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KERALA AGRICULTURAL UNIVERSITY

DEVELOPMENT PLAN
OF
THE FACULTY OF AGRICULTURE
1972-73 to 1978-79
(IV & V Plan Periods)

August 1972.

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KERALA AGRICULTURAL UNIVERSITY
DEVELOPMENT PLAN OF THE FACULTY OF AGRICULTURE.

Introduction

The establishment of Agricultural Universities in India marked the beginning of revolutionary changes in the Agricultural sector of the country. The contributions of these Universities in sustaining the green revolution and in improving the agriculture of the different States have been phenomenal.

The Agricultural University in Kerala is one of the youngest. Its main campus is at Mannuthy in the Trichur District where the Veterinary College is situated. The Agricultural College at Vellayani in the Trivandrum District is a little over 300 kilometres away from the main campus. In addition, all the Research Stations belonging to the Departments of Agriculture and Animal Husbandry, located in the different parts of the State, have been brought under the University.

Although the different Agricultural Universities in India differ in certain respects they have got a common objective, namely, to organise an integrated programme of teaching, research and extension. Agricultural Universities are undoubtedly higher centres of learning and scholarship, but their primary objective is to be of service to the farming community through the development of Agriculture, thereby improving the economic status and living standards of the people of the State.

When compared with the rest of India, Kerala has many special features. The density of population is very high, being 548 per sq.KM. The per capita arable land is only 0.11 ha. Nearly 60 per cent of the total holdings are less than one acre in extent, the average being, 0.38 acre. Thirty two per cent of the holdings are 1 to 5 acres in extent, and 5.6 per cent of the holdings are 5 to 10 acres in extent.

The pressure on land is thus very heavy.

The cropping pattern in Kerala is unique in so far as substantial portion of the cultivable area is used for cash crops, many of which like pepper, ginger, cardamom, tea, cashewnut etc. earn valuable foreign exchange. Some of these crops have very serious problems of their own. Although the area under these crops has been increasing during the last eighteen years or so, the average yield or the yield per unit area has been declining.

Kerala is chronically deficient with regard to the production of food grains. The green revolution has, no doubt, boosted up the food production. But the State has to go a long way before it can become self sufficient. Only 30 per cent of the cultivated land in Kerala is under rice. Since almost every inch of cultivable land in the State has been brought under the plough, we can boost up our production only by making the available land yield more. This naturally requires sustained effort. Although varieties of rice with very high yield potential are now available, the average yield per unit area in Kerala has gone up only by just over 45 per cent over the last 18 years. This clearly indicates that the yield potential of the new high yielding varieties is not fully exploited.

Kerala has an undulating terrain which makes the land more prone to soil erosion. The progressive deforestation has considerably augmented the soil erosion problem of the State. At the same time the water resources of the State are rather good. The average annual rainfall is around 270 cm. There are also 44 rivers. But these water resources are

not effectively utilised by proper conservation and management. The ground water resources are also not properly tapped and utilized. If the water resources of the State are effectively utilised it would go a long way in boosting up not only the production of food crops but also that of the cash crops.

Only a few of the problems facing the Agriculture of the State have been mentioned here. The Kerala Agricultural University which is only in its infant stage is busy in formulating its programmes and policies to suit the needs of the State.

The various problems to be tackled at the different Research Stations as well as in the College will have to be properly chalked out and the Heads of Departments should be fully alive of the progress achieved. Thus there should be a close linkage between the research work undertaken in the Research Stations and in the College. The present staff structure for the College is suggested taking the above aspects into consideration.

In the meantime intensive efforts should be made to build up specialization in the different fields within each Department and conduct research of a fundamental as well as of an applied nature on problems that may arise or are brought to the notice by the farmers or other agencies.

The staff structure suggested for the different Departments is done taking into consideration that there would be separate projects for crop-wise research in the State in which each Department will have to play a vital role. It is also expected that teaching, research and extension should form an integral part of the responsibility of every teacher and research worker.

There are already some schemes operating in this institution. This will continue. If found necessary, they will be merged with the crop-wise research projects when they are formulated.

DEVELOPMENT PLAN FOR THE FACULTY OF AGRICULTURE
KERALA AGRICULTURAL UNIVERSITY

1. NAME OF THE INSTITUTION

Kerala Agricultural University (Faculty of Agriculture).

2. Duration of the Development Plan

For the last two years of the IV Five Year Plan (1972-1974) and for the Fifth Five Year Plan Period (1974-1979).

3. BACKGROUND INFORMATION ABOUT THE AGRICULTURAL COLLEGE AT VELLAYANI.

The Agricultural College and Research Institute, Vellayani was established on the 1st of August 1955. It is situated in the picturesque suburban area of Vellayani, surrounded on three sides by the Vellayani lake. The campus is about 11 k.m. away from the Trivandrum City and less than 10 k.m. from the famous Kovalam Beach. The College first started functioning in the Vellayani Palace which was acquired from the Royal family of the erstwhile Travancore State for the purpose.

The bare minimum number of personnel required for teaching and research at the time when the College was formed were drafted from the Department of Agriculture and the Research Department of the University of Travancore.

About 100 acres of garden land which was attached to the Palace served as the College Farm. Government also handed over to the College part of the Vellayani lake which served as the wet land.

Since the land available was found inadequate for a farm, fresh acquisitions were made in the subsequent years. At present the College has 187 acres of dry land. In addition it has 420 acres of wet land which is part of the Vellayani lake and which touches the farm on three sides. This area is used for paddy cultivation. The details of the wet land are given below:-

420
187
607

A. Double crop area	-	10 acres
B. Single crop area	-	314 acres
C. Uncultivable area	-	96 acres

Total		420 acres

The double crop land of 10 acres was originally part of the lake which was subsequently reclaimed. The remaining lake area will be submerged during the wet season. During the dry season from January to the middle of May, when the water level will be low, 314 acres of the area is dewatered and a single crop of paddy is raised. Ninety six acres of the lake area, is very deep and hence it is not cultivable.

The State Government has already launched a scheme for the reclamation of the Vellayani lake. When the scheme is completed it will be possible to raise two to three crops of paddy in the area where only one crop is raised now.

Divisions of the College

Initially the institution had only the following seven divisions.

1. Agronomy
2. Agricultural Botany
3. Agricultural Chemistry
4. Agricultural Entomology
5. Agricultural Engineering
6. Animal Husbandry
7. Plant Pathology

Horticulture functioned as a unit in the Botany Division and Statistics, Economics and Extension functioned as units of the Agronomy Division. Subsequently they were separated from their parent divisions and were raised to the status of independent divisions. Now there are the following eleven divisions in the College.

1. Agronomy
2. Animal Husbandry
3. Agricultural Botany
4. Agricultural Chemistry
5. Agricultural Economics
6. Agricultural Engineering
7. Agricultural Entomology
8. Agricultural Extension
9. Horticulture
10. Plant Pathology
11. Agricultural Statistics

Postgraduate courses leading to the M.Sc. Degree were started in five subjects, namely, Agronomy, Agricultural Botany, Agricultural Chemistry, Agricultural Entomology and Plant Pathology in 1961 and these courses are being continued. Ph.D. Degree programme was instituted in Agronomy and Agricultural Chemistry in 1965. Only two batches of students were admitted for these courses. At present some of the officers are working as part-time candidates for the Ph.D. Degree in Agronomy, Agricultural Chemistry, Entomology and Plant Pathology.

4. ACADEMIC PROGRAMMES

(a) Vellayani Campus

The existing postgraduate courses leading to the M.Sc.(Ag.) Degree in Agronomy, Agricultural Botany, Agricultural Chemistry, Agricultural Entomology and Plant Pathology will continue at the Vellayani campus.

Full time Ph.D. level teaching can be instituted at the Vellayani campus during 1972-73 in the five subjects in which M.Sc.(Ag.) Degree programme was instituted in 1961. These Departments have by now, built up a strong research base. The following are the Divisions in which Ph.D. Degree programme is proposed to be started during the current year.

1. Agronomy
2. Agricultural Chemistry
3. Agricultural Botany
4. Agricultural Entomology
5. Plant Pathology

b) Main Campus at Mannuthy

Postgraduate programme leading to the M.Sc. Degree can be instituted in the following subjects at the main campus at Mannuthy during the academic year 1973-74.

1. Agricultural Extension
2. Agricultural Economics
3. Horticulture
4. Soil Science

Ph.D. Degree programme can be started in the above subjects during the academic year 1976-77.

Postgraduate programme leading to the M.Sc. Degree in Agril. Engineering is proposed to be started during 1974-75.

Enrolment

i) Undergraduate level

The present annual intake of 50 students will be maintained for the time being. This can be enhanced as and when found necessary.

ii) Postgraduate level

a) The annual intake at the M.Sc. level will be maintained at the rate of four students in each of the five subjects in which postgraduate courses are now offered. This will be decreased or increased as and when found necessary.

With regard to the four subjects, namely, Agricultural Extension, Agricultural Economics, Horticulture, Soil Science and Agricultural Engineering in which M.Sc. level teaching is proposed to be started at the main campus, the annual intake will be 3 to 4 students per year in each subject.

b) Two students each are proposed to be admitted annually to the Ph.D. Degree courses in the five subjects in which M.Sc. Degree programme now exists.

5(a) PRESENT STAFF STRUCTURE

1. DIVISION OF AGRONOMY

<u>Designation.</u>	<u>Scale of pay</u> Rs.	<u>No. of sanctioned</u> <u>post</u>
1. Professor	700-1000	1
2. Additional Professor	700-1000	1
3. Junior Professor	600-900	3
4. Lecturer	325-725	3
5. Assistant Lecturer	250-525	1
6. Agrl. Demonstrator (II Grade)	90-190	2
7. Laboratory Assistant (II Gr.)	90-190	1
8. Peon	70-115	1
<u>Ph.D. Laboratory</u>		
1. Research Assistant	250-525	2
2. Attender	75-135	1

2. DIVISION OF AGRICULTURAL BOTANY

1. Professor	700-1000	1
2. Additional Professor	700-1000	1
3. Junior Professor	600-900	1
4. Lecturer	325-725	6
5. Technical Assistant	140-290	1
6. Laboratory Assistant	90-190	2
7. Field Assistant	90-190	1
8. Peon	70-115	3

Cytogenetics and Plant Breeding Laboratory

1. Lecturer	325-725	1
2. Research Assistant	250-525	1
3. Laboratory Assistant	90-190	1
4. Attender	75-130	1

Scheme for the Improvement of Vegetable crops

1. Research Assistant	250-525	1
2. Agrl. Demonstrator (II Grade)	90-190	1

Scheme for the Establishment of Plant Physiology Laboratory

1. Lecturer	325-725	1
2. Attender	75-130	1

3. DIVISION OF ⁹ AGRICULTURAL CHEMISTRY

1. Professor	Rs. 700-1000	1
2. Additional Professor	Rs. 700-1000	1
3. Junior Professor	Rs. 600-900	3
4. Lecturer	Rs. 325-725	6
5. Research Officer	Rs. 375-800	1
6. Research Assistant	Rs. 250-525	1
7. Bacteriology Assistant	Rs. 140-290	1
8. Technical Assistant	Rs. 140-290	1
9. Laboratory Assistant	Rs. 90-190	1
10. Assistant Chemist	Rs. 140-290	2
11. Laboratory Attender	Rs. 75-130	4
12. Peons	Rs. 70-115	1

Scheme for the compilation of research data

1. Research Assistant	Rs. 250-525	1
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Scheme for the analysis of fertilisers and manures

1. Assistant Chemist	Rs. 140-290	1
2. Laboratory Attender	Rs. 75-130	1

4. DIVISION OF AGRICULTURAL ENTOMOLOGY

1. Professor	Rs. 700-1000	1
2. Additional Professor	Rs. 700-1000	1
3. Assis Junior Professor	Rs. 600-900	1
4. Assistant Entomologist	Rs. 325-725	1
5. Lecturer	Rs. 325-725	3
6. Research Assistant	Rs. 250-525	1
7. Technical Assistant	Rs. 140-290	1
8. Agricultural Demon- strator (Special Grade)	Rs. 140-290	1
9. Typist	Rs. 90-190	1
10. Junior Technical Assistant	Rs. 85-175	2
11. Attender	Rs. 75-135	3

Ecology Scheme

1. Research Assistant	Rs. 250-525	1
2. Laboratory Attender	Rs. 75-135	1

Parasitology Scheme

1. Research Officer	Rs. 375-800	1
2. Research Assistant	Rs. 250-525	1
3. Attender	Rs. 75-135	1

Toxicology Scheme

1. Research Officer	..	Rs. 375-800	1
2. Research Assistant	..	Rs. 250-525	1
3. Agrl. Demonstrator (II Grade)	..	Rs. 90-190	1

Nematology Scheme

1. Lecturer-cum-Research Officer		Rs. 325-725	1
2. Technical Assistant	..	Rs. 140-290	1
3. Attender	..	Rs. 75-135	1

Non-Insect pest Scheme

1. Research Assistant	..	Rs. 250-525	1
2. Attender	..	Rs. 75-135	1

Biological Control Scheme

1. Entomology Assistant	..	Rs. 250-525	1
2. Technical Assistant	..	Rs. 140-290	1
3. Agricultural Demonstrator		Rs. 90-190	1
4. Gardener-cum-Laboratory Cleaner		Rs. 70-115	1

5. DIVISION OF PLANT PATHOLOGY

1. Professor	..	Rs. 700-1000	1
2. Additional Professor	..	Rs. 700-1000	1
3. Junior Professor	..	Rs. 600-900	1
4. Lecturer-cum-Asst. Virologist		Rs. 375-800	1
5. Lecturer	..	Rs. 325-725	3
6. Research Assistant	..	Rs. 250-525	3
7. Agrl. Demonstrator (II Grade)		Rs. 90-190	4
8. Peon	..	Rs. 70-115	1

Bacteriology Unit

1. Research Assistant	..	Rs. 250-525	1
2. Agrl. Demonstrator (Special Grade)		Rs. 140-290	1
3. Attender	..	Rs. 75-130	1

Scheme for Research for the Establishment of Cryptogamic Herbarium.

1. Research Assistant	..	Rs. 250-525	1
2. Attender	..	Rs. 75-130	1

Root wilt Scheme (Coconut)

1. Research Assistant	..	Rs. 250-525	2
2. Agrl. Demonstrator (Special Grade)		Rs. 140-290	1
3. Agrl. Demonstrator (II Grade)		Rs. 90-190	2

Bunchy top Research Scheme

1. Research Officer	Rs. 375-800	1
2. Research Assistant (Gazetted)	Rs. 325-725	1
3. Research Assistant	Rs. 250-525	1
4. Laboratory keeper	Rs. 75-130	1
5. Mali	Rs. 75-130	1
6. Peon	Rs. 70-115	1

6. DIVISION OF AGRICULTURAL EXTENSION

1. Professor	Rs. 700-1000	1
2. Junior Professor	Rs. 600-900	1
3. Lecturer	Rs. 325-725	3
4. Clerk-Typist	Rs. 90-190	1
5. Artists	Rs. 90-190	2
6. Photographer	Rs. 100-210	1
7. Laboratory Assistant	Rs. 90-190	2

Applied Nutrition Programme

1. Lecturer	Rs. 325-725	1
2. Audiovisual Operator	Rs. 120-230	1
3. Driver	Rs. 85-175	1

7. DIVISION OF HORTICULTURE

1. Professor	Rs. 700-1000	1
2. Junior Professor	Rs. 600-900	1
3. Lecturer	Rs. 325-725	2
4. Agricultural Demonstrator (I Grade)	Rs. 140-290	1
5. Attender	Rs. 75-130	2
6. Peon	Rs. 70-115	2

8. DIVISION OF AGRICULTURAL ECONOMICS

1. Junior Professor	Rs. 600-900	1
2. Lecturer	Rs. 325-725	1
3. Research Assistant	Rs. 250-525	1
4. H.D. Investigator	Rs. 130-270	1
5. L.D. Clerk	Rs. 90-190	1
6. L.D. Typist	Rs. 90-190	1
7. Peon	Rs. 70-115	1

9. DIVISION OF AGRICULTURAL STATISTICS

1. Professor	Rs. 700-1000	1
2. Junior Professor	Rs. 600-900	1
3. Lecturer	Rs. 325-725	2
4. Research Assistant	Rs. 250-525	1
5. U.D. Compiler	Rs. 130-270	1
6. L.D. Compiler	Rs. 90-190	2
7. Peon	Rs. 75-115	1

10. DIVISION OF ANIMAL HUSBANDRY

1. Junior Professor	Rs. 600-900	1
2. Lecturer	Rs. 325-725	3
3. Farm Manager	Rs. 175-315	1
4. Dairy Assistant	Rs. 140-290	1
5. Livestock Assistant	Rs. 100-210	1
6. Poultry Assistant	Rs. 100-210	1
7. Demonstrator (II Grade)	Rs. 90-190	1
8. Milk recorder	Rs. 85-180	1
9. Peon	Rs. 75-115	1
10. Milker	Rs. 75-115	1
11. Herdsman	Rs. 75-115	1
12. Farm workers	Rs. 75-115	4
13. Permanent workers	Rs. 65-110	8

11. DIVISION OF AGRICULTURAL ENGINEERING

1. Junior Professor	Rs. 600-900	1
2. Lecturer	Rs. 325-725	3
3. Workshop Supervisor	Rs. 175-315	1
4. Laboratory Assistant	Rs. 90-190	1
5. Blacksmith	Rs. 85-175	1
6. Carpenter	Rs. 80-150	1
7. Mechanic cum machinist	Rs. 80-150	1
8. Oil Engine driver	Rs. 85-175	1
9. Lineman	Rs. 85-175	1
10. Assistant Lineman	Rs. 75-130	1
11. Workshop attender	Rs. 75-130	1
12. Peon	Rs. 70-115	2

Repair workshop and maintenance section

1. Assistant Engineer	Rs. 375-800	1
2. Mechanic	Rs. 130-270	1
3. Pump driver	Rs. 85-175	1

CENTRAL OFFICE

1. Administrative Officer	550-900	1
2. Chief Accountant	310-600	1
3. Junior Superintendent	220-370	1
4. U.D. Clerk	130-270	2
5. L.D. Clerk	90-190	10
6. Clerk-typist	90-190	4
7. Laboratory Assistant	90-190	3
8. Attender	75-130	6
9. Attender	85-175	1
10 U.D. Typist	130-270	2
11 L.D. Typist	90-190	1
12 Peon	70-115	6
13 Lascar	70-115	1
14 Stenographer	170-385	1
15 Demonstrator <u>Vehicles Section</u>	90-190	1
1. Clerk-typist	90-190	1
2. Mechanic	85-175	1
3. Driver	85-175	6
4. Cleaner-cum-conductor	70-115	1
5. Permanent labourer	65-110	1
<u>Physical Education</u>		
1. Lecturer	325-725	1
2. Markers	@ Rs. 63/-	2
<u>HOSTELS</u>		
1. Steward	90-190	1
2. Steward	85-175	1
3. Matron	85-175	1
4. Watchers	70-115	4
5. Scavengers	70-115	3
<u>FARM OFFICE</u>		
1. Farm Superintendent	375-800	1
2. Assistant Farm Superintendent	250-525	1
3. Agricultural Assistant	250-525	1
4. Accounts Clerk--L.D.C.	90-190	1
5. Store Clerk (L.D.)	90-190	1
6. L.D. Clerk	90-190	2

7.	U.D. Typist	Rs. 130-270	1
8.	Meteorological Observer	Rs. 130-270	1
9.	Special Grade Demonstrator	Rs. 140-290	3
10.	Demonstrator - II Grade	Rs. 90-190	3
11.	Mechanic	Rs. 85-175	1
12.	Tractor driver	Rs. 85-175	4
13.	Maistry	Rs. 75-135	1
14.	Peon	Rs. 70-115	1
15.	Watcher	Rs. 70-115	1
16.	Gardener	Rs. 70-115	3
17.	Scavenger	Rs. 70-115	1
18.	Farm workers (Estt)	Rs. 70-115	20
19.	Farm workers (Cont.)	Rs. 70-115	3
20.	Head Clerk	Rs. 175-315	1
21.	U.D. Accountant	Rs. 130-270	1

HORTICULTURAL DEVELOPMENT SCHEME

1.	Horticultural Development Assistant	Rs. 250-525	1
2.	Agricultural Demonstrator	Rs. 90-190	1
3.	Mali	Rs. 70-115	3
4.	Watcher	Rs. 70-115	1
11.	Mechanic	Rs. 85-175	1
12.	Tractor driver	Rs. 85-175	4
13.	Maistry	Rs. 75-135	1
14.	Peon	Rs. 70-115	1
15.	Watcher	Rs. 70-115	1
16.	Gardener	Rs. 70-115	3
17.	Scavenger	Rs. 70-115	1
18.	Farm workers (Estt)	Rs. 70-115	20
19.	Farm workers (Cont.)	Rs. 70-115	3
20.	Head Clerk	Rs. 175-315	1
21.	U.D. Accountant	Rs. 130-270	1

HORTICULTURAL DEVELOPMENT SCHEME

1.	Horticultural Development Assistant	Rs. 250-525	1
2.	Agricultural Demonstrator	Rs. 90-190	1

5(b) PROPOSED STAFF STRUCTURE

A. Vellayani Campus

In the proposed staff structure only the posts upto the level of Instructor/Research Assistant are included. The existing research schemes with the sanctioned staff will continue. The existing technical, ministerial and other categories of staff will also continue. Wherever found necessary strengthening of the different categories of staff will be done by creating additional posts.

The calculations given for the year 72-73 are only for six months.

1. Department of Agronomy

Designation & Scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor 1100-1600	1	1	1	2	2	2	2
Associate Professor 700-1250	3	3	3	4	4	4	6
Assistant Professor 400-950	5	5	5	7	7	7	9
Instructor/ Research Assistant 300-600	6	6	6	8	8	8	10

This Department will undertake specialised studies and impart instruction in the following branches.

1. Soil Fertility
2. Plant Nutrition and Soil Management
3. Weeds and Weed Control
4. Crop Production
5. Seed Technology
6. Irrigation and Water Management
7. Soil Erosion and Control
8. Agricultural Meteorology

Ph.D. Degree programme will be instituted during the current year. Some of the research projects that are proposed to be undertaken are given in Appendix I.

2. Department of Agricultural Botany

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor 1100-1600	1	1	1	1	1	1	2
Associate Professor 700-1250	2	3	3	4	4	4	6
Assistant Professor 400-950	6	6	6	7	7	7	9
Instructor/Research Assistant 300-600	6	6	6	6	6	6	6

This Department will undertake specialised studies and impart training in the following branches.

1. Plant breeding
2. Plant Physiology
3. Economic Botany

Ph.D. Degree programme will be instituted during 1972-73. Some of the research projects that are proposed to be undertaken are given in Appendix. II.

This Department will work in close collaboration with the Department of Cytogenetics and Plant Breeding at the Main campus.

3. Department of Agricultural Chemistry

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor 1100-1600	2	2	2	2	2	2	2
Associate Professor 700-1250	3	3	3	4	4	4	6
Assistant Professor 400-950	6	6	6	7	7	7	9
Instructor/Research Assistant 300-600	6	6	6	8	8	8	10

The Department of Agricultural Chemistry will undertake specialised studies and impart training in the following branches.

1. Soil fertility
2. Fertilizer use
3. Agro-chemicals
4. Plant nutrition
5. Soil Science.

Ph.D. Degree programme will be instituted during the current year. Some of the research projects that are proposed to be taken up by the Department are given in Appendix III. This Department will work in close collaboration with the Department of Soil Science at the Main campus at Mannuthy.

4. Division of Agricultural Economics

Designation and scale of pay		72-73	73-74	74-75	75-76	76-77	77-78	78-79
Associate Professor	700-1250	1	1	1	1	1	1	1
Assistant Professor	400-950	2	2	2	2	2	2	2
Instructor/ Research Assistant	300-600	1	1	1	1	1	1	1

This Division will undertake undergraduate level teaching. It will be a part of the Department of Agricultural Economics which will be located at the Main Campus. This Division will also handle research projects in collaboration with the Department of Agricultural Economics at Mannuthy.

Some of the research projects that are proposed to be undertaken are given in Appendix IV.

5. Department of Agricultural Entomology

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor 1100-1600	1	1	1	1	1	1	2
Associate Professor 700-1250	3	3	3	4	4	4	6
Assistant Professor 400-950	4	4	4	6	6	6	8
Instructor/ Research Assistant 300-600	6	6	6	8	8	8	10

This Department will undertake specialised studies and impart instruction in the following branches.

1. Taxonomy and Morphology
2. Insect Physiology
3. Toxicology and Ecology
4. Economic Entomology
5. Stored grain pests etc.
6. Nematology

Ph.D. Degree programme will be instituted during the current year. Some of the research projects that are proposed to be undertaken are given in Appendix V.

5. Division of Agricultural Engineering

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor 1100-1600	-	-	-	1	1	1	1
Associate Professor 700-1250	1	1	1	1	1	1	1
Assistant Professor 400-950	3	3	3	3	3	3	3
Instructor/ Research Assistant 300-600	1	1	1	1	1	1	1

This Division will teach Agricultural Engineering at the Undergraduate level. It will be a part of the Department of Agricultural Engineering which will be located at the Main Campus. This Division will also take up research projects in collaboration with the Department of Agricultural Engineering at Mannuthy.

7. Division of Agricultural Extension

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor 1100-1600	1	1	1	1	1	1	1
Associate Professor 700-1250	1	1	1	1	1	1	1
Assistant Professor 400-950	2	2	2	2	2	2	2
Instructor/Research Assistant 300-600	3	3	3	3	3	3	3

This Division will undertake undergraduate level teaching. It will be a part of the Department of Agricultural Extension which will be located at the Main Campus. This Division will also handle research projects in collaboration with the Department of Agricultural Extension at Mannuthy.

Some of the research projects that are proposed to be undertaken are given in Appendix VI.

8. Division of Animal Husbandry

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor 1100-1600	-	-	-	-	1	1	1
Associate Professor 700-1250	1	1	1	1	1	1	1
Assistant Professor 400-950	2	3	3	3	3	3	3
Assistant Professor (Vet. Sci.) 400-950	1	1	1	1	1	1	1
Instructor/Research Assistant 300-600	1	1	1	1	1	1	1

This Division will teach Animal Husbandry and Veterinary Science at the Undergraduate level. It will also take up small research projects with the limited facilities available.

9. Division of Horticulture

Designation & scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor 1100-1600	1	1	1	1	1	1	1
Associate Professor 800-1250	1	1	1	1	1	1	1
Assistant Professor 400-950	2	2	2	2	2	2	2
Instructor/ Research Assistant 300-600	3	3	3	3	3	3	3

This Division will teach at the undergraduate level. Research projects will be undertaken in collaboration with the Department of Horticulture of the proposed College of Horticulture.

10. Department of Plant Pathology

Designation & scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor 1100-1600	1	1	1	1	1	1	2
Associate Professor 700-1250	3	3	3	4	4	4	6
Assistant Professor 400-950	4	4	4	6	6	6	8
Instructor/ Research Assistant 300-600	6	6	6	8	8	8	10

This Department will undertake specialised studies and impart instruction in the following branches.

1. Phytovirology
2. Mycophysiology and Biochemistry of Plant infection
3. Phytobacteriology
4. Ecology of Plant pathogens
5. Epidemiology
6. Seed pathology

Ph.D. Degree programme will be instituted during the current year. Some of the research projects that are proposed to be undertaken are given in Appendix VIII.

11. Division of Agricultural Statistics

Designation and scale of pay		72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor	1100-1600	1	1	1	1	1	1	1
Associate Professor	700-1250	1	1	1	2	2	2	2
Assistant Professor	400-950	2	2	2	3	3	3	3
Instructor/ Research Assistant	300-600	1	2	2	2	2	2	2

DIVISIONS OF BASIC SCIENCE SUBJECTS AT THE VELLAYANI
CAMPUS

Division of Biological Sciences

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
<u>Botany</u>							
Associate Professor 700-1250	1	1	1	1	1	1	1
Assistant Professor 400-950	1	1	1	1	1	1	1
Instructor/Research Assistant 300-600	1	1	2	2	3	3	4
<u>Zoology</u>							
Assistant Professor 400-950	1	1	1	1	1	1	1
Instructor/Research Assistant 300-600	1	1	1	1	2	2	2
<u>Microbiology</u>							
Assistant Professor 400-950	1	1	1	1	1	1	1
Instructor/Research Assistant 300-600	1	1	2	2	3	3	3
<u>Chemistry</u>							
Assistant Professor 400-950	1	1	1	1	1	1	1
Instructor/Research Assistant 300-600	1	1	2	2	3	3	3
<u>Human Nutrition</u>							
Assistant Professor 400-950	1	1	1	1	1	1	1
Instructor/Research Assistant 300-600	1	1	1	1	2	2	2

In addition to teaching this Division will conduct research of a fundamental nature in collaboration with the Department of ~~Biochemistry~~ Biology at the Main Campus.

2. Division of Social Sciences
(Economics, Psychology and Sociology)

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Assistant Professors 400-950	3	3	3	3	3	3	3
Instructor/Research Assistant 300-600	3	3	3	3	3	3	3

In addition to teaching this Division will conduct research in collaboration with the Department of Social Sciences at the Main Campus.

3. Division of Physical Sciences
(Statistics, Physics and Chemistry)
↓ Mathematics

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Assistant Professors 400-950	2	2	2	2	2	2	2
Instructor/Research Assistant 300-600	3	3	3	3	3	3	3

In addition to teaching this division will conduct research in collaboration with the Department of Physical Sciences at the Main Campus.

Division of Physical Sciences
(Statistics, Physics and Chemistry)

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
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B. POST-GRADUATE DEPARTMENTS TO BE ESTABLISHED AT THE MAIN
CAMPUS AT MANNUTHY

1. DEPARTMENT OF AGRICULTURAL ECONOMICS

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor	1100-1600	1	1	1	1	1	1
Associate Professor	700-1250	1	2	2	3	3	5
Assistant Professor	400-950	2	3	3	3	4	5
Instructor/ Research Assistant	300-600	4	4	4	4	6	8

This Department will undertake specialised studies and impart instruction in the following branches.

1. Production Economics and Farm Management
2. Marketing and Price
3. Economic Theory and Growth
4. Cooperation
5. Agr. Finances and Credit
6. Quantitative Economics

Postgraduate Programme leading to the M.Sc. Degree will be instituted during 1973-74. Ph.D. Degree programme will be instituted during 1975-76.

Some of the research projects that are proposed to be undertaken are given in Appendix IV

2. DEPARTMENT OF AGRICULTURAL ENGINEERING

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor	1100-1600	-	-	1	1	1	1
Associate Professor	700-1250	-	-	2	2	2	2
Assistant Professor	400-950	-	-	4	4	4	4
Instructor/ Research Assistant	300-600	-	-	6	6	6	6

Post-graduate Degree programme leading to the M.Sc. Degree is proposed to be instituted during 1975-76. Ph.D. programmes will be instituted at a later date.

3. DEPARTMENT OF AGRICULTURAL EXTENSION

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor	1100-1600	1	1	1	1	1	1
Associate Professor	700-1250	1	1	2	2	3	3
Assistant Professor	400-950	2	2	2	2	3	3
Instructor/ Research Assistant	300-600	3	3	3	3	4	4

This Department will undertake specialised studies and impart instruction at the Post-graduate level in the following branches.

1. Communication
2. Extension education methods
3. Audiovisual
4. Rural Sociology
5. Social psychology
6. Extension administration
7. Diffusion and adoption process.

Postgraduate programme leading to the M.Sc.(Ag.) degree is proposed to be instituted during 1973-74. Ph.D. Degree programme is proposed to be instituted during 1975-76.

4. DEPARTMENT OF PLANT BREEDING AND CYTOGENETICS

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor	1100-1600	1	1	1	1	1	2
Associate Professor	700-1250	1	2	2	3	3	5
Assistant Professor	400-950	2	3	3	4	4	5
Instructor/ Research Assistant	300-600	4	4	4	4	6	8

This Department will undertake specialised studies and impart instruction in the following branches.

1. Plant Breeding
2. Cytogenetics

Postgraduate programme leading to the M.Sc. Degree will be instituted during 1973-74. Ph.D. Degree programme will be instituted during 1975-76.

5. DEPARTMENT OF SOIL SCIENCE

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor	1100-1600	1	1	1	1	1	2
Associate Professor	700-1250	1	2	2	3	4	5
Assistant Professor	400-950	2	3	3	4	4	5
Instructor/ Research Assistant	300-600	4	4	4	4	6	8

This Department will undertake specialised studies and impart instruction in the following branches.

1. Soil Survey, Genesis and Classification
2. Soil Physics
3. Soil Chemistry
4. Soil Fertility and Plant Nutrition
5. Soil Microbiology
6. Soil Technology

Postgraduate programme leading to the M.Sc. Degree will be instituted during 1973-74. Ph.D. Degree programme will be instituted during 1975-76.

Tabulated statements showing the following details are given below:

- i. Statement of total number of posts suggested in the Agriculture Faculty.
- ii. Statement showing pay and allowances of teaching staff proposed for Vellayani Campus.
- iii. Statement showing pay and allowances of teaching staff proposed for Main Campus.

.....contd.

STATEMENT SHOWING TOTAL NUMBER OF TEACHING POSTS SUGGESTED

(AGRICULTURE)

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor 1100-1600	13	13	13	16	17	17	22
Associate Professor 700-1250	24	28	29	40	41	43	57
Assistant Professor 400-950	47	51	51	66	68	68	81
Instructor/ Research Assistant 300-600	55	56	56	70	77	77	91

STATEMENT SHOWING PAY AND ALLOWANCES OF TEACHING STAFF

A. VELLAYANI CAMPUS

Department/Division	72-73 (6 month)	73-74	74-75	75-76	76-77	77-78	78-79
Department of Agronomy	57,246	121,092	127,932	183,600	192,588	202,164	255,908
Department of Agricultural Botany	55,686	128,016	135,384	158,160	165,672	174,000	231,168
Department of Agricultural Chemistry	68,130	143,940	151,908	186,636	195,348	204,996	260,112
Division of Agricultural Economics	14,960	31,788	33,744	35,100	365,76	38,436	40,296
Department of Agricultural Entomology	53,724	113,568	119,880	160,596	168,780	177,276	245,664
Division of Agricultural Engineering	18,486	39,312	41,796	58,104	60,384	63,324	66,264
Division of Agricultural Extension	28,002	59,064	62,220	64,776	67,788	70,968	74,148
Division of Animal Husbandry	18,486	46,356	49,320	51,432	68,064	71,208	74,628
Division of Horticulture	28,002	59,064	62,220	64,776	67,788	70,968	74,148
Department of Plant Pathology	53,724	113,568	119,880	160,596	168,780	177,276	245,664
Division of Agricultural Statistics	22,326	53,088	55,944	75,108	78,564	82,740	86,448
Total	418,776	908,856	960,228	1198,884	1270,332	1333,356	1655,448

B. MAIN CAMPUS AT MANNUTHY

Department	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Department of Agricultural Economics	20,560	82,248	86,784	97,332	124,236	140,364	175,812
Department of Agricultural Extension	18,668	59,064	72,384	75,948	102,036	107,196	112,404
Department of Agricultural Engineering	-	-	-	97,284	102,804	108,516	113,028
Department of Plant Breeding and Genetics	20,560	82,248	86,784	104,376	124,716	130,728	190,164
Department of Soil Science	20,560	82,248	86,784	104,376	124,716	134,916	199,044
Total	80,348	305,808	332,736	479,316	578,568	621,720	790,452

C. TOTAL FOR THE AGRICULTURAL FACULTY

	72-73	73-74	74-75	75-76	76-77	77-78	78-79
XXXXXXXXXXXX	499,124	1,214,664	1,292,964	1,678,200	1,848,840	1,955,076	2,445,900

6. INSTRUCTIONAL FARM FACILITIES

A) VELLAYANI CAMPUS

The Agricultural College at Vellayani has 187 acres of dry land in addition to 10 acres of double crop paddy land and 314 acres of single crop paddy land. As has already been mentioned earlier, the single crop paddy land now available will shortly be converted into double crop land. A scheme for the purpose has already been launched by the State Government which is expected to be completed in two year's time. There is a livestock farm attached to this College for teaching purposes. This is proposed to be expanded.

A Farm Superintendent with adequate complement staff has been provided to look after the College Farm.

Equipment, implements etc.

There are 2 garden tractors and 3 power tillers with accessories. There are also other farm equipment needed for instruction and for carrying out the farm operations. It is proposed to increase the instructional facilities by providing additional farm equipment. An amount of Rs. 2 lakhs is proposed to be utilised for the purchase of instructional farm equipment. All the farm equipment will be centralised so that it can be used for teaching as well as for the normal farm operations.

B) MAIN CAMPUS AT MANNUTHY

Proposals for the instructional farm facilities to be provided at the Main campus will be prepared separately.

7. BUILDINGS--EXISTING BUILDINGS AND THE PROPOSED EXPANSION

When the site was originally acquired, there were a few buildings including the palace. New laboratory buildings and a few residential quarters were subsequently built.

A sketch plan indicating the position of the existing buildings in the campus and the location of the new buildings proposed to be built is appended.

a) Details of the buildings housing the different faculties, laboratories, lecture halls etc. are given below:

Sl. no.	Name of building	Date of construction or assessed age	Plinth area (M ²)	Estimated present worth of building/ recorded capital cost
1.	Old Palace building	30 years	2503.15	@ Rs. 300/M ² =Rs. 7,50,900/-
	The Central Office, Agronomy Division, Engineering Division and the Council Room are housed in this building.			
2.	New College building	1956	4134 + gas house 40.16	@ Rs. 250/M ² = Rs. 10,35,500/- @ Rs. 100/M ² =Rs. 4,016/-
			Total	Rs. 10,37,516/- =====

The Agricultural Chemistry, Agricultural Botany and Horticulture Divisions are housed in this building. A few rooms are given to the Soil Testing Unit. All the three lecture halls in the College are located in this building

3.	Extension building	1964	2855	@ Rs. 200/M ² = Rs. 5,71,000/-
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The Divisions of Extension, Statistics and Agricultural Economics are housed in this building. Two rooms in this building are utilised as the Central Library. The local Branch of the State Bank of Travancore is also housed in this building.

4. Dairy building 1960 574.5 M² @ Rs. 200/M²
= Rs. 114900/-

Animal Husbandry Division is housed in this building

5. Defertilisation building. 1956 167.5 @ Rs. 200/M²
= Rs. 33506/-

Used by the Animal Husbandry Division

6. Dairy paddock 1960 347 @ Rs. 200/M²
= Rs. 69400/-

Used by the Animal Husbandry Division

7. Plant Protection building 1970 3190 M² Rs. 475000/-

Entomology and Plant Pathology Divisions are housed in this building.

8. Insect proof house 1962 108 @ Rs. 200/M²
~~Rs. 69400/-~~
= Rs. 21600/-

Used by the Plant Pathology Division.

9. Workshop building 1958 347 @ Rs. 200/M²
= Rs. 69400/-

Attached to the Engineering Division.

HOSTELS

1. Undergraduate Hostel	1956	4735.38	@Rs. 200/M ²	= Rs. 947076/-
2. Postgraduate Hostel	1964	2285.18	@Rs. 200/M ²	= Rs. 457000/-
3. Ladies Hostel	30 years	626.42	@Rs. 300/M ²	= Rs. 187926/-
	+ Latrines	34.29	@Rs. 100/M ²	= Rs. 5150/-
			Total	=Rs. 193076/-
4. New dining room and kitchen for the Ladies Hostel.	1971	190M ²		= Rs. 23180/-

(An old building in the campus was dismantled and re-erected as Kitchen and dining room. Previously an old building which was away from the hostel served as the dining room and kitchen).

7.(a) FARM BUILDINGS

1.	Farm Office	1956	463	@ Rs. 200/M ² = Rs. 92600/-
2.	Granary building with A.C. roofing	1967	335.4	@ Rs. 150/M ² = Rs. 50200/-
3.	Green house with welded mesh roof	1967	445.5	@ Rs. 100/M ² = Rs. 44600/-
4.	Smoke house with A.C. sheet roofing	1967	82	@ Rs. 150/M ² = Rs. 12300/-
5.	Banana store	1962	209	@ Rs. 150/M ² = Rs. 31350/-
6.	Implement shed	1962	87	@ Rs. 150/M ² = Rs. 13050/-
7.	Sales depot	1962	130	@ Rs. 150/M ² = Rs. 19500/-
8.	Cart shed	1963	33 M ²	@ Rs. 100/M ² = Rs. 3300/-
9.	Labourers canteen	1969	152	@ Rs. 150/M ² = Rs. 22800/-

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OTHER BUILDINGS

1.	Canteen building	30 years	376	@ Rs. 200/M ² = Rs. 75222/-
2.	Cattle shed and cowdung pit 3 Nos	1963	285	@ Rs. 100/M ² = Rs. 28500/-
3.	Summer house	30 years	259	@ Rs. 150/M ² = Rs. 38800/-
4.	Bump houses 4 Nos.	1960-61 and 1968-69	84.41	@ Rs. 125/M ² = Rs. 10550/-
5.	Cooperative Store	30 years	60 M ²	@ Rs. 150/M ² = Rs. 9000/-
6.	P.W.D. Section Office	1967	89	@ Rs. 200/M ² = Rs. 17800/-
7.	Clock house (Nursery) 3 Nos.	1970	295 M ²	= Rs. 78804/-

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-24-35-

8.	Dispensary building	1971	348.88 M ²	Rs. 117140/-
9.	Office building for scheme for improvement of vegetable crops	1967	68 M ²	Rs. 10427/-

448.41
1864.41

7. (c) STAFF QUARTERS (Existing)

1.	Warden's quarters (Principal's quarters)	30 years	621	@ Rs. 200/M ² = Rs. 124200/-
2.	Assistant Warden's quarters (Ladies Hostel)	30 ..	354	@ Rs. 250/M ² = Rs. 88500/-
3.	Assistant Warden's quarters (Men's Hostel)	30 ..	214	@ Rs. 200/M ² = Rs. 42800/-
4.	Farm Superintendent's quarters	30 ..	222	@ Rs. 200/M ² = Rs. 44400/-
5.	Professor's quarters	66-67	140.2	@ Rs. 200/M ² = Rs. 28000/-
6.	Junior Professor's quarters	66-67	116	@ Rs. 200/M ² = Rs. 23200/-
7.	Quarters QA1	61-62	97	@ Rs. 200/M ² = Rs. 19400/-
8.	.. QA2	61-62	97	@ Rs. 200/M ² = Rs. 19400/-
9.	.. QB1	1960	86	@ Rs. 200/M ² = Rs. 17200/-
10.	.. QB2	1960	86	do
11.	.. QB3	1960	86	do
12.	.. QB4	1967	94	@ Rs. 200/M ² = Rs. 18800/-
13.	.. GB5	1969	94	do
14.	.. QB6	1969	94	do
15.	.. QC1	1963	61	@ Rs. 200/M ² Rs. 12200/-
16.	.. QC2	1963	61	do
17.	.. QD1	1963	51.66	@ Rs. 200/M ² = Rs. 10332/-
18.	.. QD2	1963	do	do
19.	.. QD3	1963	51-66	do
20.	.. QD4	1963	do	do
21.	.. QE1	1963	36	@ Rs. 200/M ² = Rs. 7200/-

22. Quarters	QE2	1962	36	@ Rs. 200/M ² = Rs. 7200/-
23.	.. QE3	do	do	do
24.	.. QE4	do	do	do
25.	.. QE5	do	do	do
26.	.. QE6	do	do	do
27.	.. QE7	do	36 M ²	do
28.	.. QE8	do	do	do
29.	.. QF1	1969	49.5	@ Rs. 200/M ² = Rs. 9900/-
30.	.. QF2	do	do	do

(The other half)

7. (a) FACULTY - LABORATORY/LECTURE HALLS ETC.

(i) FOR THE VELLAYANI CAMPUS

The details of the existing laboratory buildings were already given. The additional laboratory requirements of the Vellayani campus are given below. At present there are only three lecture halls.

1.	Horticulture	500 sq.m.	Rs. 1,50,000/-
2.	Agricultural Economics	400 sq.m.	Rs. 1,20,000
3.	Agricultural Engineering	500 sq.m.	Rs. 1,50,000
4.	Agricultural Statistics	500 sq.m.	Rs. 1,50,000
5.	Agronomy	500 sq.m.	Rs. 1,50,000
6.	Botany - Additional requirements	500 sq.m.	Rs. 1,50,000
7.	Chemistry do	500 sq.m.	Rs. 1,50,000
8.	Lecture halls	300 sq.m.	Rs. 90,000
9.	Insect Proof House, glass house, environment controlled room		Approximate cost Rs. 2,10,000
10.	Insectory with temperature and humidity control room		Approximate cost Rs. 2,00,000

(ii) FOR THE MAIN CAMPUS

The estimate of the requirements given below is only approximate.

1.	College of Horticulture, laboratories, class rooms, staff rooms etc.	3300 sq.m	Rs. 10,00,000
2.	College of Basic Sciences and Humanities- Laboratories, glass rooms, staff rooms etc.	2600 sq.m.	Rs. 7,80,000

3. Department of Soil Science

1. Soil Survey and cartography lab.	120 m ²
2. Micronutrient laboratory	120 ..
3. Soil Chemistry laboratory	120 ..
4. Soil microbiology laboratory	120 ..
5. Soil Physics lab.	120 ..
6. Special equipment lab.	60 ..
7. Soil and water conservation lab.	100 ..
8. Soil testing and fertiliser use lab.	120 ..
9. General digestion room	50 ..
10. Oven room	20 ..
11. Undergraduate teaching lab.	100 ..
12. Postgraduate teaching lab.	60 ..

	1110 m ² -
	Rs. 3,33,000/-

4. Department of Plant Breeding and Genetics

1. Quality evaluation lab.	60 m ²
2. Cytology and genetics lab.	60 ..
3. Digestion chambers	20 ..
4. Field laboratory	
5. Undergraduate teaching lab.	10 ..
6. Postgraduate teaching lab.	80 ..
7. Anatomical and embryological lab.	50 ..
8. Plant Physiology lab.	100 ..
9. Museum	60 ..
10. Mutation research lab.	60 ..
11. Seminar room	60 ..
12. Library room	50 ..
13. Dark room	50 ..

	750 ..
	Rs. 2,25,000/-

14. Glass house	50 ..
	Rs. 1,00,000/-

Total = 800 .. Rs. 3,25,000/-

5. Department of Agricultural Extension

1. Photographic lab.	60 m ²
2. Artist lab.	100 ..
3. Extension lab.	100 ..
4. Projection room	150 ..
5. Library	60 ..
6. Seminar	90 ..
7. Training	300 ..
8. Duplication section	30 ..
9. Information including indoor museum to be accommodated along with auditorium	500 ..

1390 .. = Rs. 4,17,000/-

6. Department of Agricultural Engineering

1. Farm machinery lab,	400 m ²
2. Research lab., Lecture halls etc.	800 ..
3. Machinery maintenance workshop	600 ..

1800 .. = Rs. 5,40,000/-

7. Department of Agricultural Economics

1. Data processing lab.	100 m ²
2. Undergraduate teaching lab.	100 ..
3. Postgraduate teaching lab.	80 ..
4. Library room	50 ..

330 .. = Rs. 99,000/-

Adequate space for staff, offices etc. and a seminar room may be provided for each Department.

b) Library

i) VELLAYANI CAMPUS

There is no separate library building for the College. There was a proposal to construct a modern library building in 1966. Plans and estimates were also prepared. But later on the idea was dropped by the Government. Two rooms in the Extension Division are made use of for the Central Library. It is suggested that a library building may be constructed at the Vellayani campus at an estimated cost of Rs. 2,00,000/-

ii) MAIN CAMPUS AT MANNUTHY

A library building may be provided at the main campus at a cost of about Rs.8,00,000/-.

c) Staff quarters - existing number and the number proposed to be built

Existing number of staff quarters - list already given.

Number of staff quarters proposed to be built

i) Vellayani Campus

The additional number and type of staff quarters necessary for the Vellayani campus is given below. The calculations are made on the basis of G.O.MS.No.225/70/PW dated 12-10-1970. The actual number of quarters that can be built at the Vellayani campus may be decided on the basis of funds available. The following is the actual requirement of staff quarters .

Sl. No.	Grade of officers	Type No. of quarters.	No. of quarters to be constructed.	Approximate cost.
1.	Rs. 70-115 75-130 85-175	I	94	Rs. 9000 x 94 = Rs. 8,46,000/-
2.	Rs. 90-190	II	49	Rs. 12000 x 49 = Rs. 5,88,000/-
3.	Rs. 130-270 140-290 170-385 175-325	III	31	Rs. 15,000 x 31 = Rs. 4,65,000/-
4.	Rs. 220-370	IV	1	Rs. 19000 x 1 = Rs. 19,000/-
5.	Rs. 300-600	V	52	Rs. 1,04,000/-
6.	Rs. 400-950	VI	52	Rs. 10,40,000/-
7.	Rs. 700-1250	VII	23	Rs. 9,89,000/-
8.	Rs. 1100-1600	IX	9	Rs. 6,66,000/-
<u>ii) Main Campus at Mannuthy</u>				
1.	Rs. 300-600	V	43	Rs. 8,60,000/-
2.	Rs. 400-950	VI	32	Rs. 6,40,000/-
3.	Rs. 700-1250	VIII	22	Rs. 9,46,000/-
4.	Rs. 1100-1600	IX	7	Rs. 5,18,000/-

d) Farm buildings

Details of the existing facilities are already given. In addition to that the following improvements may be made at the Vellayani Campus.

1. Construction of Granery	300 m ²	Rs. 0.75 lakh
2. Threshing floor (closed)	1000 ..	Rs. 1.00 ..
3. Fencing		Rs. 2.00 ..

	Total	Rs. 3.75 ..

e) Museum, auditorium, students' welfare centre etc.

We do not have an auditorium and student's welfare centre. Provision has to be made for the construction of an auditorium and also a students' welfare centre. Proposals for providing auditorium and students' welfare centre are given under item 10.

8. EQUIPMENT

MAIN CAMPUS

i. Central Instrumentation Laboratory

It is proposed to establish a Central Instrumentation Laboratory in order that costly equipment which are only of limited use to the different Departments could be pooled and kept at a common place in order to avoid duplication. This will include instruments such as Electron microscope, U.V. Spectrophotometer, Ultra Centrifuge, Differential thermal analysis equipment etc. and also similar instruments now available here. It may often become necessary to fabricate instruments for certain specialized items of work to be conducted by staff and students. The Central Instrumentation Laboratory should be able to do this for which purpose different types of components may have to be stocked. Such improved equipment could be dismantled after their use is over and the components could be utilised for similar purposes. They can be used by research workers of all the Departments, thus avoiding duplication.

At present many costly instruments are only very occasionally used in some of the Divisions. Some such instruments are available in more than one Division. In addition a number of costly equipment are remaining unusable since they have gone out of order. There is no competent mechanic to repair these instruments either in the College or any where nearby.

In order to effect economy and in order that costly equipment could be properly maintained and kept in working condition, it is suggested that a competent Instruments Engineer with adequate staff may be provided for the Central Instrumentation Laboratory. The chief man should be one who have got adequate experience in the manufacture and maintenance of sophisticated equipment. I suggest that he may be given the status of a Professor. This will help to save considerable public funds by way of purchasing sophisticated equipment which are required only rarely. The following staff structure is suggested for the Central Instrumentation Laboratory.

1. Instrumentation Engineer	..	1
2. Senior Technicians	..	2
3. Junior Technicians	..	2
4. Mechanics	..	2
5. Clerk	..	1
6. Typist	..	1

Approximate expenditure towards salary and allowances during 1973-74--Rs. 44,500/-

The approximate cost of equipment required for the different Departments during IV Plan period is given below:

1.	Central Instrumentation Laboratory	Rs. 11 lakhs
2.	Agronomy	.. 2.75 ,,
3.	Meteorological Equipment: (Recording rain gauge, sunshine recorder, instruments for recording microclimate, instruments for recording dew, wind, velocity etc.)	1.50 ,,
4.	Agricultural Botany	.. 2.00 ,,
5.	Agricultural Entomology	.. 0.50 ,,
6.	Plant Pathology 1.00 ,,
7.	Horticulture 0.50 ,,
8.	Agricultural Statistics 0.40 ,,
9.	Agricultural Economics 0.40 ,,
10.	Animal Husbandry 0.50 ,,
11.	Agricultural Engineering	.. 0.75 ,,
12.	Agricultural Chemistry 2.00 ,,
13.	Agricultural Extension 0.70 ,,
14.	Instructional Farm equipment Unit	2.00 ,,
15.	Central Photographic Unit and documentation centre 2.00 ,,

(where all types of photographic work to cater the needs of all divisions including extension division will be undertaken)

Total Rs. 28.00 lakhs

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9. DEVELOPMENT OF LIBRARY FACILITIES

(a) Present position in regard to Library collections

Books	..	9533
Back volumes of journals (Indian and Foreign)	..	3126
Current journals subscribed for		
Indian		45
Foreign		56

Total		101
		=====

(b) Requirements of the Fourth Plan for purchase of Books and Periodicals.

It is absolutely essential to purchase back volumes of as many journals as are available for the University Library. It is expected that an amount of Rs. 5,00,000/- can be utilised for the purchase of back volumes of journals, for subscribing to additional journals and for the purchase of books for the Agricultural Faculty of the University during the Fourth Plan period.

(c) Expenditure on purchase of books and periodicals

1969-70	..	Rs. 28,634.32
1970-71	..	Rs. 89,689.75

10. Student Welfare Centre--Present position--programme of expansion--cost.

There is no student welfare centre at present. As a matter of fact the amenities now available to the students are very meagre. I am therefore suggesting the following student amenities.

1. The present play ground is very small and inadequate. Hence a stadium may be provided immediately. The approximate cost of constructing the stadium will come to Rs. 50,000/-.

2. At present meetings and other functions of students are held out doors since there is no auditorium in the College. It is therefore suggested that an auditorium may be provided for the College immediately. The approximate cost, including furniture and other accessories to accommodate about 500 people may come to Rs. 2,00,000/-.

3. A recreation centre for men students may be provided immediately. At present there is no facility for conducting indoor games, neither is there a common room. The approximate cost of the building with accessories may come to Rs. 50,000/-.

4. A recreation centre for the lady students may be provided at an approximate cost of Rs. 25,000/-.

5. The lack of a Gymnasium is very keenly felt. A Gymnasium may therefore be provided. The approximate cost will come to Rs. 25,000/- including necessary accessories.

6. There are three hostels in the campus, one for the undergraduate students, one for the postgraduate students and the third for the lady students. Four water coolers may be provided, two for the undergraduate hostel, one for the post-graduate hostel and one for the ladies hostel. The total cost will come to Rs. 20,000/-.

7. Provision may also be made for the purchase of sports goods at a cost of Rs. 10,000/-.

8. The dining hall of the undergraduate hostel is in a bad condition. It has to be provided with fans, wash basins etc. An amount of Rs. 10,000/- may be provided for the purpose.

9. A new kitchen and dining hall has been recently constructed for the ladies hostel. It has not yet been electrified and furnished. An amount of Rs. 10,000/- may be provided for the purpose.

Abstract

1. Stadium	..	Rs. 50,000
2. Auditorium	..	Rs. 2,00,000
3. Recreation centre for men students	..	50,000
4. Recreation centre for lady students	..	25,000
5. Gymnasium	..	25,000
6. Water coolers-4	..	20,000
7. Sports goods	..	10,000
8. Amenities for U.G. Hostel	..	10,000
9. Amenities for ladies hostel		10,000
Total	..	<u>4,00,000</u>

11. Guest house-cum-staff club

At present there is no Guest House in the Vellayani Campus. Four Guest rooms are, however, provided in the Post-graduate Hostel. There is no staff club in the Vellayani campus. It is absolutely essential to provide a staff club at an estimated cost of Rs. 50,000/-.

12. Coordinated research projects

There is only one coordinated research project functioning in this College, namely, "Coordinated Project for research on forage crops".

The provision made by the I.C.A.R. for the project is Rs. 1,16,428/-

13. Budget ..

14. Resources available ..

15. ~~XXXX~~ Concurrence of the State Government...

16. Needs for advanced training of Faculty members.

At present there are 16 foreign trained members in the Faculty. But most of them except the present Principal were sent for advanced training at the M.Sc. levels only, according

to the U.S.A.I.D. and Colombo Plan Programmes at a time when the Ph.D. programme was not envisaged in the College. Now that the Ph.D. courses are to be offered in the various subjects, it is essential that the staff be properly equipped by advanced training at the Ph.D. level. The Faculty-wise list of personnel who have undergone training is given below:

	Total	No. trained	No. un-trained
Agronomy	7	2	5
Agricultural Chemistry	11	2	9
Agricultural Botany	7	1	6
Plant Pathology	6	2	4
Agricultural Entomology	6	-	6
Agricultural Extension	4	2	2
Horticulture	4	2	2
Economics	2	1	1
Agricultural Statistics	3	1	2
Agricultural Engineering	4	1	3
Animal Husbandry	4	2	2

It is estimated that training will have to be given to about 40 members of the Faculty and the areas where training in foreign institutions is considered essential are given below:

Agronomy

1. Soil fertility and Plant nutrition
2. Crop physiology and ecology
3. Crop management
4. Seed technology
5. Irrigation and water requirement

Agricultural Botany

1. Plant Breeding and Genetics
2. Mutation Breeding
3. Plant Physiology

Agricultural Chemistry

1. Soil Physics
2. Soil Microbiology

3. Pedology
4. Instrumentation
5. Radioactive isotopes
6. Pesticides
7. Bio-chemical analysis

Agricultural Entomology

1. Toxicology and Ecology
2. Nematology
3. Physiological and behavioural control of pests
4. Ecological control of pests

Plant Pathology

1. Phyto-virology
2. Micophysiology and Bio-Chemistry of plant infection
3. Phyto-bacteriology
4. Ecology and of plant pathogens
5. Epidemiology

Horticulture

1. Fruit and Vegetable Technology
2. Fruit culture
3. Olericulture
4. Floriculture and Ornamental gardening

Agricultural Extension

1. Communication
2. Educational Psychology
3. Rural Sociology
4. Social Psychology

Agricultural Statistics

Genetic Statistics

Agricultural Economics

1. Production Economics and Farm Management
2. Econometrics

Special proposals

Teacher's Hostel

Approximate cost

(1) Main Campus	Rs. 3,00,000
(2) Vellayani Campus	Rs. 2,00,000

PROPOSALS FOR THE ESTABLISHMENT OF COLLEGE OF
HORTICULTURE AT MANNUTHY

A substantial portion of the land in Kerala is used for the cultivation of cash crops such as pepper, ginger, cardamom, coconut, arecanut, cashew etc. This is so because the climate as well as the water resources of the State are ideally suitable for growing such crops. Some of the cash crops earn valuable foreign exchange.

Just over 6% of the area is under pepper, ginger and cardamom. 1.83% of the area is under banana. 1.31% of the area is under tea and nearly 1% of the area is under coffee. Just over 6% of the area is under rubber, Coconut and arecanut together occupy just over 27% of the area. It could thus be seen that Kerala concentrates more on cash crops than on food crops. Most of these crops are not properly cared for as is evident from the progressive decline in yield.

Over the last eighteen years or so the average yields of coconut and cashew have gone down by over 19 per cent and 27 per cent respectively. During the same period the area under cardamom has gone up by 84 per cent while the average yield fell by over 50 per cent. The story of pepper is also more or less the same. While the area under this crop went up by nearly 50 per cent the average yield fell by about 28 per cent. These figures go to show that there is urgent necessity for intensification of research on the problems facing these crops in order to find speedy solutions. The green revolution should not be confined to food crops only, it should be made to embrace the cash crops as well.

Apart from the crops already mentioned, Kerala is now trying to popularize more paying crops like cloves, nutmeg, cocoa and oil palm. The area under these crops is now gradually increasing. Cocoa is recommended to be



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interplanted in coconut gardens. There is need to conduct adaptive research with regard to the new cash crops which are now being popularized. Properly trained personnel with adequate background on the problems facing cash crops are also necessary to conduct extension work in this field.

It is in the above context that a College of Horticulture is proposed to be established at the Main Campus of the Kerala Agricultural University at Mannuthy.

The College of Horticulture can be started during the current academic year itself. The minimum space required for the purpose can be made available in the existing building at Mannuthy.

The staff immediately required for teaching can be made available from the Agricultural College at Vellayani till permanent staff are posted for the College. Similarly equipment and books which are immediately required can be made available from the Agricultural College.

The following will be the main functions of this College.

1. To impart instruction in horticulture at the undergraduate and postgraduate levels;
2. To conduct research for the improvement of fruits and vegetables;
3. To conduct research for solving the problems facing commercial crops with a view to maximise production;
4. To develop suitable technologies for processing horticultural and commercial crops for internal as well as external markets.

The proposed staff structure of the College of Horticulture is given below:-

COLLEGE OF HORTICULTURE

Staff Structure

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
<u>Department of Horticulture</u>							
Professor 1100-1600	1	1	1	1	1	1	2
Associate Professor 700-1250	1	2	2	3	3	3	5
Assistant Professor 400-950	1	2	3	6	6	7	9
Instructor/ Research Assistant 300-600	4	4	6	6	8	8	10
<u>Division of Agronomy</u>							
Associate Professor 700-1250	1	1	1	1	1	1	1
Assistant Professor 400-950	1	1	1	2	2	2	3
Instructor/ Research Assistant 300-600	2	2	2	3	3	3	4
<u>Division of Agricultural Botany</u>							
Associate Professor 700-1250	1	1	1	1	1	1	1
Assistant Professor 400-950	1	1	1	2	2	2	3
Instructor/ Research Assistant 300-600	1	2	2	2	3	3	4
<u>Division of Agricultural Chemistry</u>							
Associate Professor 700-1250	1	1	1	1	1	1	1
Assistant Professor 400-950	1	1	1	2	2	2	3
Instructor/ Research Assistant 300-600	2	2	2	3	3	3	4

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
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Division of Plant Pathology

Associate Professor	700-1250	1	1	1	1	1	1	1
Assistant Professor	400-950	1	1	1	2	2	2	3
Instructor/ Research Assistant	300-600	2	2	2	3	3	3	4

Division of Agricultural Entomology

Associate Professor	700-1250	1	1	1	1	1	1	1
Assistant Professor	400-950	1	1	1	2	2	2	3
Instructor/ Research Assistant	300-600	2	2	2	3	3	3	4

Division of Agricultural Engineering

Associate Professor	700-1250	1	1	1	1	1	1	1
Assistant Professor	400-950	1	1	1	1	1	1	1
Instructor/ Research Assistant	300-600	2	2	2	2	2	2	2

Subjects like Agricultural Economics, Agricultural Extension etc. will be taught by the staff proposed for the post-graduate departments which are to be located at the Main Campus.

The Department of Horticulture suggested for the College will form part of the post-graduate institute which is to be located at the Main Campus.

The Divisions of Agricultural Botany, Agricultural Chemistry and Agricultural Engineering may ultimately be associated with the respective post-graduate Departments.

The different Divisions provided will work in close collaboration with the corresponding Department/Division of the Agricultural College at the Vellayani campus.

Teaching at the Undergraduate level will begin during the current academic year itself. Postgraduate level teaching leading to the M.Sc.(Ag.) Degree is proposed to be started during the academic year 1973-74. Ph.D. level teaching is proposed to be started during the academic year 1975-76.

The College will organize a comprehensive programme of research covering all aspects of Horticultural crops including plantation crops. A tentative list of research projects is given in Appendix VII.

EXPENDITURE FOR BUILDING AND EQUIPMENT

i. Laboratories, class rooms, staff rooms etc.	= 33,000 sq.ft.
Approximate cost @ Rs.30/- per sq.ft.	= Rs. 10,00,000.00
ii. Equipment and fittings	= Rs. 10,00,000.00
<hr/>	
Total	= Rs. 20,00,000.00
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COLLEGE OF HORTICULTURE

STATEMENT SHOWING THE TOTAL NUMBER OF TEACHING
POSTS SUGGESTED

Designation and scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor 1100-1600	1	1	1	1	1	1	2
Associate Professor 700-1250	7	8	8	9	9	9	11
Assistant Professor 400-950	7	8	9	17	17	18	25
Instructor/ Research Assistant 300-600	15	16	18	22	25	25	32

COLLEGE OF HORTICULTURE

STATEMENT SHOWING PAY AND ALLOWANCES OF TEACHING STAFF

Division/Department	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Department of Horticulture	546,36	75,804	98,256	127,512	151,248	168,108	236,460
Division of Agronomy	28,560	30,240	31,968	46,116	48,636	51,144	66,072
Division of Agricultural Botany	22,884	29,940	31,668	40,140	47,868	50,544	65,172
Division of Agricultural Chemistry	28,560	30,240	31,968	46,116	48,636	51,114	66,072
Division of Agricultural Engineering	28,560	30,240	31,968	33,396	35,136	36,816	38,496
Division of Agricultural Entomology	28,560	30,240	31,968	46,116	48,636	51,144	66,072
Division of Plant Pathology	28,560	30,240	31,968	46,116	48,636	51,144	66,072
Total	220,320	256,944	289,764	385,512	428,796	459,954	604,416

COLLEGE OF BASIC SCIENCES AND HUMANITIES

It is proposed to establish a College of Basic Sciences and Humanities at the main campus at Mannuthy during the current academic year itself. To begin with, it is proposed to have the following three Departments with related subjects under them.

1. Department of Biological Sciences

This Department will include the following subjects:

- i. Botany;
- ii. Zoology;
- iii. Microbiology;
- iv. Biochemistry.

2. Department of Physical Sciences

This Department will include the following subjects:

- i. Statistics;
- ii. Physics;
- iii. Chemistry; and
- iv. Mathematics.

3. Department of Social Sciences.

This Department will include the following subjects:-

- i. Economics;
- ii. Sociology;
- iii. Psychology.

Small Divisions of the above three Departments will be attached to the Agricultural College at the Vellayani Campus. The staff structure for the Vellayani Campus has already been given. The staff structure for the Main Campus at Mannuthy for the 3 Departments are given below:

1. DEPARTMENT OF BIOLOGICAL SCIENCES

Designation & scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
<u>Botany</u>							
Professor 1100-1600	1	1	1	1	1	1	1
Associate Professor 700-1250	1	1	1	2	2	2	2
Asst. Professor 400-950	2	2	2	3	3	3	3
Instructor/ Research Assistant 300-600	2	2	2	3	3	4	4
<u>Zoology</u>							
Associate Professor 700-1250	1	1	1	1	1	1	1
Assistant Professor 400-950	1	1	1	2	2	3	3
Instructor/ Research Assistant 300-600	1	1	1	2	2	3	3
<u>Microbiology</u>							
Associate Professor 700-1250	1	1	1	1	1	1	1
Assistant Professor 400-950	1	1	1	2	2	3	3
Instructor/ Research Assistant 300-600	1	1	1	2	2	3	3
<u>Biochemistry</u>							
Associate Professor 700-1250	1	1	1	1	1	1	1
Assistant Professor 400-950	1	1	1	2	2	3	3
Instructor/ Research Assistant 300-600	1	1	1	2	2	3	3

This Department will undertake research of a fundamental nature in the different subjects indicated.

2. DEPARTMENT OF PHYSICAL SCIENCES

Designation & scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
<u>Statistics</u>							
Professor 1100-1600	1	1	1	1	1	1	1
Associate Professor 700-1250	1	1	1	1	1	1	1
Assistant Professor 400-950	2	2	2	3	3	3	3
Instructor/ Research Assistant 300-600	1	2	2	2	3	3	4
<u>Physica</u>							
Associate Professor 700-1250	1	1	1	1	1	1	1
Assistant Professor 400-950	1	1	1	1	1	1	1
Instructor/ Research Assistant 300-600	1	1	2	2	3	3	3
<u>Chemistry</u>							
Associate Professor 700-1250	1	1	1	1	1	1	1
Assistant Professor 400-950	1	1	1	1	1	1	1
Instructor/ Research Assistant 300-600	1	1	2	2	3	3	3
<u>Mathematics</u>							
Assistant Professor 400-950	1	1	1	1	1	1	1

3. DEPARTMENT OF SOCIAL SCIENCES

Designation & scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Associate Professor of Social Science 700-1250	1	1	1	1	1	1	1
Assistant Professors 400-950	3	3	3	3	3	3	3
Instructors/ Research Assistant 300-600	3	3	3	3	3	3	3

Buildings and equipment

(i) Buildings.

Approximate area - 26,000~~0~~ sq.Mt.
Approximate cost
(Rs.30/- per sq.ft) - Rs. 7,80,000/-

(ii) Equipment and fittings.

Approximate cost - Rs. 8,00,000/-

Total Rs. 15,80,000/-
=====

COLLEGE OF BASIC SCIENCES & HUMANITIES

STATEMENT SHOWING TOTAL NUMBER OF TEACHING POSTS SUGGESTED

Designation & scale of pay	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Professor 1100-1600	2	2	2	2	2	2	2
Associate Professor 700-1250	9	9	9	10	10	10	10
Assistant Professor 400-950	25	25	25	30	30	33	33
Instructor/ Research Assistants 300-600	22	23	28	32	40	44	46

COLLEGE OF BASIC SCIENCES AND HUMANITIES

STATEMENT SHOWING ESTIMATE OF EXPENDITURE ON PAY AND ALLOWANCES OF TEACHING STAFF

Department	72-73	73-74	74-75	75-76	76-77	78-78	78-79
A. MAIN CAMPUS							
1. Department of Biological Sciences	1,25,820	1,25,880	1,33,020	2,10,048	2,26,740	2,86,704	3,00,084
2. Department of Physical Sciences	97,464	1,09,140	1,27,932	1,41,552	1,69,116	1,77,216	1,92,960
3. Department of Social Sciences	48,324	51,264	54,348	56,532	59,149	62,088	65,028
Total Rs.	2,71,608	2,92,284	3,15,300	4,08,132	4,55,004	5,26,008	5,58,072
B. VELLAYANI CAMPUS							
1. Department of Biological Sciences	73,764	78,264	93,780	97,692	1,51,116	1,58,136	1,68,000
2. Department of Physical Sciences	45,204	48,024	51,036	52,848	55,068	57,888	60,708
3. Department of Social Sciences	38,160	40,500	42,984	44,568	46,584	48,924	51,264
Total Rs.	1,57,128	1,66,788	1,87,800	1,95,108	2,52,768	2,64,948	2,79,972
Total for Main campus and Vellayani Campus	4,28,736	4,59,072	5,03,100	6,03,240	7,07,772	7,90,956	8,38,044

ABSTRACT OF EXPENDITURE

A. PAY OF TEACHING STAFF

	72-73	73-74	74-75	75-76	76-77	77-78	78-79
<u>College of Agriculture</u>							
i) Vellayani Campus	4,18,776	9,08,856	9,60,228	11,98,884	12,70,332	13,33,356	16,55,448
ii) Main campus (post-graduate institute)	80,348	3,05,808	3,32,736	4,79,316	5,78,508	6,21,720	7,90,452
Total Rs.	4,99,124	12,14,664	12,92,964	16,78,200	18,48,840	19,55,076	24,45,900
<u>College of Horticulture</u>							
Main campus	2,20,320	2,56,944	2,89,764	3,85,512	4,28,796	4,59,954	6,04,416
<u>College of Basic Sciences and Humanities.</u>							
i) Vellayani Campus	1,57,128	1,66,788	1,87,800	1,95,108	2,52,768	2,64,948	2,79,972
ii) Main campus	2,71,608	2,92,284	3,15,300	4,08,132	4,55,004	5,26,008	5,58,072
Total Rs.	4,28,736	4,59,072	5,03,100	6,03,240	7,07,772	7,90,956	8,38,044
GRAND TOTAL	11,48,180	19,30,680	20,85,828	26,66,952	29,85,408	32,05,986	38,88,360

B. BUILDINGS etc.

1. Vellayani Campus

i. Laboratories etc.	..	15,20,000
ii. Library	..	2,00,000
iii. Staff Quarters	..	56,53,000
iv. Farm Buildings	..	3,75,000
v. Guest House	..	50,000
vi. Teachers' Hostel	..	2,00,000
vii. Auditorium	..	2,00,000
viii. Recreation Centre	..	75,000
ix. Gymnasium	..	25,000
x. Stadium	..	50,000

Total Rs. 83,48,000

2. Main Campus

i. Departmental Laboratories		34,94,000
ii. Library	..	8,00,000
iii. Quarters	..	29,64,000
iv. Teachers' Hostel	..	3,00,000
v. College of Horticulture		10,00,000
vi. College of Basic Sciences and Humanities	..	7,80,000

Total Rs. 93,38,000

C. EQUIPMENT & BOOKS (For the Main Campus and for the Vellayani Campus)

i. Central Instrumentation Laboratory.	..	11,00,000
ii. Departmental Laboratories		17,00,000
iii. Equipment etc. for students Welfare Centre, Mess Hall etc.	..	30,000
iv. Sports goods	..	10,000
v. Books	..	5,00,000
vi. College of Horticulture		10,00,000
vii. College of Basic Sciences & Humanities	..	8,00,000

Total Rs. 51,40,000

Appendix I

DEPARTMENT OF AGRONOMY

Research Projects proposed to be undertaken

1. Effect of alternate flooding and draining on the growth, yield and nitrogen uptake of rice under local conditions. Alternate flooding and draining is likely to result in denitrification and loss of nitrogen. It is proposed to investigate the extent to which loss of nitrogen takes place under such conditions.
2. Effect of granular weedicides on control of weeds in rice fields.
3. Influence of plant population and fertilizers on the yield and yield attributes of rice (var: Triveni).
4. Effect of foliar application of nitrogen through low volume sprays to rice in the third crop season (Punja, i.e. summer season--January-April).
5. Response of high yielding rice (Var: Triveni) to nitrogen applied through soil and foliage at the physiologically important stages of growth.
6. Investigation on the lack of response of rice to phosphorus in red loam soils.
7. Studies on the vegetative and productive attributes of four rice varieties (Aswathi, Triveni, Rohini and Annapoorna) under varying level of nitrogen.
8. Experiment to investigate the possibility of raising four paddy crops in the same land in one year and comparison of economics with the existing cropping systems in the irrigated areas (Project areas).
9. Comparative study of cultural and chemical method of weed control in rice.
10. The effect of phosphorus application to the nursery and its effect on yield and yield attributes of rice.
11. Performance of two newly evolved varieties of sweet potato (H.41 and H.42) under graded doses of nitrogen, phosphorus and potassium.

12. Studies on the yield, quality and nitrogen uptake of three improved sweet potato varieties to different levels and timings of nitrogen application under agro-climatic conditions of Vellayani.
13. Effect of graded doses of nitrogen on the growth, yield and symbiotic nitrogen fixation by soybean under inoculated and uninoculated conditions.
14. Effect of application of phosphorus alone and in combination with lime on the growth and yield of soybean.
15. Adaptability and performance of high yielding varieties of cowpea under Vellayani conditions.
16. Effect of weed control by cultural operations as compared to chemical and mechanical methods on the yield of coconut.
17. Experiment on multiple cropping--a study to evolve a suitable cropping pattern for dry lands.
18. Experiment on multiple cropping--a study to evolve a suitable cropping pattern for paddy lands.
19. Studies on the adaptability, performance and manurial requirements of medicinal plants--Phyllanthus nirvri, Eclipta alba, Kaempferia galanga, Aritidesma diandrum, Trianthema portulacastrum and Sida rhombifolia.
20. Preparation of the climatic map of the State in respect of temperature, rainfall and relative humidity.
21. Effect of nitrification inhibitor on the efficiency of utilisation of applied nitrogen on maize.
22. Effect of split application of potash on the yield of rice.

Appendix II

DEPARTMENT OF AGRICULTURAL BOTANY
(Vellayani Campus)

&

DEPARTMENT OF PLANT BREEDING AND GENETICS
(Main Campus)

Research Projects proposed to be undertaken

1. Determination of the effectiveness and efficiency of radiations and chemical mutagens in seed propagated crops like cereals, pulses and vegetables.

In seed propagated crops mutation breeding is preferable to other methods of breeding such as selection and hybridization when the objective is to breed for additional characters in an adopted variety. Several mutagens are now available and it is proposed to determine their effectiveness.

2. To develop and maintain a germ plasm of induced mutants in rice and other seed propagated crops of importance to Kerala

In crops such as rice in which considerable breeding work has already been done, the varietal diversity available in nature has been largely utilised. Therefore in future, in breeding for specific objectives the breeder has to depend to a large extent on induced variability. A germ plasm of induced mutants will meet this requirement of new variability.

3. Mutation breeding for better grain quality in rice

Several high yielding varieties of rice produce grains of low quality. Grain shape and cooking quality of these varieties can be improved through mutational alteration. Mutation breeding is efficient in changing the physical and chemical properties of starch and improving the nutritional value of the rice grain by increasing protein content.

4. Evolution of short statured high yielding mutants in promising tall rice varieties of Kerala.

The tall varieties of rice evolved in Kerala through selection and hybridization have several adaptive features which make them highly suitable to the conditions in this

State. Short statured mutants can be induced in these varieties to replace their tall counterparts in due course.

5. Mutation breeding to evolve short duration high yielding varieties of cow pea and other pulse crops

High yielding, short duration varieties of cowpea can be grown on a large scale as a field crop for seed purpose in several regions of this State. Varieties suitable for this purpose are proposed to be evolved through mutation breeding from the long duration, trailing varieties now available.

6. Mutation breeding to evolve wilt resistant varieties of tomato, brinjal and chillies

Wilt resistant varieties of solanaceous crops such as tomato, brinjal and chillies are proposed to be evolved through mutation breeding. The programme is to treat existing varieties with effective mutagens, screen the mutated population under epiphytotic conditions and isolate resistant mutants.

7. Determination of RBE and optimum radiation dose for vegetatively propagated crops

The RBE of radiations of vegetative propagules which form the biological material for mutagen treatment in vegetatively propagated plants, will differ considerably from that on seeds. The determination of the optimum radiation type and dose is proposed because it is basic to the application of mutation breeding in the improvement of vegetatively propagated plants such as spices and tuber crops.

8. Inducing somatic mutations in vegetatively propagated crops and maintenance of a germplasm of somatic mutants

In vegetatively propagated crops a desirable mutant once induced can be propagated and made use of directly. Induction and maintenance of a collection of somatic mutants will help in the creation of genetic variability. This work will be taken up in vegetatively propagated spices and tuber crops.

9. Breaking incompatibility in sweet potato through induced mutations for the utilization of hybrid vigour

In sweet potato hybrid vigour can be easily exploited because of its vegetatively propagated nature. But several varieties show incompatibility in crossing. Self and cross compatible mutants are proposed to be induced and utilised in evolving hybrid varieties.

10. Determination of linkage relationship of genes of economic importance in crops and mapping of genes on chromosomes

In the induced mutation work, the mapping of genes on the chromosomes of crop plants is important. This is proposed to be taken up on the basis of the recommendation of the I.C.A.R. Scientific panel for plant breeding.

11. Project to study the possibility of introducing new crops in Kerala and to investigate their adaptability

Maize, Bajra, and sorghum are some of the important food crops which are not popularly cultivated at present in Kerala. The project is to study the adaptability of these crops to Kerala and also to evolve promising types suitable for this State.

12. Introduction and selection of soy bean varieties suitable for Kerala

Realizing the importance of soybean as a ready source of protein, it is being extensively cultivated throughout India. However its cultivation has not been popularised in this State. The project involves the study of the scope of introducing this crop, its adaptability and to use modern techniques of breeding to develop suitable strains which can be grown in all parts of Kerala.

13. Breeding improved varieties of Ragi

Ragi is an important field crop grown mostly in the northern districts and occupies a large area. The project is meant to introduce new varieties and to evolve better varieties, through intervarietal hybridisation and induced mutations.

14. Breeding high yielding varieties of ground nut and sesamum suitable for high rainfall conditions of Kerala

By inter varietal hybridisation and selection, high yielding strains suitable for rainfed conditions could be evolved.

15. Breeding high yielding, dwarf varieties of sunflower

Sun flower is attaining more importance as an oil seed crop because of its high oil yield, short duration, easy adaptability to all conditions and better quality oil. The oil is better than coconut oil as an edible oil. Therefore it is proposed to evolve better yielding, dwarf varieties suitable to our conditions, through introduction, selection, hybridisations and by induced mutations and polyploidy.

16. Varietal improvement in cowpea through introduction, selection and hybridisation

The objective is to evolve short duration high yielding varieties of cow pea.

17. Study of intraspecific divergence in cowpea.

The assessment of the degree of divergence between populations is useful to the breeder in permitting the choice of genetically divergent parents, to obtain desirable recombinants in the segregating generations.

18. Cytomorphological changes induced by certain fungicides and pesticides on rice.

Seed and plant treatment with fungicides and pesticides are known to cause morphological, physiological and cytological changes. Effects ranging from poor germination and stunted growth; to internal changes which could lead to hereditary alterations as a result of chromosomal and gene mutations have been recorded. Hereditary variations caused by these chemicals on any plant is of importance because of the change of genotype. Therefore studies on cytomorphological changes induced by commonly used fungicides and pesticides, will be undertaken with a view to assess its effects on germination, growth and the cytological behaviour.

19. Cytogenetic studies on species and varieties of Solanaceous crops such as Brinjal and chillies

Hybridisation between cultivated and wild varieties of any crop is an important tool in improving the crop to incorporate the desirable genes from the wild relatives to the cultivators. There is no correlation between the degree of similarity in morphological characters and the genetic barriers in crossing the different species and varieties. In order to select suitable parents for hybridisation cytogenetical studies on the different species are to be undertaken. The understanding of the genetic make up of the varieties will make the selection easier.

20. Diallel analysis in cowpea

The objective is to understand the genetic architecture of the varieties with reference to the quantitative traits. Crosses will have to be effected both direct and reciprocal,

in all possible combinations. Between selected parental varieties and the behaviour of the F_1 , F_2 and $BC_1 F_1$ will have to be studied along with the parents in replicated trials.

21. Scheme to study the dryland and wet land weeds of Kerala with respect to their distribution, seasonal variation, identification and mode of reproduction.

It is proposed to collect the weeds from different parts of the State, identify them and preserve herbarium specimens. Their characteristics and methods of propagation are also studied to evolve suitable control measures.

22. To study the metabolic processes concerned with senescence and means of delaying it.

Ageing in plants is due to changes in metabolic pattern with advancing growth leading to break down of cell functions and final drying up of plant parts. Detection and modification of such metabolic processes would prevent cessation of plant growth. This scheme envisages to study the above with a view to prolong the period of growth and thus increase production.

23. The study of metabolism, growth and development of plants under water stress.

Normal growth occurs with plentiful water supply as it is a component of protoplasm and a medium of all metabolic processes. When water is in deficient supply the pattern of these processes is modified and interrupted leading to poor growth. This scheme envisages to evolve methods to prevent such changes so that normal production is available under such stress conditions.

24. The effect of nitrogen and hormonal regulation of sex expression and yield in cucurbits

Flower production and sex expression are under the control of both nutrients and growth regulating substances. In cucurbits, where unisexual flowers are formed, a larger proportion of female flowers would increase yield. The object of this scheme is to study the effect of the factors involved and to evolve practices for the production of larger numbers of female flowers.

25. Effect of magnesium, zinc and copper in chlorophyll content, photo synthesis and yield of paddy.

The yield of paddy depends on the rate of photosynthesis which in turn is dependent on chlorophyll content and their stability. Magnesium, zinc and copper have favourable effects on chlorophyll content. The extent of their control and amounts necessary for high yields will be ascertained by this study.

26. Studies on the control of *Salvinia auriculata*.

This aquatic weed has become a menace in cultivated areas, water ways and catchment areas. The study is proposed to evolve suitable chemical and other methods, cheap, effective and harmless to crop plants, livestock, fish etc. for the control of the weed.

27. Studies on the effect of weedicidal concentrations on crop plants.

A number of weedicides are in the market and many are added each year. These chemicals cannot be used without ascertaining their effects on different crop plants. The present study envisages collection of information regarding tolerance, susceptibility and symptoms of injury caused by the chemicals on crop plants and precautions to be taken during weedicidal application.

28. Study of seed, seedling, dormancy longevity and germination of important weeds of Kerala.

This information is essential for maintaining purity of seeds of crop plants, and also to evolve suitable weed control measures. The study is to collect information regarding the above aspects.

29. Nutritional deficiency symptoms of important crop plants and their correction.

Soil analysis for detection of mineral deficiency is time consuming and unreliable for many reasons. But the symptoms due to deficiency appearing on plant parts are specific and characteristic. The study is to codify the symptoms produced by particular nutrients in deficient supply and to evolve methods of correction.

30. Scheme to study the nutritional requirements of pulses

Pulses occupy 18% area of total grain production and account for 12% of production. They supply essential proteins.

No data is now available on the nutritional requirements of this group of crop plants. This study is to find the optimum and economic doses and time of application of essential nutrients to maximise production.

31. Correlation between nutrient supply and protein content in pulses.

Pulse crops are a valuable source of protein and thus the deficiency of a cereal diet is overcome. This scheme is to study the effect of different mineral elements on the protein content of the pulses.

32. Effect of mineral nutrients on fat metabolism and oil content of gingelly.

The study envisages to determine the effect of different mineral nutrients on fat metabolism and oil content in gingelly.

33. Survey, collection and cultivation of medicinal plants in Kerala.

Except Rauwolfia, no other medicinal plant has been taken up for cultivation in this State. But the State abounds in a variety of medicinal plants. A systematic collection and evaluation would yield a number of important plants that can be taken up for large scale cultivation. This scheme is proposed for a collection of medicinal plants from all over Kerala and to work out the feasibility of their large scale cultivation.

34. To study the nutritional and water requirements of sunflower growth as an oil crop

The importance of edible oils with high unsaturated fatty acid content is fast increasing due to their special medicinal properties. A number of varieties of sunflower with high oil content have been released. This scheme is to study the optimum mineral nutrient requirements of the plant correlated with high oil content.

Appendix-III

DEPARTMENT OF AGRICULTURAL CHEMISTRY (VELLAYANI CAMPUS)

&

DEPARTMENT OF SOIL SCIENCE (MAIN CAMPUS)

Research Projects proposed to be undertaken

1. Investigations on the genesis of the insitu and secondary laterite formations found in Kerala.

There are two typical types of laterite formations in Kerala which comprise more than 60% of the land area of the State. This is a fundamental study which will yield results for the management of the laterite soils.

2. Investigations on the origin and classification of the various types of red soil formations in Kerala State.

Some of the red soil formations in the State are intermingled with typical laterite formations. The interrelationships between these different formations as well as classification of the various types of red soil formations will be taken up in the present study.

3. Pedological studies on the alluvial and riverine soils of Kerala State.

The alluvial and riverine soils of Kerala State are much different from similar soils in other areas in that the major portion of such soils are under the influence of saline water from the sea and backwaters. These soils have to be studied and classified for evolving a scientific system of management.

4. Investigations on the catenary formations in Kerala State

Because of the highly undulating nature of the topography in Kerala a large number of catenary sequences are found over short distances in the State. These investigations will enable us to arrive at a better system of classification of the soils of the State from the point of view of their management.

5. Studies on the biosequences of soils in Kerala State.

The main groups of forests found in Kerala are the evergreens deciduous, monsoon and the mixed type. These vegetations in turn significantly influence the soil characteristics.

Fundamental investigations of the effect of these vegetations in influencing soil properties will enable predictions to be made in adopting suitable afforestation programmes for preventing erosion.

6. Effect of plantations on morphological, physical and chemical properties of forest soils.

Large areas of forests are being cleared for raising plantations of teak, coffee, rubber, tea etc. It is a controversial question even now whether such operations will adversely affect the soil in the long run. Fundamental investigations in this aspect will yield results useful for practical application.

7. Morphological studies on Kerala soils and the establishment of a soil Museum

Morphological studies of the various types of soils will be undertaken and monoliths prepared using which a soil Museum will be established.

8. Petrological investigations on the coarser fractions of the various soil types of the State to get an insight into the weathering processes.

Coarser fractions of the soil will be studied petrologically for the nature of the parent materials.

9. Establishment of climosequences in the laterite and lateritic types of soils of the State

The rainfall in the State varies from 70" in the south to more than 200" in some parts of the northern regions of the State. This is bound to have its influence on the extent of laterisation. Definite climosequences will be established by the investigations proposed.

10. Studies on the identification of minerals in the clay fractions of the laterite and red soils of the State.

No information is available about the nature of the clay minerals present in the soils of the State. This will be investigated using modern methods such as X-ray diffraction and DTA.

11. Studies on the influence of cropping patterns on the physical properties of the soil with special reference to structure.

The nature of the crop grown has a decisive influence

The nature of the crop grown has a decisive influence on the physical properties of the soil especially structure. Once a structure has been built up this may have profound effect on the ensuing crop. Thus in a multicrop system the inclusion of a structure building crop at a suitable position in the sequence will have beneficial effects. These aspects will be investigated.

12. Studies on the sulphur status of Kerala soils with particular reference to their transformations leading to the production of hydrogen sulphide and sulphuric acid under water logged conditions.

It has been established that the acidity in the kari soils of Kuttanad is due to the production of sulphuric acid. Under certain conditions of water logging the reduction products of sulphur particularly hydrogen sulphide are produced at concentrations toxic to rice plants. Attempts will be made to elucidate the complex processes and define conditions to evolve methods of management of such soils.

13. Anion and cation exchange properties of Kerala soils using radio isotopes

The P fixing capacity of soils and P availability will be studied using P^{32} . Similarly the cation exchange capacity and the release of Ca will be studied using radio active calcium.

14. Studies on the ramifications of iron in the rice soils of Kerala State.

In some of the acid rice soils of Kerala toxicity due to iron has been observed. In the present study the role of various forms of iron in the rice soils will be investigated. with particular reference to the soluble ferrous forms that are responsible for the occurrence of iron toxicity.

15. Effect of moisture, reaction, organic matter and liming on the solubilisation of iron in the rice soils of Kerala State

While water-logging and acidity in soils promote the solubilisation of iron. Application of organic matter and lime has been reported to suppress the solubilisation. The study proposed will critically evaluate these factors in order that feasible recommendations can be made to suppress iron toxicity in rice soils.

16. Studies on the efficiency of nitrogenous fertilisers under water-logged conditions with reference to Kerala soils.

In rice soils due to conditions of alternate drying and water-logging some of the nitrogenous fertilisers especially nitrate containing ones undergo loss by denitrification. Other forms of fertilisers also get nitrified to nitrate during dry spells and get denitrified during subsequent periods of water-logging. The present work proposes to investigate these aspects critically under careful stimulated conditions in the laboratory and by pot culture experiments.

17. Soil application of insecticides and fungicides in relation to nitrogen transformations, enzymatic activities, uptake of nutrients and residual effects in upland and lowland soils.

With the advent of systemic insecticides, there is indiscriminate use of these materials in the soil for plant protection measures. These toxic chemicals will have their influence on the soil flora and fauna. This will be manifested not only on the soil nutrient transformations and their availability but also on the physiological make up of the plant. So the study on the break down and residual effects of these insecticides under soil conditions and their effect on plant make up requires close scrutiny.

18. Effect of liming acid soils on the yield, nitrogen fixation root development and uptake of mineral nutrients by important indigenous leguminous crops.

Though considerable information is available on liming acid soils under low land conditions, there is very little information on liming in upland soils for dryland crops. In this study the role of lime in increasing the yield, nitrogen fixation, root development and uptake of mineral elements in respect of leguminous crops will be studied. This study will suggest methods for increasing the yield of indigenous leguminous crops.

19. Isolation of Rhizobium and preparation of cultures for indigenous legume crops.

No attempt has so far been made to isolate specific Rhizobium cultures for purposes of inoculation of indigenous legumes in Kerala. The present study is intended to make available cultures of Rhizobium for purposes of inoculation in the field scale.

20. Effect of algal inoculation in suppressing iron and sulphide toxicity in water-logged soils.

Inoculation of blue green algae is well known to result in an increase of yield of rice plants. Due to photosynthetic nature of the organisms they bring about aeration of the water logged soils. The present investigation proposes to evaluate this role of blue green algae in suppressing iron and sulphide toxicity in acid water-logged rice soils.

21. Studies to find out the optimum time for draining water from the fields under Kuttanad conditions after application of fertilisers.

This is an important problem of great practical significance in Kuttanad and other water-logged areas, where there exists a practice of draining the fields periodically to remove toxic soluble salts, iron, aluminium and manganous manganese liberated from the soil into the soil solution. The time lag that is required between an application of nitrogenous fertilisers and draining the fields has to be evaluated to avoid wastage of costly fertilisers applied.

22. To study the optimum time lag that should be allowed between liming and nitrogen application to avoid loss of ammonia in water logged soils.

In the present study it is proposed to investigate the minimum time lag that should be allowed between basal application of nitrogenous fertilisers in paddy soils to prevent loss of applied nitrogen.

23. Development of a quick method for determination of available nitrogen for soil testing.

None of the available methods at present gives proper correlation with crop response. Moreover the methods are cumbersome and time consuming. It is proposed to investigate this aspect so as to evolve a suitable method for estimating available nitrogen.

24. Studies on the suitability of high analysis fertilisers like anhydrous ammonia and polyphosphates for Kerala soils and crops

The use of anhydrous ammonia is limited due to the non-availability of a suitable appliance. However it is the cheapest source of nitrogen. In Kuttanad and other areas its

application can be done by simple methods like passing the gas into irrigation water. Other high analysis fertilisers like polyphosphates are being introduced in India. They also require evaluation under our conditions.

25. Trials with indigenous sources of Potassic fertilisers like shoenite and phosphatic fertilisers like Laccadive phosphates and Mussorie phosphates.

In the case of potassium and phosphatic fertilisers we are still dependent on imported materials. We have deposits of phosphorus at Laccadive and Mussorie. Indian basic slag, though low in phosphorus, contains silica and lime. Indigenous shoenite has also been reported to be a good source of potassium. It is proposed to conduct studies with such indigenous materials.

26. Survey of the laterite soils of Kerala with a view to finding out areas of zinc deficiency.

Very little information is available about the micro-nutrient status of the laterite soils of Kerala. To initiate such a work it is proposed to undertake a survey to locate areas of zinc deficiency.

27. Studies on the paddy soils of Kerala with a view to locating areas of Zinc deficiency.

Zinc has been reported to be a critical element in the nutrition of some of the high yielding varieties of rice. In this context there is an urgency to locate areas of zinc deficient paddy soils covered by the high yielding variety programme.

28. Effect of Phosphorus in suppressing zinc availability in rice soils.

With a view to find out a suitable dose of phosphate for preventing chlorosis induced by zinc deficiency this project is proposed. It is known that high rates of application of phosphates may induce zinc deficiency and chlorosis in rice especially the high yielding varieties. In the present package of practices recommended for high yielding varieties higher doses of phosphates are recommended. It is proposed to investigate whether zinc induced chlorosis observed in certain areas is due to higher doses of phosphates. Further it is proposed to study the minimum dose of phosphate that could be recommended to prevent such deficiencies.

29. Survey of calcium and magnesium status of upland soils of Kerala with a view to locating areas of deficiency.

Though considerable data are available on the calcium and magnesium status of rice soils very little information is available on upland soils. Liming and application of magnesium bearing liming materials are known to give good response for some of the upland crops like coconut, rubber and tapioca. It is proposed to locate areas of deficiency with respect to calcium and magnesium.

30. Survey of areas affected by pepper wilt with a view to studying optimum ratio of N/Ca+Mg+K

Preliminary work conducted in this laboratory shows that areas affected by pepper wilt have a high ratio of N/Ca+Mg+K. The optimum dose of nitrogenous fertilisers, potassic fertilisers and liming materials that should be applied to prevent the incidence of wilt has to be further worked out.

31. Studies on the nutrient status of sub soils with reference to plantation crops.

Studies on nutrient status is generally confined to the surface soils since most of the annual crops are surface feeders. Plantation crops like rubber, coffee, tea etc. take up nutrients from the sub soils also. Hence the nutrient status of sub soils need further investigation.

32. Studies on fractionation of soil phosphorus with a view to explaining the lack of response to Phosphatic fertilisers.

Some of the rice soils in Kerala especially the red loam soils at Vellayani and the rice soils of Palghat are reported to show lack of response to phosphates. It is proposed to fractionate the various forms of soil P to find out the reasons for the lack of response.

33. Studies on the effect of alternate conditions of drying and water-logging on the available P status of with a view to minimising the application of P fertilisers.

Conditions of alternate drying and water-logging may release unavailable Phosphorus into available forms. This may be one of the reasons for the lack of response to application of phosphatic fertilisers in some of the rice soils in the State. This aspect will be studied.

34. Effect of pre-soaking, Triveni, Aswathi and IR-8 paddy seeds in borax solutions on yield.

This investigation is to study the influence if any, of the effect of pre-soaking seeds in borax solutions on the yield of the varieties mentioned above.

35. Studies on the influence of soil reaction and salt content on the alluvial, laterite and forest soils of the State.

It is proposed to investigate whether increase in salt content will tell upon the yield and growth of paddy in these soils.

36. Studies on the genesis and management of the coconut growing laterite soils of Kerala State.

The object of the study is to correlate the physico-chemical characteristics of these soils with the bearing capacity of the coconut palm.

37. Investigations on the lack of K availability in the rice soils of the State.

The results of a number of field experiments show a general lack of response to application of potassic fertilisers. A critical evaluation of the soil problems in relation to the requirements of K will be investigated.

Appendix-IV

DEPARTMENT OF AGRICULTURAL ECONOMICS

Research Projects proposed to be undertaken

1. Study on the production, consumption and marketable surplus of farm produce. The study is meant to ascertain that how far farming is market oriented.
2. Price spread of coconut.
To find the difference in prices between the initial price received by the producer and the final price paid by the consumer. The study will be of help in finding that how the disparity in the two prices could be brought down and the share of the producer in the consumer's rupee.
3. Study on the economy of the use of power tillers.
To estimate the cost per acre for the different farm operations with the power tiller in relation to traditional methods.
4. Credit requirements and availability to the farmers.
The study is to be undertaken with the object of knowing the requirements of supply and shortfall of farm credit.
5. Economics of local and high yielding varieties of paddy.
To estimate the costs and returns of local and high yielding varieties of paddy.
6. Study on the marketing of Agmark products.
To study the trends in the acceptability of selected agmark products.
7. The size of holdings in relation to agricultural production. To find the trend in production per unit area with the change in size of holdings.
8. Income and occupational distribution of farm families.
To find the contribution of different sources of income including agriculture to the total income of the farmer's family.

9. Cropwise distribution of variable inputs in relation to production. To determine the variable inputs required for the different crops and their effect on the production and income from these crops.
10. Marketing channels and costs of marketing of vegetables in Trivandrum.
To find the marketing costs and the margin of profit the producer gets in marketing through the different channels.
11. Cost of cultivation and return of coconut.
12. Cost of cultivation and return of arecanut.
13. Cost of cultivation and return of pepper.
14. Cost of cultivation and return of rubber.
15. The above four studies are to determine the net returns in growing the crops.
16. Rural indebtedness and its impact on agricultural production. To estimate the relationship of the extent of indebtedness of the farmer and its effect on his purchase of inputs required for agricultural production.
17. Utilisation of family labour input in agricultural production. To estimate the relationship between family labour input, the size of farm and the cropping pattern adopted.

DEPARTMENT OF AGRICULTURAL ENTOMOLOGY

Research Projects proposed to be undertaken

1. Rhinoceros beetle of coconut

Many aspects on the biology, ecology and behaviour of this important pest of coconut remain to be understood. These and the effect of hormone mimics, microbes and various sterilising chemicals on this pest will be studied in detail.

2. Red palm weevil of coconut

Techniques for large scale multiplication of this pest in the laboratory are to be evolved. Possibilities of controlling the pest with the release of sterilized males and baiting with attractants (including pheromones) will be investigated.

3. Rice stem borer

Large scale multiplication of this insect on synthetic and semi-synthetic diets will be attempted. Scope of 'sterile male technique' and 'improved trapping methods' in controlling this pest will be explored.

4. Coconut caterpillar.

Genetic improvement of the important parasites of this pest and the selection of insecticide tolerant strains of the parasites will be made with a view to integrating chemical and biological methods of control against this pest.

5. Paddy gall fly

The information available on the biology, ecology and control of this insect, which has become of serious pest of paddy in several parts of Kerala, is very meagre. All these aspects will be studied in detail.

6. Leaf roller of paddy.

This insect has assumed the status of a major pest of paddy in several parts of India including Kerala. The qualitative and quantitative loss caused by this insect to the grain yield will be assessed. Effective chemical and biological methods in controlling this pest also will be evolved.

7. Rice bug.

The introduction of new strains of paddy with more succulent stem and leaves and the continuous cropping pattern adopted in various regions of the State resulted in bringing this pest as a menacing problem to Agriculture. Effective control measures will have to be evolved by suitable laboratory and field experiments.

8. Areca spindle bug

Possibilities of introducing exotic parasites for the biological control of this pest will be explored.

9. Contact poisons for paddy pest control

This is to evaluate the effectiveness of new contact insecticides in controlling the pests of paddy with a view to improve periodically the control schedules recommended to the cultivators.

10. Residual systemic poisons for paddy pest control.

Several systemic poisons with sustained residual toxicity are now available many as granules. The possibility of protecting paddy from insect infestation using these insecticides will be a fruitful item of work with high potentialities. The frequency, timing and dosage of the insecticide application have to be worked out with special reference to side effects if any.

11. Mixtures of insecticides for paddy pest control

Formulations of insecticide mixtures are now available and the effectiveness of these insecticides in comparison with various contact and systemic poisons will have to be assessed with a view to augmenting the existing schedule of insecticide spraying for paddy.

12. Insecticidal control of vegetable pests.

Objective field investigations for evolving adequate control measures against pests of important vegetables of this region will be undertaken.

13. Residual toxicity of insecticides to the predators and parasites of vegetable pests.

Residual toxicity of various insecticides, while applied on plants under field conditions, to the parasites and predators will be assessed with a view to integrating chemical and biological methods of control.

14. Resistance spectrum of crop pests like the rice bug, case worm etc. to insecticides

Continuous application of the same type of insecticide in a tract result in the development of tolerance of that insecticide by the insects there. Hence the assessment of the resistance of various insects to different insecticides will be essential for fixing the correct insecticide for specific pest problems.

15. Determination of the persistence of toxic residues of the various insecticides on crop plants.

No information is available on the persistence of various insecticides sprayed on crops in Kerala. It is essential to make quantitative assessment of the residues on crops in each locality for fixing the tolerance limit and waiting period for a particular insecticide. This will be done by chemical and biological assay.

16. Investigations on the biology and ecology of important pests in the locality.

Informations available on the biology and ecology of most of the crop pests in the State, including some of the major ones are very meagre. This aspect is of considerable importance in devising suitable control measures against them. Hence detailed investigations are proposed.

17. Surveillance on and biology of crop pests

It is necessary to have a constant watch of insects in the field since in recent years many new pests could be detected and many minor pests recorded earlier have assumed the status of major pests now. Information in this line will help in forecasting insect outbreaks and in fixing the correct time and frequencies of insecticidal application.

18. Survey and parasites and predators associated with important crop pests of this region

The hazards associated with large scale application of insecticides are being viewed with great concern all over the world. Utilization of natural enemies in controlling injurious insects has thus gained greater importance in modern pest control programmes. But information available on indigenous parasites and predators is very meagre and hence the project is proposed.

19. Survey and utilization of virus diseases of insects in Kerala

Recent studies have revealed the possibility of utilising virus diseases of insects as an effective biological control agent. But no information is available on the virus pathogens of insects in India. Hence it is proposed to conduct a survey on the occurrence of virus diseases among common insect pests of the State and to conduct field and laboratory studies, to explore the possibilities of their utilization in pest control programmes.

20. Survey and utilization of pathogenic fungi and bacteria affecting insects in Kerala.

Pathogenic fungi and bacteria are known factors limiting insect population in nature. Utilization of these agents in insect control will be an important step in achieving the goal of integrated programmes of pest management. Hence a survey of bacterial and fungal diseases occurring among important pests in the State will be of immense value. Field and laboratory trials will also be conducted with a view to evaluating their efficacy in pest control programmes.

21. The survey and control of rats and mice in the State

Rats cause considerable destruction to our crops in the field and commodities in store. No information is available on the identity, biology and ecology of these animals and this remains as a serious handicap in formulating effective control programmes. Hence detailed studies on the above aspects is an absolute necessity.

22. Non-insect pests other than rats.

Many animal species other than insects and rats viz. crabs, millipedes, mites, snails and slugs, birds, flying foxes, squirrels, porcupines etc. are known to cause havoc to agriculture in different parts of the State. No serious attempt has so far been made to study the extent of this problem and form evolving suitable control methods. Hence a survey of these pests and studies on the biology, ecology and control of economically important species are contemplated in this project.

23. Storage pests and their control

The information available on the agencies which cause heavy damage to food grains and other commodities like spaces tapioca etc., in storage is very meagre. Hence it is necessary to initiate systematic and sustained research in this field to evolve suitable measures to prevent or control the heavy loss done to our commodities in storage.

24. Survey of plant parasitic nematodes in Kerala.

Nematodes are recognised as a major limiting factor in agricultural production all over the world. Pathogenic species of nematodes have been reported on crops like citrus, banana, coconut etc. from Kerala. A detailed survey of pathogenic nematodes associated with various crops in the State and the assessment of the extent of damage caused by them will be of considerable importance in our Agricultural Programmes.

25. Use of trap crops in controlling root-knot nematodes on Vegetables.

Important vegetables like Bhindi, Brinjal, Tomato etc. are seriously damaged by root knot nematodes. Use of trap crops is a known method of checking the population of root knot nematodes in soil. Hence the project is proposed.

26. Use of organic soil conditioners for the control of plant Parasitic nematodes.

Organic soil conditioners have been found useful in controlling soil nematodes. The effect of locally available materials like different types of oil cakes has to be studied for assessing their utility in controlling nematode damages.

27. Varietal screening of different crop plants in controlling plant parasitic nematodes

Some of the crop varieties are found to be resistant to plant parasitic nematodes. Screening for resistance together with a breeding programme will be a good line of work in solving the nematode problem of the State.

28. Rotation of crops for controlling root knot nematodes

Making suitable changes in cropping pattern of a particular soil tract by crop rotation, so as to bring the nematode population to the minimum, is envisaged in the project.

29. Chemical control of plant parasitic nematodes

Nematicidal properties of various insecticides have been reported widely and a number nematicides have been introduced in market. Field experiments to evaluate the efficacy of these chemicals in controlling important plant parasitic species noted in the state will be carried out.

30. Screening of plant strains for tolerance to insect infestation

The aim is to fix plant types tolerant to pest attack. The information will be of use in breeding purpose and in the selection of suitable strains for various tracts and different seasons. Efforts will be made to identify the mechanism of tolerance also.

31. Effect of sublethal doses of insecticides on the consumption, digestion and utilisation of food plants by insects.

Ionising radiation is known to have deleterious effect on consumption, digestion and utilisation of food by insects. Such effects are anticipated by the application of sub-lethal doses of insecticides. No previous work relates to this important aspect of insect nutrition and hence this project.

32. Screening of indigenous plants for factors with insect hormonal action

Plants are known to be rich in components acting as moulting and juvenile hormones to insects. Kerala is famous for the wide variety of plants and herbs and it will be worthwhile exploring them as sources of hormone analogues.

The ultimate aim is their utilisation for insect control.

33. Effect of farnesyl ethyl ether and similar synthetic analogues or juvenile hormones on the metamorphosis of insects

The biochemical changes caused by the application of these substances will be studied. The insecticidal properties of juvenile hormones found will enable the utilisation of these substances in pest control methods, especially in integrated pest control programmes.

34. Use of antifeedents and repellents in insect control.

Screening for the susceptibility of different crop pests to the antifeeding property of triphenyl tin acetate and similar compounds as well as neem seed extract and similar substances will lead to pest control measures less harmful than the conventional pesticides to human beings.

Appendix-VI

DEPARTMENT OF AGRICULTURAL EXTENSION

Research Projects proposed to be undertaken

1. Study of the training needs of the farmers, farm women and farm youth.

Farming demands the involvement of all the members of the farm family. Therefore, the members of the farm family will have to be trained in modern methods of farming. The training given to them will have to be need oriented and hence it is essential to have an understanding of the training needs of members of the farm family. This research project will be helpful in organising effective training programme for the farm family.

2. Study of the difference in the rate of adoption of new farm practices where farmers training programmes are in operation as compared to other areas.

Farmers Training Centres have been established in selected Districts of the State. An evaluation of the training programmes implemented by the Farmers' Training Centres and their effects on the adoption of new farm practices; will be useful in the planning of training programmes and also in the effective dissemination of agricultural innovations.

3. Study of the attitude of the Extension persons towards their training programmes.

Inservice training programmes of extension personnel help to increase their professional competency. In order to build up a favourable attitude among the extension personnel towards the training programmes, they will have to be made need oriented. This study will be helpful in finding out the training needs of the extension personnel and also in finding out the ways and means of building up favourable attitude towards inservice training programme for the extension personnel.

4. Evaluating the role performance and role fulfilment of the rural youth leaders in Agricultural Programme in the State.

It is possible for the youth of the State to make significant contribution in increasing agricultural production. They can be fruitfully utilised for agricultural extension work provided they can be got satisfactorily involved in such programmes. This study will reveal the aptitude of the youth for specific jobs in farming which will form a guideline for our extension workers in the fruitful involvement of youth in farming.

5. Study of the personality traits, motivational pattern and attitudes of rural youth in relation to agricultural programmes in the State.

Involvement of youth in farming should form a major feature of the agricultural extension programmes in the State. The attitude of the Youth should be suitably oriented to this. A study of the various factors governing the attitude of the youth towards farming will help in the proper utilisation of village youth in this field.

6. Study of the role of voluntary organisations in agricultural programmes of the State.

Various types of voluntary organisations are functioning in every village. Services of these organisations can be made use in speeding up the spread of innovations. For this, it is necessary to study their structure, function and extent of participation. This study will enable the extension workers to effectively involve the voluntary organisations in the farm programmes in the State.

7. Study of the role of information sources and communication channels in the adoption of improved practices by farmers.

Communication channels and information sources like the radio and the journals play a major role in increasing production in the farms of the State. It is essential to deteriorate such specific sources and communication channels and study their effect on adoption of improved farm practices. This will enable the extension worker to utilise such sources and channels effectively.

8. Study on the use mass media in Agricultural Extension work in the State.

Mass media like campaign, film shows etc. are being widely used in our agricultural extension work in the State. It is essential to assess the change that is being brought about by the mass media in the adoption behaviour of the farmers in respect of improved farming production. This study will aid the effective use of the mass media in increasing agricultural production.

9. Study of the communication pattern at different stages of adoption of farm practices.

The adoption of an innovation by a farmer is not the result of a spontaneous decision. He passes through various mental stages before an innovation is adopted. The extension worker has to be familiar with these stages in relation to the pattern of communication available in the village. The result of this study will enable the extension workers to set out suitable patterns of communication in relation to adoption of different improved farming practices.

10. Study of sequentiality of information seeking behaviour of the farmers with regard to adoption of improved farm practices.

Every farmer follows a sequential fashions to learn about and adopt improved farming practices. He consults many sources of information to get convinced of the practice to be adopted by him. A study of the sequence of their information seeking behaviour will enable the extension worker to make available varied and reliable sources of information to the farmers.

11. Study of the sociometric pattern in the village with regard to decision making.

The pattern of the society in the villages in a way interferes with the introduction of improved farming practices. Introduction of innovations very often depends upon decisions made by individuals families, or even groups of people and their leaders. Therefore a study of the decision making behaviour of a society will help the extension worker to focus his attention to the decision makers of the society.

12. Follow up studies of utilisation of communication material sent out to the village change agents.

Proper and effective utilisation of communication materials like pamphlets leaflets folders etc. is very essential to achieve dissemination of information among farmers. For this purpose, communication materials are being sent out. Thus it is essential to followup such materials with regard to their effective and timely use by farmers in the State. This followup study will help to find out the relative effectiveness of various types of communication materials.

13. Analysis of content of communication related with Agricultural Practices

The importance of agricultural information communication through Mass media is increasing. If the content of such information is not appropriate and adequate the communication will not produce the desired results. It is very essential to examine the content of such information in order to suggest ways to make them more useful. This study will measure the trend, importance and validity of agricultural information given through the important mass media of the State.

14. Study of the role of key communicators in the diffusion of agricultural innovations in the society.

It is a known fact that any communication is passed on to the members of the society through the key communicators. These people have a high influence on the other members of the society. The nature, characteristics, knowledge, attitude etc. of these key communicators influence or retard the process of diffusion of innovation in any society. Since these factors vary in different societies it is essential to study them in order to plan programmes to make these key communicators more competent. The results of this study will be useful to the extension workers to locate and work with the influential key communicators for easy and rapid dissemination of information related to the agricultural innovations.

15. Evaluation of methods and procedures of implementing agricultural development programmes.

Any programme directed towards development will have to be implemented in scientific ways through the steps prescribed. By passing any step will hinder the smooth implementation of

the programme. Many agricultural development programmes failed due to unscientific implementation. This study will examine the methods and procedures used in implementing agricultural development programmes in order to suggest a suitable pattern for the State taking into consideration the peculiarities of the State.

16. Study of the agricultural development administration as related to the changing needs of the farmer.

Any administration to be effective will have to take into consideration the needs and aspirations of the society. Changes in the society make it necessary to re-orient the methods and procedures of development administration. If the administration is to cater to the needs of the farmers it must reflect the aspiration of the people. This study will examine the role, as perceived by farmers, people's representatives, officials etc. of agricultural development administration in order to suggest a model set of methods and procedures for an effective agricultural administration system.

17. Study the role perception and performance of the personnel of the development departments.

The goals, methods and procedures of the administration will undergo changes as the objective of the State or Nation changes. The relative importance of the various objectives will have to be understood by the personnel of the administration to formulate suitable ways and working procedures to achieve the objective. Without such corresponding changes in the outlook and methods of administration the desired aim cannot be achieved. This study will examine the role perception and performance of the various categories of staff of the development departments.

18. Analysis of the situational factors which influence adoption of agricultural innovations

Any innovation to be adopted by an individual must satisfy certain conditions. The individual must have the required specific attributes developed through extensive activities and the innovation must satisfy certain specific conditions. Even if these factors are very conducive for adoption of the practice, adoption of the practice may not take place

place unless the situational factors are favourable. This study will examine the situational pre-requisite factors that are necessary for adoption of new agricultural technology. The results of this study will be useful to the extension workers.

19. Study of the influence of the adoption of agricultural technology on social change.

Society is dynamic and is constantly undergoing changes. Various factors contribute and influence these changes. In a predominantly agricultural society the pattern of agricultural production and the methods used for production will have an important role in the social change of the society. This study will examine the role of improved agricultural technology in the social change of our society.

20. Study of attitude of farmers towards the different new agricultural practices and related factors.

Attitude is an important factor which has great influence in the adoption of new methods and practices. It is a factor which can be manipulated by the extension worker. To do this through appropriate methods they must know the direction and intensity of attitude of farmers and the relevant factors which produce such attitude. This study will measure the direction and intensity of farmers' attitude towards the various agricultural practices and study the related factors.

21. Study the social, psychological and economic factors related with adoption

Quick adoption of the new agricultural technology by the vast number of farmers is the aim of the extension agency. Analysis of the adoption pattern of the different practices by the different farmers will reveal the influence of various social, psychological and economic factors that either hinder or influence the process of adoption. The identification of such factors will help to plan and implement more effectively the programmes aimed at increasing agricultural production.

22. Study of the intra and inter departmental coordination for agricultural development.

Agriculture is not an isolated activity. It is an activity which will have to be assisted by various agencies. No single agency will be able to cater to the needs of the

farmer. In order to implement agricultural development programmes effectively coordination of all related agencies of utmost importance. This study will measure the extent of coordination and related factors which will enhance such coordination both at intra and inter departmental levels.

23. Study of the motivational pattern of the farmers

Motivation is an important factor that has an influence in the behaviour of individuals. The pattern and intensity will vary from individual to individual and from society to society. Favourable changes can be produced only through the production and intensification of appropriate motives that are conducive for adoption. The present pattern of motivation among the farmers will have to be identified and measured. This study will measure the motivation among farmers through appropriate methods.

24. Developing appropriate techniques suitable for wide use in the agricultural extension work of the State.

Agricultural extension will have to be undertaken through various measures and methods. Methods that are suitable and efficient in other societies with different culture and back ground may not be applicable to our Society. This study will identify suitable methods and techniques for effective extension work.

25. Study of the aspiration of rural youth

Rural youth are the farmers of tomorrow. To become efficient farmers they must have the aptitude for farming. The aspiration at the young age will have an important role in producing the correct aptitude necessary for the future activities. This study will measure the aspiration of rural youth which will suggest steps for organizing rural youth programmes to make them efficient farmers of tomorrow.

26. Study of the role of house-wife in adoption of new agricultural technology.

The decision to adopt a practice is not taken by the farmer alone. He will have to consider the needs and aspirations of his family members especially of the house-wife. The ~~XXXXXX~~ women will have to play an important role in the adoption of the new agricultural practices. This study will indicate the role of women in adoption of agricultural practices.

27. Study of the factors associated with the success of rural youth clubs.

Youth clubs are effective organisations capable of producing the desired factors in youth to make them better farmers in the future. The aims, methods and programmes of youth clubs will have to be sound if the youth clubs are to function effectively. This study will isolate the factors that contribute to the effectiveness of the rural youth clubs.

DEPARTMENT OF HORTICULTURE

Research Projects proposed to be undertaken

1. Physico-chemical studies of certain varieties of mango and sapota.

The work in this line will be much useful in assessing the quality of fruits, for grading and also for packing in various containers.

2. Picking studies on fruit vegetables (chilli, bhindi and cluster bean).

The above crops are for vegetable purpose. The fruits are to be harvested at the right tender stage. The periodicity of harvesting will be much useful to judge the total number of economic harvests for each of such vegetable crops.

3. Introduction and assessment of ornamental plants suited to Kerala conditions.

Ornamental floriculture is gaining importance now-a-days. Innumerable varieties of roses have been produced and grown elsewhere. Much of the ornamental plants though perform well elsewhere, do not thrive and perform well under our conditions. Hence introduction is very useful.

4. Developing a working plan for a Model Kitchen Garden suited to Kerala State.

Working out the area required for establishing a kitchen garden for an average family (of 5 members) developing a suitable layout, drawing a cropping scheme which will supply $2\frac{1}{2}$ to 3 kilogrammes of vegetables daily, working out the economics, selection of varieties suitable for kitchen garden under Kerala conditions etc.

5. Evolution of high yielding varieties in vegetables of importance to Kerala State.

Brinjal, chillies, bhindi, cucurbits, cowpea, dolichos, Amaranthus.

Varieties that can perform well under the partial shade conditions available in the Homestead gardens will be aimed at.

6. Studies on breeding for disease resistance in vegetables.

Yellow Vein Mosaic in Bhindi, bacterial wilt in Tomato and brinjal will be initially investigated. The work will reveal the inheritance of resistance in these cases and will throw more light on the resistance mechanisms apart from aiding in developing resistant varieties in these crops.

7. Description of Mango varieties grown in Kerala

Mango varieties are known differently at different places with more of synonyms and fancy names. To avoid duplication of names scientific description of mango varieties will be taken up.

8. Description of Banana varieties grown in Kerala

All the banana varieties grown in Kerala will be collected scientifically described and synonyms and duplication of names will be eliminated.

9. Varietal improvements in cucurbits (Cucumber, pumpkin, snakegourd and bitter gourd).

The various varieties under each of the above four groups will be collected, grown and promising types will be selected and multiplied further.

10. Studies on exploitation of heterosis in Brinjal.

Heterosis in brinjal will be a useful tool in assessing characters and selection of promising varieties.

11. Study on post harvest physiology of Mango and banana.

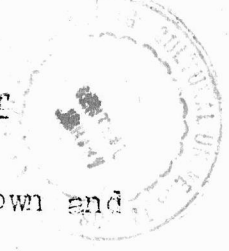
The physiological changes during ripening of fruits will be studied.

12. Introduction of new vegetables to Kerala State and their evaluation.

New types and varieties will be collected from Kerala and outside and their performance under Kerala conditions will be assessed.

13. General studies on Indian beans

All the available varieties of beans from India will be collected, grown and their suitability under Kerala conditions will be assessed.



14. Assessment of performance of rose varieties under Vellayani conditions.

All the rose varieties will be collected, grown and their performance and suitability will be studied.

15. Selection of suitable varieties of rose for export

Suitable varieties of rose will be selected for export.

16. Cultivation studies on economic flowers.

Jasmine, crossanora, marigold etc. will be grown on large scale and their possibility to fit in as a commercial floriculture venture will be assessed.

17. Vegetative propagation studies on Tea and Coffee

Besides seed propagation various vegetative methods of propagation trials will be taken up on tea and coffee.

18. Studies on chemical stimulation of latex in Rubber.

Physiology of latex production in relation to external application of various chemicals will be studied.

19. Utilization studies in cashew apple

The cashew apple will be utilised to prepare various products like beverage, fig. etc.

20. Varietal studies in brinjal

All the known brinjal varieties will be collected and their suitability to Kerala conditions will be studied.

21. Effect of micronutrients on bhindi

Essential micro-nutrients will be applied besides N,P,K and their effects on bhindi will be recorded and studied.

22. Comparative study of foliar and soil application of N, P, K on brinjal, bhindi and cluster bean.

N,P,K will be applied on both methods and their effects studied.

23. Collection and selection of papaya varieties suitable to Kerala conditions.

All the various varieties of papaya will be collected and suitable varieties for Kerala will be selected.

24. Rootstock studies in sapota

Sapota will be grafted on various rootstocks so far found suitable and their performance will be assessed.

25. Breeding new varieties in Hibiscus

All the varieties of Hibiscus sp. will be collected and by making crosses in all possible combinations and new varieties will be evolved.

26. Study on the chemical induction of flowering and fruiting in Vanilla

With the help of plant growth regulators like NAA, the flowering of Vanilla under Vellayani conditions will be studied.

27. Rootstock studies in Rubber

Various varieties of rubber will be collected and on them high yielding varieties of rubber will be budded and their performance studied.

28. Study on vegetative methods of propagation of Nutmeg

Various nutmeg species will be collected and the nutmeg will be propagated and the suitability of the rootstocks will be assessed.

29. Study on vegetative methods of propagation of cinnamon.

Cinnamon will be propagated vegetatively on cinnamon and "vazhana" and their performance studied.

30. Study on sex problem in Nutmeg

Study will be taken up to identify the sex at juvenile stage of Nutmeg.

31. Introduction and evaluation of spice crops

All the spice crops will be collected and their performance studied.

32. propagation studies on Cacao

Vegetative methods of propagation like budding and grafting will be taken up and their suitability studied.

33. Pollination studies in Cacao

With the help of pollinating agents and other chemical means fruit set will be increased.

34. Pollination studies on Vanilla

Besides hand pollination other methods like bee pollination etc. will be studied.

35. Propagation studies in Clove

Besides seed propagation vegetative methods of propagation like inarching and budding will be studied.

36. Propagation studies in Alspice

Besides seed propagation vegetative methods of propagation and their suitability in large scale production of grafts will be studied.

DEPARTMENT OF PLANT PATHOLOGY

Research projects proposed to be undertaken

1. Yellow leaf disease of arecanut palm

Preliminary work conducted here indicate that there is a likelihood of the yellow leaf disease of arecanut palm being caused by some soil factor. This aspect will be studied further.

2. Nature of immunity of *Solanum torvum* against *Pseudomonas solanacearum*, the organism causing wilt of solanaceous plants.

Solanum torvum is immune to infection by *Pseudomonas solanacearum* which causes the wilt disease in many Solanaceous plants. Earlier work done here as well as elsewhere had shown that *S. torvum* can be used as root stock for tomato plants for controlling the bacterial wilt. It is in this context that the present work is proposed.

3. Evolution of criteria for forecasting diseases of paddy with special reference to blast caused by *Piricularia oryzae*.

This work has already been started and some useful data is available. It is proposed to intensify this work. Hirst's automatic volumetric spore trap and recording meteorological instruments were used in the study.

4. Evolution of criteria for the forecasting of incidence of Tikka leaf spot of groundnut caused by *Cercospora* sp.

Preliminary work has already been done on this disease. This work will be intensified and continued.

5. Preservation of fresh toddy

The aim is to study the strains of yeasts naturally involved in the fermentation of toddy in order to isolate strains which are more efficient. Different methods to check the fermentation path way will also be attempted with a view to prevent spoilage.

6. Screening of phosphate solubilizing microorganisms.

Kerala soils are deficient in P_2O_5 . It is proposed to isolate and study the microorganisms which are capable of solubilizing insoluble forms of phosphorus.

7. Isolation and screening of bacteriophages against certain plant pathogenic bacteria.

Isolation of bacteriophages from soil and rhizosphere with a view to screen them against plant pathogenic bacteria like Xanthomonas citri and Pseudomonas solanacearum. The phages will also be utilized to determine the presence of strains of bacteria.

8. Study of the microorganisms involved in the retting of the coconut husk.

Detailed study will be undertaken to characterize the microorganisms involved in the retting phenomenon of coconut husk. The retting efficiency of different organisms will be assessed and trials will be conducted to increase their efficacy and quality of the product by enrichment technique.

9. Effect of foliar application of Zinc on the rhizosphere microflora and on the growth of Solanaceous plants.

The results of the work so far done here go to show that there is a decrease in the microbial population in the rhizosphere when Zinc sulphate was applied on the foliage. At the same time the plants exhibited more vigorous growth as compared to control. Further studies along this line will be taken up.

10. Studies on the usefulness of indigenous plant products for the control of diseases crop plants.

The object of the scheme is to screen medicinal plants like Neem, Aduthoda, Rauwolfia, Hydnocarpus etc. and some of the indigenous oils against plant pathogens and to assess the possibility of utilizing them for the control of plant diseases.

11. Microbial deterioration of processed cashewnut during storage.

The organisms associated with the deterioration of processed cashewnut will be isolated and identified. The chemical changes brought about by these organisms will be investigated to evolve suitable measures to prevent the deterioration during storage and thereby improving market quality.

12. Storage Rots of Arecanuts

A number of microorganisms are involved in the deterioration of stored arecanut. A detailed study of the organisms associated with processed arecanut under different conditions and the chemical changes brought about by them will give necessary information to evolve suitable measures to prevent storage deterioration.

13. Control of bacterial wilt of Solanaceous plants

Investigations conducted here showed that antibiotics are systemically absorbed and translocated in solanaceous plants, when applied as foliar spray. The efficacy of the antibiotics singly and in combination in controlling bacterial wilt of tomato, brinjal, chilli etc. will be determined.

14. Identification and determination of interrelationships of the whitefly transmitted yellow mosaic diseases of plants (Green gram, Black gram etc.) and weed hosts.

The interrelationships between the whitefly transmitted yellow mosaic diseases are not known clearly. No systematic work has been done to determine the exact viruses responsible for the diseases. The results of these investigations will help to determine the identity of the causal virus and the role of weeds in their perpetuation.

15. Study of the vector-virus relationships of yellow mosaic diseases.

The acquisition and inoculation thresholds, the incubation period of the virus in the vector as well as in the plant, possibility of multiplication of the virus

in the vector and transovarial transmission etc. will be determined. These are background informations needed for the evolution of any sound control measure.

16. Isolation of microorganisms especially actinomycetes from different soils and screening for their antagonistic activities against plant pathogens.

Earlier work done in this Department show that a number of microorganisms especially actinomycetes isolated from local soils can inhibit the growth of plant pathogenic fungi. This project is intended to isolate microorganisms, especially actinomycetes from different soils of Kerala and screen them for their antibiotic properties against plant pathogens.

17. Role of weed hosts in the perpetuation of virus and mycoplasma diseases of crop plants in Kerala.

The virus and mycoplasma disease of weed plants will be surveyed and their role, if any, in the perpetuation of crop diseases like yellow vein mosaic of bhindi, bunchytop of banana, mosaic of chillies, little leaf of brinjal. Phyllody of sesamum and cucurbits etc. will be determined in order to adopt control measures.

18. Microbial deterioration of copra during storage

Microorganisms causing deterioration of copra during storage will be isolated and the nature and extent of damage caused by them will be studied with a view to develop methods to prevent and control their activity.

19. Isolation and study of microorganisms pathogenic to insect pests.

Fungi and bacteria infecting insects will be isolated and the possibility of utilizing them for the control of insect pests of crop plants will be investigated.

20. Post harvest diseases of banana and pineapple

Fungi and bacteria causing transit and storage diseases of bananas and pineapple will be isolated and studied with a view to evolve suitable control measures.

21. Effect of soil and foliar applications of fungicides on the control of sheath blight of paddy.

Sheath blight of paddy has been observed recently in a

serious form in certain regions of Kerala. Development of effective control measures against the disease will be of immediate practical value.

22. Histopathological studies on parasitic coelomycetes

This study is expected to provide information about the actual damage done by the parasite and also about the defence mechanism of the host.

23. Studies on the leaf blight of pineapple

A new disease of pineapple causing leaf blight has been observed in Kerala. This study is intended to evolve effective control measures against the disease.

24. Microbial deterioration of vegetable seeds and their control

The organisms responsible for the deterioration of seeds and the nature of damage will be determined with a view to evolve suitable control measures.

25. Study of the reaction of different banana varieties to infection by bunchytop virus and the types of symptoms expressed by them.

There is no definite information about the variations in the symptom expression of the disease in different banana varieties. The variation in the incubation period of the virus in different varieties also will be investigated.

26. Investigations on the "Kokkan" diseases of banana

This is a new disease of banana confined to Kerala. There is no information about the aetiology perpetuation and spread of the disease. The disease will, therefore, be studied in detail with a view to evolve suitable control measures.

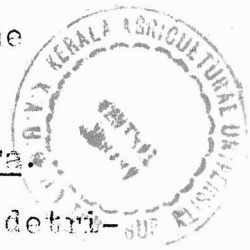
27. Investigations on the collateral hosts of tapioca mosaic

The relationship of tapioca mosaic virus with other whitefly transmitted viruses will be determined to identify the collateral hosts if any.

28. Collection and study of the plant pathogenic *Pestalotia* spp.

Even though a number of plant pathogenic species of *Pestalotia* have been reported from India, the interrelationship

is of the different species is not known. This has naturally led to a great deal of confusion in the identity of the various species. It is, therefore, proposed to study the various species of Pestalotia occurring in the country with the ultimate aim to prepare a monograph of the genus.



29. Effect of fungicidal application on soil microflora.

This work is aimed at estimating the possible detrimental effects due to soil fungicides on beneficial microflora such as Rhizobium sp., Nitrosomonas sp., Nitrobacter sp., Acetobacter sp. and also on those organism which are responsible for the decomposition of organic matter.

30. Biological control of certain soil borne plant pathogens by soil amendments

Modification of soil environment by organic or inorganic soil amendments and exploitation of the changed soil biology in the suppression of plant pathogens such as Pythium spp. (Soft rot of ginger and damping off of vegetables), Fusarium spp. (foot rot of paddy and panama disease of banana) and Rhizoctonia spp. (Root rot and damping off of vegetables) will be studied.

31. Evaluation of comparative efficacy of some of the newer fungicides in controlling tikka disease of groundnut.

Field experiments will be conducted using different fungicides.

32. Screening of different fungicides for the control of powdery mildew of chillies.

In addition to the commonly used fungicides, the newer fungicides such as PP-149 and PP-675 will be tried for the control of powdery mildew of chillies.

33. Host parasite relationship in cordana leaf spot of banana

The role of toxins in the development of certain plant diseases has been well established. The project is intended to study whether any toxin is evolved in the production of symptoms, in the leaf spot of banana caused by Cordana musae.

34. Production of good quality steeped arecanut

In Kerala, people use steeped arecanut for chewing purpose during off season. A good percentage of steeped nuts are spoiled by microorganisms. The aim is to evolve suitable preventive measures.