

800851

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

- 1. Institute Code No : AG.21.1Che.1
- 2. ICAR Code No :
- 3. Name of Institute : Rice Research Station, Pattambi
- 4. Title of the Project : Studies on movement of nitrogen and phosphorus in soils.
- 5. Name of Principal investigator : P.N. Pisharody, Associate Professor (Chemistry)
- 6. Name of Associate : S. Seshadrinath, Asst. Professor (Chemistry)
- 7. Location : Pattambi

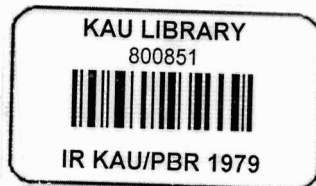
a) Objective: Nitrogen is highly mobile in the soil. Irrigation water increases mobility of this nutrient. Therefore, considerable amount of nitrogen is lost from the soil through leaching. Phosphorus is generally considered to be immobile. It is easily fixed by aluminium, iron and calcium present in the soil. Organic anions, however, decrease the activity of Fe, Al, and Ca by chelation thereby releasing soil phosphates. Studies conducted at Pattambi in 1973-74 have indicated that phosphates are also leached along with percolating water. The objective of the present experiment is to study the effect of well rotten compost, green leaf, cowdung and synthetic complexant sodium citrate on the mobility of nitrogen and phosphorus through soil columns upon continuous leaching with irrigation water.

b) Practical Utility:

The study will throw light on the behaviour of plant nutrients in the soil.

9. Technical Programme:

The study will be conducted under laboratory conditions using 2 soil types = (laterite and alluvial)





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Specially designed glass tubes will be used for filling the soil.

- Treatments:
1. NP at 90, 45 kg/ha.
  2. NP + cowdung at 5 t/ha
  3. NP + green leaf at 5 t/ha,
  4. NP + Compost at 5 tons/ha
  5. NP + Sodium nitrate 45 kg/ha

125 kg. of friable soil will be packed in the glass columns and carefully packed with a rubber thumper. The height of the column will be 10 cm. The treatments will be applied to the top layer of the soil stirred and then compacted. The leachate will be collected using tap water continuously. The leachate will be collected every day and analysed for N and P. After the lapse of 10 days, each soil column will be dismantled into 5 segments of 2 cm from top to bottom. The status of N and P in each segment will be analysed separately. The experiment will be repeated 3 times.

- |                         |                                   |
|-------------------------|-----------------------------------|
| 10. Date of start       | : June , 1977                     |
| 11. Date of completion  | : September, 1977                 |
| 12. Estimated man month | :                                 |
| 13. Facilities required | : Existing laboratory facilities. |
| 14. Finance             | : Kerala Agricultural University  |
| 15. Approximate cost    | : Rs. 200/-                       |
| 16. Signature of        | :                                 |

Principal investigator.

## KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture

: Department of Agricultural -  
Chemistry.

1. Name of Research Centre

: College of Agriculture, Vellayani

2. Project No.

: AG. 21. 18. Che.2.

3. Title of the Project

: Phosphorus and potassium fixing  
capacity of Kerala's soils.

4. Name (s) and Designation of

(a) Project Leader

: Dr. P. Padmaja.

(b) Associate

: Dr. S. Kabeerathamma  
Dr. M.M. Koshy.

5. Objective

6. Practical utility

7. A short review of literature

8. Technical Programme

9. Date of start

: July 1977

10. Likely date of completion

: December 1977

11. Additional facilities

: Nil

12. Approximate cost

: No cost involves.

13. Signature

Project leader

Head of Department.

-4-

## 5. Objectives:-

It is generally believed that most of the Kerala soils will not respond to phosphatic and Potassic fertilizers. The exact reason for this behaviour is not known. Phosphorus and Potassium fixing capacity of a soil is one of the factor which determine to a large extent the effectiveness of added P or K fertilizers. So far no such work has been conducted to study the K or P fixing capacity of major soil groups of Kerala and its relation with their physical and chemical characteristics and hence this attempt.

## 6. Practical utility

Fixation of P and K in soils and their subsequent release are the two intricate reactions responsible for maintaining their equilibrium concentration in soil solutions and their availability to plants. Information on fixation and subsequent release of these nutrients in Kerala soil is lacking. After identifying the P & K fixing capacity of different types soils of Kerala, an experiment using graded doses of their fixation capacity with their effect in the major crops of Kerala is worth undertaking so as to fix the critical levels for their maximum yield.

## 7. Review of literature.

According to Visnion and Khatri, (1974) highly significant positive correlation was obtained for K fixation with PH and  $\text{Ca CO}_3$  in black soils of Lower region. Nad et al showed that  $\text{Ca CO}_3$ , available P, PH and silt content did not show any significant correlation while sand showed a negative and organic carbon positive correlations. Clay and free iron oxide together explained 76-77 % of the variations followed by clay and organic carbon which together accounted for 69%.

## 8. Technical Programme and observations

20 samples from each major soil types of Kerala will be collected and assembled at College of Agriculture, Vellayani. The P fixing capacity of these soils will be determined following the procedure given by Waugh and Fitts (1966) and K fixing capacity by the method of Jackson (1967). Other physical and chemical characters such as total sesquioxides, organic matter exchangeable  $\text{Ca}^{2+}$  and mechanical

KERALA AGRICULTURAL UNIVERSITY

FACULTY OF AGRICULTURE

DEPARTMENT

AGRICULTURAL CHEMISTRY

PROGRAMME OF RESEARCH FOR MASTERS DEGREE

(for approval of University)

1. Name of the Candidate : R.K. Mohan
2. Date of admission and admission No. : 27..11..1976  
76..11..14.
3. Name and Project No. : AG.21.18 Che 3.
3. Name and designation of the Chairman of the Advisory Committee : Dr. M.M. KOSHY  
Professor of Agricultural Chemistry
4. Topic of Research for Thesis : Soil Test - Crop Response studies for Phosphorus in Kerala Soils
5. Objective of the Research : To evaluate different soil testing methods for available phosphorus so as to choose the best method for predicting the fertilizer needs for crops.
6. Brief review of previous work done : The literature bearing on the subject is very extensive but some of the recent works are reviewed below.

SUBRAMANIAN (1971) found that Bray's extractant is superior to other reagents for extracting available Phosphorus in acid soils. But according to GRIGG (1972) Olsen's method is most suitable extractant for available phosphorus SOBULO (1972) also found that Bray's method of extraction is the most suitable for determining available phosphorus in top and sub soils. However GATTANI and SETH (1973) BHAN and SHANKER (1973), SRIVASTHAVA and JAPRI (1974), RAJ KANNU (1975), PATHAK et al 1975 EKPETE (1976) and WILMSLEY and FORDE (1976) revealed that olsen's method is superior to other reagents including Bray's reagent.

References:-

1. BHAN, C and SHANKER, H (1973) Journal of the Indian Society of Soil science (1973) 21 (2) : 127-180
2. EKPETE, DM (1976)  
Soil Science (1976) 21 (4) : 217-221
3. GATTANI, PD and Seth, SP (1973) Journal of the Indian Society of soil science (1973) 21 (3) ; 373 - 375

4. GRIGG, LL(1972) Journal of Agricultural Research (1972) 15 : 648 - 652
5. PATHAK ETAL (1975) Journal of the Indian Society of Soil science (1975) 23 (2) : 207-216
6. RAJ KANNU, K (1975) The Madras Agricultural Journal (1975) 62 (9) : 544 - 549
7. SRIVASTH V, Sc and JAFRI, SM k 91974) Journal of the Indian Society of soil science (1974) 22 (2) : 134 - 138.
8. SUBRAMANIAN, CK (1971) Int. Symp. Soi. Test evaluation (1971) 1 : 371 - 375
9. SOBULD; RA. (1972) Soils afr (1972) 15 : 351 - 365
10. WALMSLEY, D and FORDE (1976) Tropical Agricultural (1976) 53(4) : 281 - 291

7. Scientific and of practical importance of the research.

Brays reagent No I is now being used for determining available phosphorus in the soil testing laboratories in Kerala state. But when recommendations are made on the basis of this method to phosphorus application is found to be not significant for rice. It is possible that the phosphorus extracted by Brays' reagent I is not correlated to the amounts taken up by plants. It is also possible that in the case of rice more phosphorus is made available under water logged conditions. Hence the method of determining available phosphorus in Kerala soils has to be reviewed and a more reliable method evolved.

8. Technical Programme:  
(give out line)

1. Collection of typical soil samples from the state.
2. Estimation of available phosphorus in these soils using different reagents such as Bray's No 1 Bray's NOII Truog's reagent, Clsens reagent etc.
3. Pot culture experiments in these soils using rice as the test crop and 3 levels of Phosphorus applications.
4. Analysis of the plant for uptake of Phosphorus
5. Working out correlations between the Phosphorus extracted by the reagent and phosphorus absorbed by the plant.
6. Extraction of the soil samples at the time of harvest of the plant with the reagents and working out of correlations with the phosphorus absorbed.
7. Extraction of Phosphorus by the reagents under dry and water logged conditions and working out of correlations with plant uptake.

9. Estimate of  
expenditure and  
receipts, if any

Contigent expenditure including  
cost of Chemicals, Collecting and  
transporting soil samples, cost  
of posts, fencing etc .....  
Rs. 2000/-

10. Location of  
research  
(if out side the  
college campus:

College of Agriculture  
Vellayani.

Place : College of Agriculture  
Vellayani.

Signature of the Candidate

Date : 26.6.78

Signature of the Chairman of  
Advisory Committee.

Signature of the Head of  
Department.

Signature of the Dean.

KERALA AGRICULTURAL UNIVERSITY  
FACULTY OF AGRICULTURE SCIENCE

Department of Agricultural Chemistry, College of Agriculture

PROGRAMME OF RESEARCH FOR MASTER'S DEGREE

1. Name of Candidate : Madhusoodanan Nair K.
2. Date of Admission & admission No. 27th Nov. 1976  
76..11..13
3. Name and Designation of Chairman of Advisory Committee Dr. (Smt. ) Padmaja P.
4. Topic of Research  
Project No. AG. 21.18 Che. 4
4. Topic of Research for Thesis. Studies on Increasing the Efficiency of Rock Phosphate in Kerala Soils.
5. Objectives of Research:
  1. To study the Physical and Chemical Characteristics of the different rice soils of Kerala State including their P fixing capacity and percentage P saturation.
  2. To study whether the efficiency of rock phosphate can be increased for enhancing the yield of rice in acid soils of Kerala State if it is applied sufficiently in advance in moist aerobic soil.
  3. To compare the efficiency of rock phosphate applied to rice soil sufficiently earlier in moist sub soil with that of super phosphate and super phosphate + rock phosphate mixture at flooding on equal P basis.
  4. To estimate available P of the different treatments at flooding and correlate it to P uptake and grain yield.
  5. To estimate inorganic P fractions of different treatments at flooding and correlate with available P as estimated by Olsen's and Bray's methods, P uptake and grain yield.
  6. Brief review of previous work done on the topic (Give reference to important publications/theses);



A series of experiments conducted at central Rice Research Institute, Cuttack to study the ways and means of increasing the efficiency of rock phosphate can replace water soluble phosphatic fertilizers in acid soils if they are applied sufficiently in advance in moist aerobic state before flooding.

( Patnaik, S. et al. Fert. News. Vol. 19 Nov. 12. 1974).

Most of the rice soils of Kerala being acidic the feasibility of applying these results in these soils with respect of Missouri rock phosphate is worth undertaking.

7. Scientific and practical importance of the research:

Proper use of indigenous sources of plant nutrients is always desirable. Sulphur, Sulphuric acid or Phosphoric acid are to be imported for the production of water soluble phosphatic fertilizers from rock phosphate.

Most of the rice soils of Kerala being acidic, some modification in the method of application which may increase the efficiency of applied rock phosphate may help in the direct application of rock phosphate, saving a part of the foreign exchange required for the production of water soluble phosphatic fertilizers.

8. Technical Programme ( Outline ):

- a. Collection of soil samples from the major rice growing tracts of Kerala State.
- b. Study of Physical and Chemical Characteristics of the Major rice soils of Kerala State including their P fixing capacity and percentage P saturation.
- c. Conducting pot culture experiments in the following major rice soils of the state.
  - i. Laterite soils.
  - ii. Coastal sandy soils.
  - iii. Acid Sulphate soils (Kari soils)
  - iv. Karappadam soils.
  - v. Kole soils.
  - vi. Kayal soils.
  - vii. Pokkali soils.
  - viii. Forest soils.



KERALA AGRICULTURAL UNIVERSITY  
PROGRAMME OF RESEARCH FOR M.Sc. (Ag) DEGREE  
FACULTY OF AGRICULTURE SCIENCE  
DEPARTMENT OF AGRICULTURAL CHEMISTRY

1. Name of the Candidate : P. MAHENDRAN
2. Date of admission and  
admission number : 11..10..1977,  
: 77..11..12
- Project No. : AG.21.18.Che.5
3. Name and designation  
of the Chairman of the  
Advisory Committee. : Dr. R.S. AIYER  
Assoc. Professor of Agrl.  
Chemistry  
College of Agriculture  
Vellayani.
4. Topic of Research for  
Thesis : Investigations on the possible reasons  
for the lack of response to phosphorus  
in Kerala.
5. Objectives: - : No systematic varietal screening  
of rice in respect of response to  
phosphorus in relation to different  
levels of available phosphorus  
taking into consideration, root  
parameters and the concept of capacity  
factor in the uptake of phosphorus  
has been attempted. Such an inves-  
tigation may give some answers to  
explain the lack of response or other-  
wise to phosphorus fertilization un-  
der Kerala Conditions.
6. Brief review of the  
work done:- : Studies conducted in India and  
abroad reveal that under lowland  
conditions in many locations rice  
fails to respond to phosphorus  
fertilization. Work carried out  
in our state, has yielded conflicting  
results. The response to phosphorus  
varies depending upon soil type  
soil condition and varietal differ-  
ences. The lack of response to phos-  
phorus in many experiments in research  
stations must be attributed to the  
high fertility status of the soils due  
to continuous and regular application  
of phosphatic fertilizers.

This reasoning appears to be justified since studies in cultivator's fields through All India Co-ordinated Agronomic Research Projects show that while there is no response in Palghat and Trichur Districts, positive results have been obtained in Quilon, Malappuram, and Trivandrum Districts. Further even among ~~and~~ rice varieties, varietal variations in extent of response have been sporadically observed and reported. Varietal differences among other factors depend upon the varietal differences in root activity, root distribution cation exchange capacity of the roots etc. Since it is more or less known that phosphorus is taken by root interception rather than by diffusion or active absorption, Koshy, and Brito-Muthunayagam (1965) attempted to relate fixation and availability of phosphorus in Kerala soils. Sundaresan Nair (1978) has worked out the relationship between various fractions of phosphorus and available phosphorus as determined by Bray No.2 reagent in 6 soil types. However no attempt has been under<sup>+</sup>so far to study <sup>uptake</sup> varietal variations and soil and root parameters influencing the uptake of phosphorus. Hence the present study.

7. Practical importance of the research:

At different levels of available phosphorus in the soil, screening of varieties will enable to fix the phosphorus requirements of varieties in relation to available phosphorus status of the soil. The chemical studies will enable critical levels to be established.

8. Technical Programme:-

(i) Experimental Design:-

Split plot design with varieties as sub plots and 4 levels of phosphorus as the main plot treatment viz. 0, 30, 60 and 90 kg/ha P<sub>2</sub>O<sub>5</sub>  
Sub Plot treatment - 20 high yielding and traditional varieties.

Season - First crop season

(2) Observations to be made

1. Yield and other yield contributing parameters.
2. Root studies : - Root weight, Root volume.  
Cation exchange capacity of the root.
3. Fractionation of phosphorus in soil by accepted phosphorus fractionation procedures and correlating the fractions with available phosphorus and uptake.
4. Phosphorus fixing capacity of the soil in the field.

9. Estimation expenditure

Expenditure for the conduct of the experiment	Rs. 5500/-
Stipend to the P.G. Student Rs. 400/-trimester	Rs. 2400/-
	-----
Total	Rs. 5900/-

10. Location of research (if outside the the campus)

College of Agriculture, Vellayani.

Place : Vellayani

Date : 10..2.78.

Signature of the Candidate

Signature of Chairman Advisory  
Committee.

Signature of Dean

Signature of Head of Department.

KERALA AGRICULTURAL UNIVERSITY  
COLLEGE OF HORTICULTURE  
RESEARCH PROJECT. 1978.

1. Institute Code No. : AG.21.18.Che. 6
2. ICAR Code No. :
3. Name and address of the research centre. : College of Horticulture, Vellayanikkara, Mannuthy.
4. Title of the Project : Availability & Requirement of phosphate to plants in the Laterite Soils of Kerala.
5. Name and designation of associates and establishment on which borne : Mathew Jacob, K. Post-Graduate student in Soil Science & Agril. Chemistry, College of Horticulture Vellanikkara.
6. Name and designation of Principal investigator : Dr. A.I. Thse, Associate Professor College of Horticulture, Vellanikara.
7. Location of the research Project. : College of Horticulture Vellanikkara, Mannuthy.
8. Objectives : To evolve a suitable laboratory index of phosphate availability to plants with special reference to the laterite soils of Kerala.  
  
To find out the optimum soil phosphate status to be maintained in laterite soils in relations to the phosphate requirements of different crops.
9. (b) Practical utility : From time to time, many chemical extractants have been used for the estimation of available phosphorus in soils. But often the amount of chemically extracted phosphorus does not reflect the amount of P available to the crop since the availability to plants is influenced by the varying conditions in which the plants are grown. Therefore, recently fertilizer practices that build up P reserves in soils up to an optimum level or no response level have been suggested rather than meeting the crop requirement for shorter periods. In this context, it is necessary to evolve

suitable chemical methods which will estimate the quantity of soil P that will reflect the reasonably mobile P reserve of the soil over a specified but fairly long period of plant growth.

This Project envisages the development of a suitable laboratory chemical method for the estimation of this fraction of soil phosphorus. Once the method is evolved, it will be possible to find out the levels of optimum soil P reserves to be maintained for different crops, by correlating the laboratory index values with crop responses in field expts. information on the possibility and extent of skipping of P application in soils of high P status can also be worked out.

9. Technical Programme

The first stage of the project will consist of laboratory studies to evolve a suitable chemical method for the estimation of P available to plants over a fairly long period.

In the second stage of the project, the optimum level of P reserve for different crops will be found out by examining the soil test values at different periods of crop growth and at different levels of crop response under continuous cropping system.

10. Date of Start : January 1978

11. Likely date of completion : January 1983

12. Estimated man months :

13. Facilities required : Facilities available in the college of Horticulture will be utilized.

14. If financed by an organisation other than the institute.

a. Name of the financing organisation.

b. Title of the project if the project forms part of a longer project Not applicable

15. Approximate cost.

		<u>Lab. Studies</u>	<u>Field expts.</u>
T.A.	Rs.	1,000	Rs. 2000/-
contingencies & cultivation expn.		<u>2,000</u>	<u>1000</u>
Grand Total	Rs.	15,000/- (for five years)	

Principal Investigator

Head of Division

Director.

KERALA AGRICULTURAL UNIVERSITY

Programme of Research for M.Sc. (Agrl.) Degree.

Faculty of Agriculture, Department of Agricultural Chemistry

1. Name of the Candidate : K. Anila Kumar
2. Date of admission and No. : 13..10..1977 - 77/11/11
3. Name and designation of the Chairman of the advisory committee. : Shri. P.R. Ramasubramanian Associate Professor of Agricultural Chemistry, College of Agriculture, Vellayani.
- Project No. : AG. 21.18. Che. 7
4. Topic of Research for thesis. : Studies on the response of paddy to lime application in acid soils of Kerala.
5. Objective : To study the calcium status and its availability in the rice areas of the state with a view to determine the critical levels of calcium in soils below which response to liming can be expected.
6. Brief review of the work done:-

Application of lime is being recommended for the correction of soil acidity. Results of experiments conducted in different parts of Kerala have not always been consistent. The results of experiment

conducted in Kuttanadu by the Department of Agricultural Chemistry College of Agriculture, Vellayani indicated that liming results in increased rice yields and the economic dose of lime was found to be 1120 kg/ha (Annual report of C.M.A. Scheme 1966). Increase in the up take of major nutrients by rice variety culture 28 with increasing doses of lime was reported in 1969 by Kabeerathamma who has also reported that the optimum doses of lime for maximum efficiency ie. half of the lime requirement for Kari soils. Sivan Nair (1970) from pot culture studies found that lime at half the lime requirement was beneficial to the growth and yield of rice in vellayanikayal soils while the yield characters were adversely affected on increasing the liming rate to full lime requirement. Yield increase of paddy by lime application at 2000kg/ha for Kari soils, 1000/kg/ha for Karapadam soils and 500kg/acre for pokkali soils have also been reported. Lime requirement studies on laterite soils of pattambi, Kole land soil and Acid sulphate soils have been worked out.



7. Practical importance of the Research:-

The field trials conducted at the Model Agronomic Centre Karamana during 1971 fail to record any significant effect on rice yield on lime application. The trials conducted in cultivations fields in Trichur, Quilon and Trivandrum Districts and in the Rice Research Station, Mancombu also reported that rice don't show response to lime application. The present project is aimed at arriving at possible conclusion based on laboratory studies and pot culture studies which may throw more light on lime application to paddy soils at economical level to the benefit of farmers.

8. Technical Programme:

- (A) General:-
- (1) Collection of soils from acid soil regions growing paddy.
  - (2) Laboratory determination of the following:  
PH; CEC; levels of total and exchangeable Ca and Mg exchangeable H, Al, Fe.
  - (3) Estimation of the levels of Ca and Mg concentration in the saturation extract of soils.
  - (4) Lime requirement studies on the above soils.

(B) Pot culture experiments:-

Selected soils on the basis of the levels of exchangeable Ca and Mg and Ca and Mg in the saturation extract to be treated with different fractional levels of lime requirement ( $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$  and full lime requirement) with rice to study the response in yield parameters; root growth nutrient up take etc.

9. <u>Estimate of expenditure</u>	- Rs.3000/-
Scholarship at the rate of Rs.400/- Trimester	- Rs.2400/-
	<hr/>
	Rs.5400/-

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

Place: Vellayani, }  
Date: 14-2-1978. }

Signature of candidate.

Signature of Chairman - Advisory Committee

Sd/-

Signature of Dean

Signature of Head of Department.

S.No.811 P.G. Project.

KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture

Department of Agricultural Chemistry, College of Agriculture, Vellayani.

Programme of work for Ph.D.

(For Approval of the University)

1. Name of candidate : K. Raveendran Nair
2. Date of admission and No.: 74-21-18
3. Name and designation of chairman, advisory Committee : Dr. M.M. Koshy, Professor of Agricultural Chemistry, College of Agriculture, Vellayani.
4. Topic of Research for thesis : Studies on saline soils of Kerala
5. Project No. : Ag.21.18 Che. 8
6. Objectives of research for the thesis.

Although rice has the ability to withstand salinity to some extent, extreme conditions affect the yield adversely. In addition to Na, and Cl<sup>-</sup> ions being harmful by themselves, they may also interfere with the absorption of other nutrients by rice plants. Hence the object of the present study is to investigate how different levels of salinity affects physical properties of the soil and the absorption of nutrients by the rice plant.

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

Though a large volume of literature is available regarding the saline soils of India comparatively less information is available with regard to Kerala soils. It is estimated that in Kerala about 26,000 hectares of land are affected by salinity. These soils are quite different from the saline soils found elsewhere in India. In Kerala soils Na is present as the chloride and sulphate while in the rest of India it is present as the carbonate and the bicarbonates. Nair and Money (1963) showed that the chlorides and sulphates present in the saline soils of Kerala are causing injury to crop.

Banerjee (1959) working with some saline soils of Bengal found that the pH and exchangeable Na percentage were not directly correlated but were highly correlated with organic matter.

Zachariah and Sankarasubramony (1960), in a pot experiment with the saline soils of Kerala using certain rice varieties, showed that salt tolerance increases with maturity of the crop.

Nair and Money in a pot experiment got results that the height of plants, number of tillers and yield of straw and grain were affected adversely by increasing levels of salinity.

Profile studies of saline soils belonging to the pokkali Kaipad and Orumundakan areas of saline soils are under investigation. The seasonal variation in salinity is also being studied.

contd.....

## 8. Scientific or practical importance of Research.

At present growing of crop in the saline soils is done not based on any scientific information but is based only on the practical experience which the cultivators have gained for generations. If a systematic study is done on the variation of field salinity in different periods, its effects on the physical and chemical properties of soils as well as on the chemical constitution of rice crop, and more economic utilisation of these soils can be made. The present study aims at providing the basic data on the above aspects. More over the present investigation will also reveal the comparative tolerance, of different varieties to salinity so that the potentialities of the saline area can be better tapped.

## 9. Technical programme

### a. Soil studies:

1. Profile studies: Two profiles each will be examined at the respective areas of orumundakan and pokali regions from where soil sample for pot experiment were collected. At each site profile examination will be done one at peak salinity (April-May) and another at least salinity (July-Aug.) periods. Profile samples will be collected and analysed for morphological, physical and chemical properties.

### Observations:

1. Conductivity
2. pH
3. C.E.C. and exchangeable cations
4. Macro and micronutrients
5. Chlorides, sulphates, carbonates and bicarbonates
6. Mechanical analysis
7. Water permeability, bulk density etc.

ii. Surface samples studies: 30 surface (0-20 cm) and sub-surface (20-40 cm) samples will also be collected from Orumundakan and Pokali areas and their physical and chemical properties will be studied.

b. Pot-culture studies: Pot culture experiments will be conducted to evolve better management practices and to know the effect of different levels of salinity and soil amendments on the growth and uptake of nutrients by rice plants.

Design : RBD  
Salinity levels Three  
Soils : Two  
Varieties : Three  
Amendment  
levels(Lime): Three  
Replication : Two

contd....

Earthen were pots of 10 kg. capacity will be taken for the study. The drainage hole of the pots will be sealed and equal quantities of sieved soils will be placed. A uniform dose of N, P and K @ 90:45 kg/ha will be given. The lime will be incorporated into the soil 10 days before planting.

Observation:

Plant will be analysed at 3 stages of growth namely tillering, flower initiation and harvest. Soil for analysis will be taken after harvest from each treatment.

1. Plant characters such as height, number of tillers, number of levels, earhead characters, 1000 grain weights etc. will be noted.
2. Soil will be analysed for:-
  - a. Macro and micronutrients
  - b. C.E.C. and Exchangeable cations
  - c. pH
  - d. Conductivity
  - e. Aggregate analysis
  - f. Permeability bulk density etc.
3. Plant analysis
  - a. Macro and micronutrients.
  - b. Starch and sugars
  - c. Root and C.E.C.

10. Estimate of expenditure

1. Cost of 150 pits @ Rs.3/-	Rs.	450.00
2. Collection and transportation of soils	Rs.	500.00
3. Processing soil and conduct of Experiment	Rs.	500.00
4. Fencing area with barbed wire	Rs.	100.00
5. Cost of chemicals	Rs.	1000.00
6. Cost of covers, labels and other unforeseen expenditure	Rs.	450.00
		<hr/>
Total	Rs.	3000.00
		<hr/> <hr/>

(Rupees three thousand only)

11. Location : College of Agriculture, Vellayani.

Vellayani  
13-2-1978

Sd/-  
Signature of Candidate.

Signature of Chairman of the  
Advisory Committee Sd/-

Signature of Head of Department Sd/-  
Signature of Dean

S.No.812 P.G. Project.

KERALA AGRICULTURAL UNIVERSITY

RICE RESEARCH STATION, PATTAMBI

1. Institute Code No. : Ag.31.1 Che.9.
2. I.C.A.R Code No. :
3. Name and address of the Research Institute /centres : Rice Research Station, Pattambi.
4. Title of the Project : Nutrient Status of Weeds.
5. Title of the problem : Study on the nutrient removal capacity of weed species found in different seasons in upland and low land of Pattambi area.
6. (a) Name and designation of the Principal/Investigator : Habeebul Rahiman - E, Jr.Instructor.  
(b) Name(s) and Designation of Associate(s)
  1. S. Seshadrinath, Asst.Professor
  2. P.N. Pisharody, Assoc. Professor.
7. Location of Research Project : Rice Research Station, Pattambi.
8. (a) Objective :
  1. Assessment of N,P and K content of weed species of upland and low land areas of Pattambi, found in different seasons.
  2. Assessment of dry matter production capacity of weeds.

Review : Not much work has been done in this field.

(b) Practical Utility: (1) By Chemical analysis of each weed we **get** an estimate of the nutrient removal capacity and the NPK content of weeds. (2) Assessing the capacity of dry matter production better utilization of weeds can be made by way of composting and to some extent shortage for organic matter can be solved.
9. Technical Programme:- Collection of different species of weeds from low land and upland regions of Pattambi in different seasons for taking the following observations.
  - (1) to find out the N P K content
  - (2) to find out the total dry weight of each weed species.
10. Date of start : June, 1977
11. Likely date of completion : June, 1978
12. Estimated men months : 12
13. Facilities required : Laboratory facilities.
14. Financial organisation : Kerala Agricultural University
15. Approximate cost : Rs.500/-
16. Signature of  
Sd/- Sd/- Sd/-  
Principal Investigator Head of Division Director of Research.  
Third FRC S.No. 813.

KERALA AGRICULTURAL UNIVERSITY

1. Institute Code No. : Ag. 21.1 che. 10
2. Name and address of the Institute : Rice Research Station, Pattambi
3. ICAR Code No
4. Title of the Project : Studies on the variation of Redox Potential of rice soil on the organic Inorganic systems of rice fertilization.
5. Name and designation of the Principal Investigator : P.N. Pisharody Associate Professor (Chem.)
6. Name and Designation of Associates : S. Seshadrinath, Asst. Professor (Chem.)
7. Location : Pattambi
8. a) Objective:

The permanent manurial experiments conducted in the station for the last 10 years have clearly shown that an intergrated organic-inor ganic system of fertilization is better than applying either of them alone for tapping the production potential of rice.

A decrease in redox potential is the most striking electro chemical change caused by flooding a soil. The course of change is determined by the initial aerobic potential, temperature, the content of organic matter etc. According to Dr. Ponnampereuma, the chief contribution that a study of redox potential of submerged soil can make to better a measurable oxidation - reduction zone in which rice plants will not suffer from a deficiency of essential nutrients. The measurement manurial trial will throw light on the higher yielding capacity of the organo-inorganic fertilization system in rice. The study envisages this line of action.

b) Practical Utility:

The study will throw light that how far the electro chemical changes in the flooded soil will affect zice yield and that how far this can be manipulated by the cultural and manurial practices.

9. Technical Programme:

Experimental plots in the permanent manurial trial at Rice Research Station, Pattambi, will be utilised for this study of redox potential of the soil system. The redox potential of the soil will be measured every 10 days till the dough stage of the crop.

10. Date of start : 1977 first crop
11. Likely date of completion : 1977-79
12. Estimated man months : 24
13. Facilities required : Existing facilities available
14. If financed by an organisation other than the institute : No
15. Approximate cost : Rs.5000/- for each year
16. Signature of

Sd/-

Principal Investigator.

KERALA AGRICULTURAL UNIVERSITY  
FACULTY OF AGRICULTURE  
DEPARTMENT OF AGRICULTURAL CHEMISTRY  
COLLEGE OF AGRICULTURE, VELLAYANI

Programme of Research for M.S.(Ag.) Degree

(for approval of the University)

1. Name of the candidate : A.K. Krishna Kumar
2. Date of admission and number : 1-12-1976
3. Project No Ag.21.18 Che. 11
4. Name and designation of the Chairman of the advisory committee : Mr. M.M. Tomy, Professor of Agl. Chemistry, College of Agriculture, Vellayani.
5. Topic of research for thesis: "Study of the physico chemical characteristics of the 'Poonthelpadam' soils of Kerala".
6. Objectives of Research for the thesis : No work has so far been done on the physical and chemical characteristics of these soils. A correct appraisal of the proportion of these soils is necessary for their scientific management. Hence the present study.
7. Brief review of work done on the topic: (give reference to important publication/thesis)

No work has been done in these 'poonthalpadam' soils, but literature is available on the pedological and physico-chemical aspects of similar soils. Joffe (1949) and Rode (1962) have classified, fresh water marshes according to their origin into upland, lowland and transitional.

Ruther (1963) has described the transition from lowland to upland and the accompanying changes in vegetation. But there is no niche for these organic soils in the classification of histosols proposed by USDA soil survey staff (1968), in which emphasis is on the plant residue, not the water regime. Pearsall (1938) Misra (1938), Pearsall and Mortinier (1939), Pierce (1953) and Armstrong and Boatman (1967) have shown an association between the chemical properties of the soils especially their oxidation reduction state and distribution of natural vegetation in marshes.

Gorham (1953) found that in passing from the relatively inorganic lake muds through semi-aquatic soils to raised bog peats, soil acidity increased, base saturation decreased and humus Nitrogen content fall.

In Kerala the work done in the soils of Kuttanad has been summarised by Sukumaran and Money (1973). The results of the physico-chemical studies show that the productive problems of these soils are indeed varied and complex. They are related to strong soil acidity, Seasonal variation of PH and soluble salt content, very wide C/N ratio, base unsaturation, abnormal lime requirement, low content of

contd....

available plant nutrients, high phosphorous fixation, toxic concentrations of soluble iron and aluminium and hydrogen sulphide production under low redox potential.

But the poonthal padam soils are very much different from the soils of the Kuttanad in their genesis and properties and hence the present study.

8. Scientific and/or practical importance of the Research.

The Poonthal Padams are distributed in several parts of the state especially in Palghat and Malappuram districts. The soils in these tracts are very deep and slushy and in a highly dispersed condition. The exact cause of their slushy nature is not known. It is estimated that the total area covered by these problem soils is about 1400 hectares in Palghat district alone. A correct appraisal of the physical and chemical properties of these soils is necessary for their scientific management. Hence the present study.

9. Technical Programme (Give out line)

1. Survey of the areas and collection of details about location area, various grown and their performance.
  2. Collection of samples and recording the PH Electrical conductivity of the fresh soil.
  3. Processing the samples for further analysis.
  4. Analysis of the soils for their important physical Characteristics.
  5. Analysis of the soils for their important chemical characteristics and Plant nutrient status.
10. Estimate of expenditure and receipts if any: Rs.1800/-
11. Location of Research if outside the campus: College of Agriculture, Vellayani.

Place:

Date :

Signature of candidate:

Signature of Chairman  
Advisory Committee

Signature of Head of Department

Signature of the Dean:

S. No. 815 P.G. Project.



KERALA AGRICULTURAL UNIVERSITY

PROGRAMME OF RESEARCH FOR M.Sc (Ag.) DEGREE

FACULTY OF AGRICULTURE

DEPARTMENT OF AGRICULTURAL CHEMISTRY

1. Name of the Candidate : P.R. Rudra Warriar
2. Date of admission and No. : 13-10-1977, 77-11-10
3. Name and designation of the Chairman of the Advisory Committee : Dr. V. Gopalaswamy, Associate Professor of Agricultural Chemistry, College of Agriculture, Vellayani.
4. Project No. : Ag.21-18 Che. 12
5. Topic of Research for Thesis:

'Investigations on the Physico-chemical characteristics and nutrient status of Orumundakan rice field soils of Kerala'.

6. Objectives:

The detailed study of the physico-chemical and nutrient status of the Orumundakan rice field soils is necessary for improving their fertility management. Hence the present study.

7. Brief review of the work done:

The Orumundakan rice field soils are found along the coastal regions of Quilon and Alleppey Districts of the Kerala State, especially in Karunagapally and Karthikapally Taluks. The exact area under this type of Saline soils is not available. The general nature of the mundakan rice fields has been described by Sahadevan, P.C. in his book 'Rice in Kerala'. No intensive study has been done on the physico-chemical and nutrient status of the soils. The soils are influenced by marine tidal waves and back waters. Piere (1953) and Armstrong and Boatman (1967) have shown that there exists an association between the chemical properties of the soils especially their oxidation and reduction state and the distribution of coastal natural vegetation. Gorchans (1953) found that in passing from the relatively in organic lakemuds through semi-aquatic soils, soil acidity increased and base saturation decreased, and nitrogen content fell.

Soils affected by marine tidal influence as that of Kuttanad region have been investigated by Money (1950), Sukumara Pillay and Money (1960). The results show that productive problems of the soils are varied and complex strong acidity, salt content, low availability of the nutrients, abnormal lime requirement, toxic concentrations of soluble iron and aluminium are the hazards.

The Orumundakan soils are different from the Kuttanad soils and the saline soils like Pokkali and Kaipad with respect to their genesis and fertility status. Riyar and Samikuttty (1977) from a study of the saline soils of Kerala have reported that high levels of salinity exist in the Orumundakan areas compared to pokkali and Kaipad areas. This brings to the forefront the problem nature of these soils. It will be worth while to investigate the fertility aspects of these soils in greater detail.

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### 8. Practical importance of the Research

The Orumundakan rice fields are situated as several patches, between the mainland, back water and the Arabian Sea. Under favourable conditions, which may occur only at times, these fields give bumper rice crop with certain salt tolerant varieties of rice. Mostly there is crop failure and the fields are seen lying barren. Some manurial trials have been conducted in the Orumundakan fields at Muthukulam Village by the Rice Research Station, Kayamkulam. A correct appraisal of the physico-chemical characteristics of these rice field soils and the problems of the area is necessary to uplift these areas to produce more.

### 9. Technical Programme:

#### (a) General:-

- (1) Survey and collection of details regarding the area, rice varieties grown and their performance.
- (2) Collection of representative soil samples.
- (3) Analysis of soils for important physical and chemical characteristics.
- (4) A pot culture study to study the effect of adding indigenous amendments to improve the soil.

#### (b) Technical Programme for Pot culture experiment.

- Treatments:
- (1) Burnt lime
  - (2) Stubbles (Straw)
  - (3) Wood ash
  - (4) Wood ash + dung
  - (5) Dung + indigenous green leaves
  - (6) Lime + Farm yard Manure.

Replications - 4 Variety - Local Mundakan.

Observations: Periodical recording of H, E.C. (Before planting at active tillering, panicle establishment and after harvest)

Yield Data Weight of grain, straw, number of productive and non-productive tillers.

Chemical analysis - Percentage of N, P, & K and its total uptake.

10. Estimate of Expenditure - Rs. 2800/-  
Scholarship at the rate  
of Rs.400/- trimester Rs. 2400/-

Total - Rs.5200/-

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

Place: Vellayani

Date : 9-2-1978

Signature of Candidate.

Signature of Chairman advisory Committee

Signature of Dean.

Signature of Head of Department.

S.No.816 P.G. Project.

KERALA AGRICULTURAL UNIVERSITY  
FACULTY OF AGRICULTURE      DEPARTMENT OF AGRICULTURAL CHEMISTRY  
COLLEGE OF AGRICULTURE

Programme of research for Doctorate Degree.  
(For approval of the University)

1. Name of the candidate : P.C. Antony
2. Date of admission and Admission No. : 10-10-1977  
: 77-21-04
3. Project No. : Ag.21.18 Che.13
4. Name and designation of Chairman and Advisory Committee : Dr. M.M. Koshy, Professor of Agricultural Chemistry  
: 1. Dr. R.S. Aiyer  
: 2. Dr. V. Gopalaswamy  
: 3. Dr. C. Sreedharan  
: 4. Dr. Jose Samuel.
5. Topic of Research for thesis : "Studies on the physical properties of the major soil groups of Kerala with special reference to the effect of salinization and desalinization".
6. Objectives of the Research:

Though a considerable amount of work has been done in Kerala soils with reference to their chemical properties, very little work has been done on their physical aspects, except for the determination of the mechanical composition of some samples. Information on the aggregate composition, moisture retention properties, infiltration and hydraulic conductivity etc. is totally lacking. Hence one of the main objectives of the present study is to obtain these basic data for the major soil groups of Kerala.

Further, there are about 26,000 ha of low lying land in Kerala which are subject to periodic inundation with sea water. The physical effects of the alternating processes of salinisation and desalinisation on these soils are not known. Such information is necessary for the successful management of our salt affected soil. Hence this study also proposes to undertake the investigation of the effect of salinization and desalinisation on the physical characteristics such as the relative proportion of various size aggregates, their stability etc.

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

Keen and Rackzkowshi (1921) investigated the relationship between pore space and clay content and found that these two were positively correlated. The correlation between specific gravity and clay content was found to be negative. Volume expansion may found to be directly correlated to the percentage of clay. Wilcox (1939) reported that the sand content of soil was negatively correlated with the maximum water holding capacity.

Honczovenko, G. (1960) reported that ploughing of ten peat causes rapid drying and decreases porosity both in the arable layer and in the sub soil.

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Gota (1967) found that in swampy field soils aggregation and density under dry conditions were lower than the soils of well drained fields, but porosity maximum water holding capacity and moisture equivalent were higher.

Ghosh et al (1973) in their study on kari soils of Kerala found that these soils were clay loam in texture. The bulk density and particle density varied from 1.24 to 1.46 and 2.52 to 2.56 gm/cc respectively. The hydraulic conductivity was quite low in Thottappally soils and high in Kattampalli soil.

#### References

1. Keen, J. and Rackzokowski 1921 The relationship between clay content and certain physical properties of soils. J. Agric. Sci. 11: 441-449.
2. Wilcox 1939 Soil moisture studies and some factors affecting the moisture holding capacity and its determination. Sci. Agric. 20: 140-149.
3. Honczarenko, G. 1960 The effect of ploughing on physical properties and vegetation of degraded peat soil. Zesz. Problan Postep. Nauk vol. 25:225-265.
4. Goto, S. 1967 Characteristics of swampy paddy fields with special reference to those of sasayma basin. Mim. Hyago Univ. Agric. No.19. Agron. Serv. 7, pp. 81.
5. Ghosh, S.K., Das 1973 D.K. and Deb, D.L. Physical chemical and mineralogical characterization of kari soil from Kerala. Paper presented in the Symposium on acid sulphate and other acid soils of India, held at Trivandrum in February, 1973.
6. Scientific and/or practical importance of the research:

Very little work have been done on the physical properties of the soils of Kerala. Hence this work have been added the knowledge of the physical characters of our soils.

#### 8. Technical programme.

- I. Soil samples from the major soil groups of Kerala will be collected and their physical properties with respect to the following will be studied.
  - a. Mechanical composition and texture
  - b. Single value constants, plasticity, Hillerberg's constants etc.
  - c. Aggregate analysis
  - d. Infiltrations and hydraulic conductivity in disturbed samples.
  - e. Infiltration and hydraulic conductivity in field samples.
- II. Study of soil moisture relationships.

Core samples will be collected and soil moisture retention curves will be studied. Samples will also be collected from different depths in typical soils and moisture retention pattern in the profiles will be investigated.

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III. Effect of salinity on the soil physical properties.

Columns of soils will be kept submerged under the following salinity levels for a specified lengths of time after which the main soil physical properties will be studied.

- a. Salinity as the same as that of sea water.
- b. 75% sea water and 25% pure water
- c. 50% sea water and 50% pure water
- d. 25% sea water and 75% pure water
- e. pure water alone.

The effect of the above salinity levels on the soil structure will be studied.

9. Estimation of expenditure -	
Equipment, chemicals etc.	Rs.5,000/-
Fellowship	Rs.4,800/-
	-----
Total	Rs.9,800/-
	=====

10. Location of research if outside College campus -  
College of Agriculture, Vellayani.

Place: Vellayani  
Date : 15-2-1978.

Sd/-  
Signature of the candidate

Sd/-  
Signature of Head of the Department

Signature of the Dean.

S.No.817. P.G. Project.





KERALA AGRICULTURAL UNIVERSITY

Faculty of Agriculture : Department of Agricultural Chemistry.

1. Name of Research Station : Rice Research Station, Moncompu
2. Project Leader : Smt. K. Leela, Associate Professor  
Associate : Shehana R.S., Jr. Instructor.
3. Project No. : Ag. 21.5 Che. 6
4. Title of the project : Zinc status of Kuttanad Soils
5. Objective : To have an idea of the total and available Zinc content of Kuttanad Soils.
6. Practical utility : Peaty soils are usually considered to be deficient in N.P.K. and also in micronutrients like Zn and Cu. Zinc is considered to be one of the most important nutritional factor limiting grain yield of rice in low land rice soils. Details on total and available Zinc status of the soils in different tracts of Kuttanad are lacking. Hence, the study will be useful.
7. A short review of literature:
8. Technical programme : Soils from different tracts will be collected and analysed for total available Zinc content. Profiles will be dug out in the major tracts and soil samples collected from different horizons. Samples will be analysed for total and available Zinc content. Along with it the important physical and chemical characteristics of the soil for the same samples may also be determined and correlation co-efficients worked out for total and available Zinc content. The above studies will provide an idea on the distribution of Zinc in the profile and the factors deciding it's mobility and availability to plants.
9. Date of start : As soon as the project is approved
10. Likely date of completion: One year
11. Approximate cost : Rs.2,000/-
12. Additional facilities : Facilities available at the Station may be utilized
13. Signature of

Sd/-  
Project Leader

Sd/-  
Head of Department

Director of Research.





KERALA AGRICULTURAL UNIVERSITY

1. Faculty of Agriculture : Department of Agricultural Chemistry
2. Project No. Ag. 21.18 Che. 18
3. Title of the Project : Studies on Biodegradation of Pesticides
4. Name of Designation :
  - (a) Project leader : Dr. K.P. Raja Ram, Associate Professor
  - (b) Associates :
    1. Sri. P.A.Korah, Asst. Professor of Chemistry
    2. Smt. Alice Abraham, Asst. Professor of Chemistry.
    3. Sri. Ignatius Komnikker, Asst. Professor of Bacteriology.

5. Objectives:

To survey, isolate and identify the soil micro-organisms and prevalent in soils of Kerala capable of active biodegradation of the pesticides applied.

6. Practical Utility:

The plant protection chemicals applied as foliar spray, dust or soil granular form ultimately reach the soil. Their persistence in the soil will be influenced by the soil microflora. Hence it is desirable to identify the micro organisms actively involved in the detoxication of plant protection chemicals. The information collected can be utilized in either arresting the rate of biodegradation of desirable pesticides in soil or hastening the detoxication of unwanted plant protection chemicals in soils.

7. Short review of literature:

Sethumathen (1972) has reported extensive degradation of Diazinon by flavobacterium sp. Siddaramappa et al (1975) isolated a species of Pseudomonas capable of hydrolysing parathion to P - nitrophenol and further releasing inorganic nitrite. Raja Ram and Sethunathan (1976) has reported the, role of microbes in the degradation of Hinosan in an allevial soil.

8. Technical programme

1. Common soil pesticides will be applied at periodic intervals to the various soil types of Kerala and their rate of degradation will be followed in laboratory in arbatation studies.
2. The soil microflora actively involved in the bio-degradation process will be isolated and identified.

9. Date of start : September 1977

contd.....

10. Likely date of completion : September 1980

11. Additional facilities required : The facilities available in the laboratories of the Division of chemistry and Division of plant pathology will be utilized.

12. Approximate cost:-

1) Cost of chemicals for one year	Rs.2500/-
2) Cost of laboratory wares	Rs.1000/-
3) Contingent expenditure	Rs. 500/-

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Total cost per year Rs.4000/-

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Cost for three years

Rs.4000/- x 3  
Rs.12,000/-

13. Signature:

Sd/-  
Project Leader

Sd/-  
Head of the Department.

Third FRC. S.No.822.

KERALA AGRICULTURAL UNIVERSITY

1. Faculty of Agriculture : Department of Agricultural Chemistry
2. Project No. : Ag. 21-18 Che. 19
3. Title of the Project : "Study on the interaction of Carbofuran and Urea in the soil"
4. Names and Designation of :
  - a) Project leader : Dr. K.P. Rajaram, Associate Professor  
College of Agriculture, Vellayani.
  - b) Associates : 1. P.A. Korah, Asst. Professor (Chemistry)  
2. Alice Abraham -do-  
3. Dr. Mohan Das, Associate Professor  
(Eroto)

5. Objective:

When Carbofuran granules are applied in soil, in the presence of Urea, there are chances for interaction of the chemicals. Carbofuran may affect the microbial population of the soil which may alter the rate of mineralization of Urea. On the other hand the presence of Urea will enhance the multiplication of certain groups of soil microbial population, which may influence the rate of biodegradation and persistence of the Carbofuran chemical in the soil. Hence the interaction of these chemicals in the soil is to be traced so as to evaluate the fate of these chemicals in the soil and their effect on the availability of nitrogen, and toxicity and persistence of Carbofuran in soil.

6. Practical Utility:

Urea is extensively used for top dressing of crops. The rate of mineralisation of Urea decides the rate of release of the available nitrogen from the fertilizer, so as also the period for which the nutrient is available in the field. The mineralization of N is a function of the microbial activity in the soil. The application of plant protection chemicals like carbofuran alters the microbial population of the soil and may influence their activity. Hence it is of practical importance to trace the importance of one chemical on the other. With regards to its persistence and its period of availability in the soil.

7. Short review of literature:

MATHAN & MURUGAN (1975) reported that when 2-4 D was mixed with Urea a reduction of mineralization was noticed. Mathan et-al reported that extensive changes in microbial population after application of carbofuran.

contd....



KERALA AGRICULTURAL UNIVERSITY

College of Horticulture, Vellanikkara.

1. Institute code No. : Ag.21.19 Che. 20
2. I.C.A.R. Code No. :
3. Name and address of the research centre : College of Horticulture, Vellanikkara, Mannuthy.
4. Title of the Project : Studies on the rate of decomposition of salvinia as influenced by Chemical agents.
5. Name & designation of Principal Investigator : Dr. A.I. Jose, Associate Professor of Soil Science & Agricultural Chemistry.
6. Name & designation of Associate and establishment on which borne. : Smt. K. Leela, Asst. Professor of soil Science & Agricultural Chemistry, College of Horticulture, Vellanikkara.
7. Location of the research project : College of Horticulture, Vellanikkara, Mannuthy.
8. (a) Objectives : To screen chemical agents suitable for hastening the decomposition of salvinia mechanically removed from water bodies.  
(b) Practical utility : One of the most popular methods of eradicating salvinia from the rice fields or from water bodies is its removal by mechanical means. The removed material is often heaped on bunds or in fields where it remains for a very long period due to its very slow rate of decomposition. The selection and application, of a chemical agent which will hasten the process of decomposition will result in easy and quick disposal of the collected material. The decomposed material can be utilized as a manure without the risk of rejuvenation of the material.  
(c) To find out an efficient method for composting Salvinia

Review of literature

N.R. Dhar and Co-workers (1958) have carried out large number of experiments on composting of cow dung, wheat straw and weeds in the presence and absence of phosphatic fertilizers and have observed that greater fixation of atmospheric nitrogen in the presence of phosphatic in composting. Compost prepared with the addition of super phosphate and other phosphatic fertilizers are known to increase phosphorus and nitrogen content. The present investigation is to find out quick and efficient way of composting the weed and to obtain a material of high quality manurial value.

contd.....

9. Technical programme:

First, laboratory study will be carried out with the following treatments. The adaptability of selected treatments will be tried in fields as the second phase of the experiment.

No.	Treatments	Treatment details
1.	N	0.5 kg. N in the form of urea per 100 kg. green matter
2.	NP	0.5 kg. N in the form of ammonium phosphate per 100 kg. green matter
3.	Cowdung	1 Kg. Cowdung (made into a slurry) per 100 kg. green matter.
4.	Lime	1 Kg. burnt lime per 100 kg green matter
5.	N + Cowdung	1 kg. cowdung + 0.5 kg. N in the form of urea per 100 kg. green matter
6.	N + lime	1 kg. burnt lime + 0.5 kg. N in the form of urea per 100 kg. green matter
7.	NP + cowdung	1 kg. cowdung + 0.5 kg. N in the form of ammonium phosphate per 100 kg. green matter.
8.	NP + lime	1 kg. burnt lime + 0.5 kg. N in the form of ammonium phosphate per 100 kg. green matter.
9.	Cowdung + lime	1 kg. burnt lime + 1 kg. cowdung per 100 kg green matter
10.	N + cowdung + lime	1 kg. burnt lime 1 kg. cowdung + 0.5 kg. N (as urea) per 100 kg. green matter
11.	NP + Cowdung + lime	1 kg. burnt lime + 1 kg. cowdung + 0.5 kg N as ammonium phosphate per 100 kg. green matter.
12.	Common salt	1 kg. Sodium Chloride per 100 kg. green matter
13.	Sulphuric acid	1 kg. sulphuric acid per 100 kg green matter.

Design: Completely randomised

Replications : 3

Observations:

1. Analysis of the material for nitrogen phosphorus organic carbon in the beginning and after decomposition.
2. Rate of decomposition (loss in weight of the material with progressing time.

contd.....

3. The manure value of the decomposed material.
10. Date of start : January, 1978
11. Likely date of completion : January 1979
12. Estimated man months
13. Facilities required : Facilities available in the college  
of Horticulture will be utilized
14. If financed by an organisation  
other than the institute.
- (a) Name of the financing  
organisation
- (b) Title of the project (if the  
project forms a part of a  
longer project.

15. Approximate cost:-

T.A.	Rs.1,000
Contingencies	1,000
	-----
	Rs.2,000
	=====

Sd/-                      Sd/-  
Principal Investigator    Head of Division

Director.

Fifth FRC S.No.824.



KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

1. Faculty of Agriculture : Department of Agricultural Chemistry
2. Project No. : Ag.21.18 Chc. 21
3. Title of Project : Survey and Identification of N fixing blue-green algae in the waterlogged rice fields.
4. Names and designation of:
  - (a) Project Leader : Alice Abraham  
Assistant Professor
  - (b) Associates : Dr. K.P. Rajaram, Assoc. Professor  
Dr. M.M. Koshy, Professor  
Shri. Luckins C. Babu Assistant Professor.
5. Objective:

Some species of blue-green algae have been noted for their capacity to utilize atmospheric nitrogen and transform it into organic constituents. These algae which form a major microbial population under waterlogged conditions can be highly significant in maintaining the nitrogen fertility of paddy fields. In the present context, it is proposed to make a survey and identification of N-fixing blue-green algae and determine their nitrogen fixing properties in order to evaluate their role in the nitrogen fertility of waterlogged rice fields.

6. Practical utility:

Identification and study of nitrogen fixing blue-green algae from waterlogged rice soils will give an idea about the quantity of nitrogen that can be possibly fixed during an year. This fixation can be boosted up by supplying other nutrients like P, Ca, Mo etc. in appropriate amounts. Inoculation of efficient cultures of blue-green algae to waterlogged soils can help to minimise fertilizer N application, and contribute to be organic matter content of these soils.

7. A short review of literature

New techniques have revealed that biological N-fixation is much more wide spread than had been previously supposed. Microorganisms responsible for Nitrogen fixation in paddy soils were found to include both aerobic and anaerobic bacterial and blue-green algae. Japanese workers have shown that Nitrogen fixation of blue-green algae in association with azolla (a water form) is another significant factor and it was estimated that 1 Kg. N/ha/day could be fixed in this manner. Studies on Japanese paddy soils have indicated that application of phosphatic fertilizers was effective in maintaining N fertility of paddy soils either by prevention of N loss or promotion of N. fixation.

contd....

8. Technical Programme:

Algal film from waterlogged paddy fields will be collected and cultured in the laboratory. From these species of blue-green algae will be isolated, identified and studied for their Nitrogen fixing properties by chemical methods.

9. Date of start : October 1977  
10. Likely date of completion : October 1980  
11. Additional facilities required : Nil  
12. Approximate cost : Rs.2000/-  
13. Signature of

Sd/-  
Project Leader

Sd/-  
Head of the Department.

Third PRC. S.No.825.

KERALA AGRICULTURAL UNIVERSITY

MODEL AGRONOMIC RESEARCH STATION, KARAMANA, TRIVANDRUM.

1. Title of the Scheme : Studies on Inter cropping  
(Experiment 1 d)
2. Project No. : Fig. 21.7 Agron. 1
3. Location : Model Agronomic Research Station, Karamana
4. Principal investigator : Project Co-ordinator, IICARP
5. Associate Investigator : Associate Professor, Model Agronomic  
Research Station, Karamana
6. Objective : To screen different short duration crops  
for their suitability as intercrops.
7. Practical Utility : To identify the best intercrop for a  
Tapioca garden so as to increase the pro-  
duction and profit from a Unit area of  
wet land during the summer season.
8. Review of Research : Nil
9. Technical Programme
  - a) Treatment : 1. Tapioca (Pure Crops)  
2. Tapioca + Ground nut  
3. Tapioca + Cow pea  
4. Tapioca + Maize
  - Spacing : Tapioca 90 cm x 90 cm  
Ground nut: 15 cm x 15 cm (Two rows in  
between two rows of Tapioca)  
Cowpea : 15cm x 15 cm ( -do- )  
Maize : 30 cm apart in the row (one row)
  - Manuring : As per state recommendations
  - Design : Randomised Block design
  - Replication : Six
  - Plot size : 100 sq. M (Gross)
  - Observation to be recorded : 1. Yield of tuber of main crop and grain  
and Pod yields of inter crops.  
2. Soil analysis before and after taking  
the crop.
  - b) Arrangements for analysing : Statistical analysis will be done by  
the Director Institute of Agricultural  
Research Statistics IARI, New Delhi.

contd....

10. Facilities:

(a) already available : Land and other infrastructures are available

(b) additional facilities required : Not needed

11. Duration : Likely to be continued for two seasons in 1977-78 and 1978-79.

12. Staff requirement : Will be done by the staff members provided for the ICARP Scheme.

13. Estimate of cost : Rs.1915/- per seasonx

14. Receipts : Rs.2043/- per season.

15. Remarks:-

Certified that the Work proposed is one included in the All India Co-ordinated Agronomic Research Project and discussed and finalised in the annual workshop of the Project held at Poona during June 1977.

Name : V. RAMACHANDRAN NAIR

Designation: Associate Professor.

Sixth FRC S.No.826.

SIGNATURE

KERALA AGRICULTURAL UNIVERSITY  
RESEARCH PROJECT

- Faculty of Agriculture : Department of Agronomy
1. Name of Research Centre : Rice Research Station, Mannuthy
2. Project No. : Ag.21.2 Agron.2
3. Title : Effect of the types of 'Sown wind break' and their spacing on growth performance, water requirement and yield of rice in Mundakan season.
4. Name and designation of
- a) Project leader : Dr. U.P. Bhaskaran
- b) Associates : Dr. P. Balakrishna Pillay  
: Dr. V.K. Sasidharan.
5. Objectives : (i) To choose the best crop and crop combinations that can be raised on wind breaks for rice crops.
- (ii) To assess the optimum shelter space for wind breaks
- (iii) To assess the water requirement and water economy possible by raising sown wind breaks.
- (iv) To assess the yield wind net return per unit area

6. Practical utility:-

Interception of wind velocity by the wind breaks will help to create ideal microclimatic conditions favourable for rice crop in rainy season, and summer crops of pulses and vegetables raised in rice follows and uplands. Hence it will be worthwhile to take up studies on 'sown wind breaks' to identify suitable wind breaks and shelter distance in respect of different seasons and crops.

7. Review of literature:-

Rosenberg (1977) reported that a wind break of about 50% porosity, with the open space distributed more or less uniformly with height, gives good results. A field seeded to a shelter crop produced a total yield of 14% greater than an unsheltered field of the same size treated identically in all other ways.

8. Technical programme:

Treatments (a) Types of wind breaks

- (1) Daincha on bunds and in the fields
- (2) Maize/Bogra on bunds and daincha in the field
- (3) Redgram on bunds and "
- (4) Tapioca " "
- (5) Hybrid Napier grass "

contd.....

(b) Shelter spacing:

- (1) 5 times the difference in height of main crop and wind breaks
- (2) 7½ times the difference in height of main crop and wind breaks
- (3) 10 times the difference in height of main crop and wind breaks.

Lay out - Split plot design  
Replication - 3

Observation to be recorded:-

- (1) Growth character and yield of main crop
- (2) Growth characters and porosity in wind breaks
- (3) Mass exchange and energy exchange in the main crop
- (4) Different components of water requirement
- (5) Plant water potential and relative resistance in plants.

9. Date of start : 1977

10. Likely date of completion : 1980

11. Additional facilities required : Nil

12. Approximate cost : Rs.2500/-year

13. Signature of

Sd/-  
Project leader

Sd/-  
Head of Department

Director of Research.

KERALA AGRICULTURAL UNIVERSITYResearch Project

- Faculty of Agriculture : Department of Agronomy
1. Name of Research centre : Agronomic Research Station, Chalakudi  
Rice Research Station, Mannuthy, Pattambi.
2. Project No. : Ag.21-3 Agron.3
3. Title : Effect of sown wind breaks and shelter spacing on microclimate in cropped area and yield of main crop.
4. Name and designation of
- (a) Project leader : Dr. U.P. Bhaskaran
- (b) Associates : Sri. N.N. Ramankutty  
: Smt. Padmaja
5. Objectives:
- (i) To choose the best crop or crop combinations for sown wind breaks.
- (ii) To assess the optimum shelter space and Pattern of sowing wind breaks
- (iii) To assess the irrigation requirements and water use efficiency of main crop
- (iv) To assess the yield and return per unit area.
6. Practical utility:
- Interception of wind velocity by the wind breaks will help to create ideal microclimatic conditions favourable for rice crop in rabi season and summer crops of pulses and vegetables raised in rice follows and up-lands. Hence it will be worthwhile to take up studies on sown wind breaks to identify suitable wind breaks and shelter distance in respect of different seasons and crops.
7. Review of literature:
- Rosenberg (1977) reported that the microclimate of the cropped area can be changed by sown wind breaks, and the yield of the main crop can be increased.
8. Technical programme:
- (a) Types of wind breaks
- (i) Maize/Bagra
- (ii) Red gram
- (iii) Sesaman
- (iv) Tapioca
- (b) Shelter sapce and pattern of sowing
- (i) Equal to the difference in height of main crop and wind break
- (ii) Twice the difference in height of main crop and wind break

- (iii) At 1 x 3 M interval in check pattern
- (iv) Mixed sowing

Lay out - Split plot design

Replication - 3

Crop - Pulses and vegetables.

Observation to be recorded:-

- (i) growth character and yield of main crop
- (ii) Growth characters and porosity in wind break
- (iii) Mass exchange and energy exchange in the main crop
- (iv) Irrigation requirement and consumptive
- (v) Incidence of pest and diseases.

9. Date of start : 1977

10. Likely date of completion : 1980

11. Additional facilities required: Nil

12. Approximate cost : Rs.1500/-year/station

13. Signature of

Sd/-  
Project Leader

Sd/-  
Head of Department

Director of Research.



KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

- Faculty of Agriculture : Department of Agronomy
1. Name of Research Centre : Coconut Research Station, Pilicode
  2. Project No. : Ag. 21.8 Agron. 4
  3. Title of the project : Cropping pattern as influenced by soil and meteorological factors.
  4. Name and designation of Project leader : N. Neelakantan Potty, Associate Professor of Agronomy.
  5. Objectives:

To find out the ideal crop sequence that should be followed in different regions of the State safeguarding against weather fluctuations and soil moisture stress and maintaining the productivity of soil.

6. Practical utility:

Crop failures and consequent losses due to weather vagaries can be reduced by adjusting the cropping scheme to the weather trend. Thus within an available set of conditions maximum profit per unit cost of input will depend upon selection of crop and cropping pattern based on the crop soil relationship.

Nutrient potentials of the soil as well as the effect of crops and cropping pattern on the productivity and nutrient supplying power of the soil primarily determine the quantum requirement of fertilizers. The anacting influences of crops and soils on each other in modifying the physical Chemical and Biological characters of the soil condition ultimately decide the productivity of soil, and judicious selection of crops based on the individual and effects on soil is a pre-requisite in evolving cropping pattern which will give maximum return/unit area as well as improve soil productivity. A co-ordinated approach involving these three facts of production viz. climatic crop and soil will help to evolve viable authentic cropping pattern for the State that can survive climatic vagaries and judicial, manurial schedule for individual crops and the entire cropping pattern which will lead to successful and minimum crop production and higher profits/unit inputs.

I. A. Short review of literature:

Krishnan (1974) reported that different crops differently affects the available nutrient status as well as the capacity intensity and rate of release characteristics of the soil. We also found that this will have distinct influence on the fertilizer practices.

contd. . . . .



KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

Faculty of Agriculture : Department of Agronomy

1. Name of the Research Centre: College of Agriculture, Vellayani
2. Project No. : Ag. 21.18 Agron. 7.
3. Title of Project (This should indicate the nature of work) : Effect of Kaoline as an antitranspirant in some field crops.
4. Name and designation of:
  - a) Project leader : Dr. C. Sreedharan
  - b) Associate/s : Sri. M. Gopalekrishnan Nair
5. Objective : To study the effect of Kaoline as an anti-transpirant in some field crops like up-land paddy, tapioca, cowpea and blackgram.
6. Practical utility : The results will be of great advantage to the cultivators when the crops are affected by drought.
7. A short review of literature: Experiments with Kaoline conducted at I.A.R.I. have given increased yield in Blackgram, wheat and Mustard.
8. Technical programme ( in brief) : The experiments are to be laid out in R.B.D. with separate experiments for different crops.

Treatments

I. Levels of Kaoline

- 1) Control -- No antitranspirant
- 2) Kaoline @ 40 kg/ha 6% emulsion
- 3) -do- 50 kg/ha -do-
- 4) -do- 60 kg/ha -do-

Surfartant levels

- II. 1) With Teepol (Emulsifier and surfartant)  
2) Without Teepol

III. Number of sprays

- 1) One spray
- 2) Two sprays

Number of replications : 3  
Number of treatment : 16  
combinations

contd. . . . .

Size of plot

Paddy	:	20 sq. m.	5 x 4
Tapioca	:	30 sq.m	6 x 5
Blackgram	:	20 sq.m	5 x 4
Cowpea	:	20 sq. m	5 x 4
9. Date of start	:	August 1977	
10. Likely date of completion	:	October 1980	
11. Additional facilities required	:	Nil	
12. Approximate cost	:	Rs.4,000/-	
13. Signature of	:		

Sd/-  
Project Leader

Sd/-  
Head of Department

Director of Research.

Second FRC S.No.832.

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

- Faculty of Agriculture : Department of Agronomy
1. Name of the Research centre : College of Agriculture, Vellayani
  2. Project No : Ag. 21.18 Agron. 8
  3. Title of the Project  
(This should indicate the nature of work) : Physico-chemical qualities of paddy grains in relation to stage of harvest
  4. Name and designation of:
    - a) Project Leader : Dr. C. Sreedharan, Associate Professor
    - b) Associate(s) : U. Mohammed Kunju, Associate Professor
  5. Objective:-
    1. To study the qualities of paddy grains harvested at different stages of maturity.
    2. To investigate the relationship between stage of harvest and dormancy of seeds.
    3. To assess the period of viability of seeds harvested at different stages of maturity.
    4. To study the seedling vigour as influenced by stage of harvest.
  6. Practical utility : The exact date of harvest can be decided for increasing the qualities of the seeds like viability, seedling vigour etc. and the useful findings if any can be popularised.
  7. A short review of literature: Not much work has been done in this line.
  8. Technical programme (in brief) The crop will be raised under usual conditions. Harvests will be made on 20, 25, 30, 35 and 40 days after flowering. The seeds so harvested will be subjected to physical measurements like volume, weight etc. and to chemical analysis for starch, protein, amylose etc. Their dormancy, if any, will also be studied. Periodical germination tests and estimation of seedling vigour will also be conducted. Five common varieties will be used for study. They will be grown in a compact area of about 50 cents. From each variety samples for the above purposes will be harvested as per the experimental schedule.

contd.....

9. Date of start : June 1977 ( to be started)
10. Likely date of completion : July 1979
11. Additional facilities required : Nil
12. Approximate cost : Rs.900/-
13. Signature of:

Sd/-  
Project Leader

Sd/-  
Head of Department

Director of Research.

Second FRC. S.No. 833.

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

- Faculty of Agriculture : Department of Agronomy
1. Name of Research Centre : Coconut Research Station, Pilicode
2. Project No. : Ag. 21.8 Agron. 9.
3. Title of the Project : Investigation on the most suitable cropping pattern for different regions of the state based on climate crop and soil characteristics.
4. Name and designation of
- a. Project leader : N.Neelakantan Potty, Assoc. Professor of Agronomy
- b. Associate(s) : E.J. Thomas, Professor of Agr. Statistics
5. Objective:  
To find out the ideal crop sequence that should be followed in different regions of the state safeguarding against weather fluctuations and soil moisture stress and maintaining the productivity of the soil.

6. Practical utility:

Crop failure and consequent losses due to weather vagaries can be reduced by adjusting to the weather trend if predictions can be made in advance. Again within an available set of conditions maximum profit per unit cost of input will depend upon selection of crops. Selection of crops will depend upon the moisture index ( $\frac{P-PET}{PET} \times 100$ ).

Nutrient potentials of the soil as well as the effects of crops and cropping pattern on the productivity and nutrient supplying power of the soil primarily determines the quantum requirement of fertilizers. A co-ordinated approach involving these three facets of production viz. Climatic crop and soil will help to evolve viable authentic cropping pattern for the state that can survive climatic vagaries and a judicious manurial schedule for individual crops and the entire cropping pattern which will lead to successful and maximum crop production and higher profits/unit inputs.

7. Review of literature:

Singh and Krishnan (1969) initiated the study of moisture index as a measure of available moisture for crop growth. Krishnan (1971) suggested the use of moisture index calculated pented vice for deciding the crop that has to be grown and also for adjusting the calendar of operation. Based on this and weather data for 25 years he could calculate the amount available moisture in the soil which primarily decides the choice of crop and subsequent operations for the North West Rajasthan.

