficity.
c) sterdant action of the compound.
d) effect of diflubenzuron on protein and lipid metabolism of test insect.

9. Date of start 1977

10. Likely date of completion : 1979

11. Additional facilities required

12. Approximate cost : 2,800/=

13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH

S.No.857.

KERALA AGRICULTURAL UNIVERSITY
(College of Agriculture, Vellayani)
RESEARCH PROJECT

PROFORMA FOR RESEARCH FOR MASTER'S DEGREE (For approval of the University).

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Department of Entomology. Faculty of Agriculture.

1. Name of the student : A.B. Mohamed Ali.

2. Date of Admission & Admission No. : 1-12-1976. 76-11-20

3. Name and designation of the Chairman, Advisory Committee. : Dr. N. Mohandas, AssociateProfessor, Department of Entomology.

4. Topic of Research for Thesis. : Persistence of carbofuran in paddy plants when applied at different stages of growth.

Project No. : Ag.23-18 Ent.21

5. Objectives of the research:-

Carbofuran is now-a-days used widely for the control of different pests of paddy. It is a systemic poison with prolonged residual effect. It is however, not known as to how long the insecticide persists in different parts of the plant. There is also a tendency to apply this insecticide even at the ear bearing stage to control Brown Plant Hopper infestation. This may lead to the accumulation of the insecticide residues in straw and grains. The present project is hence proposed to undertake studies on:-

1. Uptake and translocation of the insecticide to different parts of the paddy plant when applied as granules in soil at different stages of growth.

2. Persistence of the insecticide and its active metabolites in grains following application at different stages of growth.

6. Brief review of previous work done on the topic (give reference to important publications/thesis).

Studies undertaken on the persistence of residues of carbofuran in crops in India are limited. The few studies undertaken cover such crops as Maize (Kapoor and Kalra), Surghum (Agrihothrudu 1976) and Sweet potato (Rajukannu et al 1976). Kandasamy et al 1975) studying the effect of carbofuran on the rhizosphere microflora of paddy observed no relationship between carbofuran and various groups of microflora. No efforts have been made in India where carbofuran is used widely for control of paddy pests to study the fate of the toxicant in the paddy plants.

(contd. . .2)

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture	Department of Entomology
1. Name of Research Centre	Rice Research Station, Moncompu
2. Project No.	AG.23.5.Ent.22
3. Title of Project	Biology and Bionomics of Chilo polychrysa the sheath bore of paddy.
4. Name and designation of	
a) Project leader	K.Balakrishna Pillai, Asst.Prof.(Ent.)
b) Associates	Dr.K.V.Mammen, Assoc.Prof.(Ent.) K.P.Radhakrishnan, Jr.Instructor

5. Objective

The sheath borer (Malayan border) is a new arrival in the Kuttanad as a pest of paddy. This is more destructive than the yellow border, since the caterpillar destroy all the clumps of paddy and can even emigrate from clump to clump. It appears that this pest also shows varietal proference. As no information is available on this pest it is proposed to study the biology, seasonal occurrence varietal preferences and control of the pest.

6. Practical utility

The information gathered will help in keeping this destructive pest under control.

7. A short review of literature

C.Polychrysa was first recorded as a pest of paddy in Trivandrum district in 1957. Some studies on the biology and control of this pest also were made. Now the pest is observed in Kuttanad.

8. Technical programme

The following studies will be made
1) seasonal occurrence
2) Life history
3) Natural enemies
4) Alternate host
5) Varietal performance.

9. Date of start : July 1977

10. Likely date of completion : March 1980

11. Additional facilities required: Nil

12. Approximate cost : Rs.1500/=

13. Signature of

Sd/-	Sd/-	Sd/-
PROJECT LEADER	HEAD OF DEPARTMENT	DIRECTOR OF RESEARCH.

Third FRC

7. Scientific and/or practical importance of the research:

The findings of the proposed studies will enable us to make the use of the carbofuran for controlling paddy pests, more rational.

8. Technical programme.

1. Chemical assay of the internal residues of carbofuran in paddy plants.

The residues of carbofuran within the different parts of paddy plants when applied at 15, 30, 45, 60 and 75 days after transplanting. Samples of the different plant parts including the grain at later stages will be collected at regular intervals (1, 3, 7, 14 & 21 days and at harvest) following application of the insecticide and analysed for their insecticide contents. The residue of carbofuran in grains will be assayed

2. Bio-assay of the insecticide residues.

Persistent toxicity of carbofuran in the leaves as well as sheaths of plants treated at different intervals after planting will be assessed using brown plant hopper as a test insect.

9. Anticipated income : ~~9,800.00~~

10. Location of research if out- side College Campus. : College of Agriculture, Vellayani Trivandrum.

Place: Vellayani.

Date : 28-7-77.

Sd/-
(MOHAMED ALI. A.B.)
Signature of Candidate.

Signature of CHAIRMAN: Sd/-

Signature of Head of Department: Sd/-

Signature of Dean: Sd/-