800861

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PHOJECT

| | Faculty of Agriculture | j | Department of Agronomy |
|----|--------------------------------|--------|---|
| 1. | Name of the Research Centre | C O | Coconut Research Station, Kumarakon. |
| 2. | Project No. | 0 | Ag.2.9. Agron. 8 |
| 3. | Title of the Project | 00 | Influence of tapping on the yield of uneconomic coconut palms under rainfed condition. |
| 4. | Name and designation of | | |
| | a) Project leader | 0 | Abraham C.T., Junior Instructor (Agronomy) |
| | b) Associate | 00 | G.Mathai, Asst.Professor (Plant Pathology) |
| 5. | Objectives | 0 0 | To improve the yield of uneconomic palms by tapping for 2 years, since preliminary trials conducted elsowhere indicated that tapping increases the yield of poor bearers. |
| 6. | Practical utility | 0 0 | In every coconat plantation, about 10 to 15% of the palms are very poor viclders. Results of the present study |

7. Short review of literature:

Tapping has been found to improve the yield of medium and poor yielding palms and the beneficial effects were found lasting for 4 years. In India, studies have indicated that tapping increases the yield, but only of poor bearers (Menon and Pandalai, 1953). In Philippines the palms which have been tapped, fruited abundantly the year after tapping was stopped and for a few years thereafter. But the copra from such trees showed comparatively lower oil content (Thampan, 1975). Similar results were reported from Malata also (Jack and Dennet, 1925). In the studies at C.P.C.R.I. tapping was found to slightly reduce the barrem but production (Chacko Mathew, 1976). However, detailed studies on these aspects are lacking.

pals.



vill throw light on the

economic maintenance of such

8. Technical Programme :-

- 2-

| | The palms will be cat on the yield records | egorised into 3 yield groups based as follows:- |
|-----------------|--|---|
| | 1. Uneconomic palms | (10 nuts/annum) 800861 |
| | 2. Poor yielders | (11-30 nuts/annum) |
| | 3. Medium yielders | (30 nuts/annum). |
| | Treatments : | 6 |
| | Replication : | 4 |
| | No. of palms/plot : | 4 IR KAU/PBR 1977 |
| | Treatments | |
| K.AU PBR | 2. Tapping po 3. Tapping Me | diun yielders. palms (control - no tapping) ers (-do-) |
| | Observations to be record | ded |
| | 1. Pre-treatment yid 2. Yield of toddy/p | eld of nuts to be recorded. lot/tapping season. |
| | Tapping will be 2 years ie. (i) March. | done for 2 seasons every year, for Dry weather tapping - November to |
| | (ii) Wet weather | tapping - April to October. |
| du | Then the palms with tapping observat: | ill be allowed to bear, and post- ions will be recorded. |
| alut | V 3. Observations dur: | ing post-tapping period. |
| and white | a) No. of bunches b) No. of female | 5 formed/annum. flowers/bunch. |
| Here the fer of | c) Setting percer d) Half yearly of (nuts aged 5 r e) Average wt. of f) Oil content of | ntage. bservations on the No. of nuts nonths and above will be counted). f copra/nut. f copra. rem nuts/bunch (observed at the |
| North ald so |) time of each r | larvest). |
| Nos | palms will be years and obse | pletion of tapping period, the allowed to bear for another 3 ervations will be recorded. |
| 2 9. | Date of start : | October 1978. |
| 1(|). Likely date of completion | on: October 1983. |
| | . Additional facilities : | |
| | Approximate cost : | Rs. 30,000/ |
| 13 | S. Signature of : | |
| Pr | Sd/- oject Leader Head of | Sd/- Sd/- ? Department Director of Research |

Second FRC. Sl.No. 297.

KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

| | Faculty of Agriculture | | Department of Agronomy | | | |
|----|--------------------------------|-----|---|--|--|--|
| 1. | Name of the Research Centre | 0 0 | Coconut Research Station, Kumarakom. | | | |
| 2. | Project No. | 00 | Ag.2.9. Agron 10 (111) | | | |
| 3. | Title of project | 0 0 | Trial cultivation of banana as an inter crop in coconut garden. | | | |
| 4. | Name and designation of: | | | | | |
| | a) Project leader | 00 | Station Project | | | |
| | b) Associate | 0 | Instructor (Agronomy) | | | |
| 5. | Objectives | С C | To find out the variety of banana suitable for cultivation as intercrop of coconut. | | | |
| ~ | | | | | | |

6. Practical utility

Increased production from unit area of land per unit time or both can be obtained by practising mixed farming. The wide range of crop plants seen growing in many coconut garden was proof enough to support the above concept. Thus growing banama is found to increase total income from coconut garden. Finding out the most profitable variety of banama that can be cultivated as an intercrop in coconut garden assures much prosperity.

7. Short review of literature:-

Cultivation of inter crops with proper cultivation to nanuring, irrigation etc. marked by improved the performance of the palms (Mohammed P.P.S. and Krishna Moorthy, K 1959). It was a popular practice in Andhra Pradesh to grow profitable intercrops like banana, turneric etc. in bearing coconut gardens. Coconut being a widely spaced crop and as all these crops love partial shade growing these remunerative crops had become extremely popular.

8. Technical programme :-

Coconut trees are planted on single row bunds alternated by channels. Under planting of coconut seedlings were done, Banana suckers will be planted in between the coconut trees.

Treatments

1. Palayankodan

-t, -

- 2. Padatty
- 3. Kannan
- 4. Poovan
- 5. Monthan
- 6. Nendran
- 7. Sanzibar
- 8. Robusta
- 9. Grosnichel

All the cultural operations will be carried out as per package of practice.

: R.B.D. Lay out

Replication : 4

Plot size : 4 banana suckers

Observations to be recorded:-

1. Yield obtained from each treatment plots including that of coconut.

1.5

2. Suckering habit of banana. No. of suckers produced for each variety under mixed cropping system to be recorded.

: Immediately after approval of the 9. Date of start project.

- 10. Likely date of completion: 1979
- 11. Additional facilities : Nil required
- : Rs. 1,500/-. 12. Approximate cost
- 13. Signature of:-

Sd/-Project Leader

Sd/-Head of Department

Sd/-Director of Research

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KERALA AGRICULTURAL UNIVERSITY

LESEARCH PROJECT

| | Faculty of Agriculture | ; | Department of Agronomy | | | | |
|----|--------------------------|------|---|--|--|--|--|
| 1. | Name of Research Centre | 0 | Coconnt Research Station, Tum raken. | | | | |
| 2. | Project No. | 00 | Lg.2.9. Agron 10 (IV) | | | | |
| 7. | Title of the project | 0 | Trial cultivation of fodder - : varieties as an intercrop in coconut garden. | | | | |
| 4. | Name and designation of: | - | | | | | |
| | a) Project Leader | 00 | Station Project | | | | |
| | b) Associate | c o | Instructor (Agronomy) | | | | |
| 5. | Objective | 57 . | To find out the variety of fodder suitable for cultivation as intercrop of coconut. | | | | |
| 6. | Practical utility | 0 | Coconut inter spaces afforded sufficient space for fodder and food crops. Mixed farming was | | | | |

7. Short review of literature:-

Cultivation of fodder in the inter spaces of coconut garden is part of the programe of mixed farring. Experiments conducted at C.P.C.R.I., Kastragod indicated that fodder grasses can be grown under coconut shade and they were reported to give very good vields by preventing loss of nutrients from the field, by adding Nitrogen to the soil by symbiotic nitrogen fixation and by more effective utilisation of irrigation water.

proved to lead to greater Agricultural prosperity.

8. Technical programe:-

The cres available in single row bunds can be utilised for fodder cultivation.

Treatments

- 1. Hybrids Napier N.B. 21
- 2. Guinea grass
- 3. Paramabe
- 4. Setaria
- 5. Cow pea
- 6. Style Santhas 7. Desmodium.

Cultural operations will be carried out as per package of practices.

Lay out : R.B.D. . 84 Replication :4 x 3 n. Plot size

Observations to be recorded:-

1. Growth measurements at monthly intervals. Days to first cutting/harvesting.
 Yield of green fodder/plot.
 Days to cutting after each harvest. : Inmediately after approval of the Date of start Project (1977).

10. Likely date of completion

: 1979

11. Addl. facilities required

12. Approximate cost

13. Signature of:-

Sd/-Project Leader

Sd/-Head of Department Director of Research.

utilised.

: Rs. 1,500/-

Sd/-

: Existing facilities can be

Fourth FRC S.No. 302.

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KERALA AGRICULTURAL UNIVERSITY RESDARCH PROJECT

| | Faculty of Agriculture | | Department of Agronomy. |
|----|--------------------------------|--------|---|
| 1. | Name of the Research Centre | 0 | Coconut Research Station, Kunarakon. |
| 2. | Project No. | 0.0 | Lg.2.9. Agron 10 (v) |
| 3. | Title of project | 0 0 | Studies on the suitability of annual crops as inter crops in coconut garden. |
| A | None and designation of: | 0 | |
| | a) Project Leader | 0.0 | Station Project |
| | b) issociate | 0 0 | Instructor (Agronomy) |
| 5. | Objectives | 0 2 | To study the suitability of the annual crops as an intercrop in coconut garden in relation to its cost economics. |
| 6. | Practical utility | e e | The inter spaces available in the widely spaced coconut garden and the solar energy received are wasted. This can profitably 60 |

7. Short review of literature:-

In the early stages of coconut plantation when the seedlings are still young and the garden is unshaded there is no harm in raising annual crops, provided sufficient care is taken to see that the subsidiary crops are well manured and that they are not grown to the very base of the palms. Likewise in adult plantation of about 25 years of age, growing of subsidiary annual crops have been found to considerably benefit the coconut palms (Menon and Pandalai 1958).

annual crops.

utilised by growing suitable

8. Technical Programme:-

The area available in between the opconut trees can be utilised for the cultivation.

| Lay out | er o | P.B.D. |
|-------------|---------|-------------------|
| Replication | 6 0 | \mathcal{L}_{r} |
| Treatments | 0 | 7 |

man bedell? 1) Pineapple ("where. 2) Banana Red glen (Prethich) 3) Elephant foot yam 4) Colocasia 5) Ginger 6) Turneric 7) Tapioca : 4 x 3 m. (in between 2 coconut Plot sixe palms grown in single row bunds) Note: - Cultural practice will be carried out according to package of practices. Observations to be recorded:-1) Total yield obtained from each plot. 2) Cost economics of each treatment plots. 3/ suifulty aspuble to the should be approximately after appr : Inmediately after approval 9. 10. Likely date of : 3 years completion 11. Addl. facilities : Nil required : Rs. 2000/-. 12. Approximate cost 13. Signature of:-

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

Fourth FRC. S.No. 303

KERALA AGRICULTUR/L UMIVERSITY

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REE MARCH FROJUCT

| | Moculty of Lericulture | ; | Department of Agrenouy |
|----|--------------------------------|---------|---|
| 1. | Name of the Pesearch Centre | 0 | Cocomut Research Station, Kumarakon. |
| 2. | Project No. | 0 15 | Ag. 2.9. Agron. 11(1) |
| 3. | Title of the project | 0、 | Trial on nixed cropping coconut with tree species, Server frees |
| 4. | None and designation of:- | - | |
| | a) Project Leader | e e | Station Project |
| | b) Associate | 0 0 | Instructor (Agronomy) |
| 5. | Objectives | 0 | To study the performance of coconut trees and tree spices like Nutmeg, cloves, Cinnamon and Cocoa under mixed cropping system. |
| 6. | Practical utility | 0 0 | Most of the coconut gardens are giving poor returns to the cultivators due to root (wilt) disease of coconut. The interspaces of coconut trees can be utilised for the cultivation |

7. Short review of literature:-

have b

Production per unit area of agricultural land, time and inputs can be increased by improving efficiency of rate and extent to which solar energy was converted into economic produce. In plantations which commit the land to the main crop for decades, the strategy for maximising production had to be intensive cropping involving annual and perennial crop mixtures and different cropping system (Bavappa, K.V.A. 1975). Coconut being a widely spaced crop and as these tree spices love partial shade growing these remunerative intercrops had become extremely popular (Anonymous 1964). The manuring and irrigation provided to the spice crops will indirectly benefit the palms and give increased yield (Bala Sundaram and Aiyaduri 1963).

of tree spices and it will enhance

the income of the farmers.

8. Technical programme :-The area available in double row bunds are selected for the experiments where the coconuts are planted in triangular system. 4 xx adult coconut palms of 40-45 year old and 2 young seedlings of 1 year old are taken to comprise a plot. In between 4 coconut palms - one tree spice will be planted as per spacing given below: -1. Cocoa Single row 4.0 m between plants. 2. Cinnamon Single row 3.0 m between plants. 3. Clove Single row 8.0 m between plants. 4. Nutmug Single row 8.0 m between plants. Treatments 1. Coconut alone 2. Coconut with Cocoa 3. Coconut with Cinnamon 4. Coconut with Nutmeg 5. Coconut with Clove. Lay out : R.B.D-Replication : 5 Plot size : 32 x 8 n Fertilizer : The recommended levels of fertilizers will be applied for all crops separately. Irrigation : Pot watering will be done according to necessity in early stage. Observations to be : 1. Date of maturity and plotwar recorded total yield obtained from each crop. Sail faltely Especial 2. Economics of cultivators will be worked out. 3. Competition of roots for nutrients and moisture will be studied. 6/ 100 9. Date of start : Immediately after the approval of the project (1977) 10. Likely date of completion : 1977 11. Additional facilities : Existing facilities in C.R.S., required Kunarakon can be utilised. 12. Approximate cost : Rs.30,000/-13. Signature of Sd/-Sd/-Sd/-Project Leader Head of Department Director of Research Fourth F.R.C. S.No. 304.

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KERALA AGRICULTURAL UNIVERSITY

REPEARCH PROJECT

Faculty of Agriculture Department of Entonology 1. Name and and address of : Coconut Research Station, Research Centre Pilicode, Nileshwar. 2. Project Number : Ar.2.8. Ent.3. 3. Title of the Project ; Chemical control of cock chafer grubs of coconut. 4. Name and designation of : r.C.Radhakrishnan, Assistant 1. Project leader Professor. 5. Objectives : To find out an effective cheap chemical and correct minimal

- Objectives : To find out an effective cheap chemical and correct minimal dosage for control of cock chafer grubs prevalent in coconut garden.
- 6. Practical utility

0

Cock chafter grub wenace is an endemic problem in coastal areas where coconut is cultivated. The root grubs are found persistant in soil when coconut is intercropped with tuber crops and other crops like banana and pulses. A long lasting remedy to eliminate the problems has to be found out.

7. Review of literature :

Mariama Daniel and Prem Kumar (1976) reported that soil insecticides control this pest effectively and granular insecticides also have been used for control of this pest. Veerash (1976) reported that chemical methods were found to be more practicable for the control of grubs in coconut gardens. Some of the granular and liquid formulations of new phosphatic and carbonate compounds have given significant results without much residual action.

- 8. Technical programme
 - T1 Chloradane 10% 60 kg/ha (one application)
 - T2 Chlordane 10% 30 kg/ha (two application) Dust
 - T3 Phorate 10% G.1 kgai/ha (one application) granular.
 - T4 Phorate 3% G.O.5 kg ai/ha (two application)
 - T5 Phorate 37 G.O.5 kg.ai/ha (one application)
 - T6 Chloradane (20% DC) @ 1.0 nl.ai/palm (20 litres of water 0.05% soil)
 - T7 Chlordane (20% DC) 0.5 nl.ai/palm (20 lt.of 0.025% soil water while irrigation)
 - T8 Control (No chemical control)

Replication

will it herproble to get get 70 affected | 70 affected |

Ten numbers of affected palms will be given the treatment as above. The efficacy of the treatments will be assessed in terms of the grubs egg, adults (dead and alive) counts in soil at nonthly intervals.

Insecticides (Chlordane dust and Phorate granules) will be applied at an interval of 45 days. All the insecticides will be applied in the entire interspaces of coconut. Observations will be made counting the grubs, egg, adults (dead and alive) from pits taken at 60 cms, 90 cms and 120 cms. Size of the pit will be 15 x 25 x 10 cms. The pre treatment and Post-treatment conditions of experimental palms including the yield data will be recorded for the entire period of the experiment.

9. Date of start : 1977

- 10. Likely date of completion : 1979
- 11. Additional facilities required : Nil
- 12. Approximate cost : Rs.750/-
- 13. Signature of

Sd/-

Sd/-

Sd/-

Project Leader Head of Department Director of Research

Fifth FRC. S.No. 328.

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KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

| | Faculty of Agriculture | | Department of Entomology. |
|----|--|----------|---|
| 1 | Name and address of Research Centre | 0 | Coconut Research Station, Filicode. |
| 2. | Project Number | 0 | Ac. ?. 8. Ent. 5. |
| 3. | Title of the project | 4. 1. | Rodent Control in cocornt gardens |
| 4. | June and designation of a.Project Leader | 0. c. | T.C.Rechekrishnen, Asst.Professor. |
| | b.Associate | 0 | |
| 5. | Objectives | В С | To find out an effective method of control of rat's damage in the coconut gardens. |
| 6. | Practical utility | • | If an effective method is devised it can be advocated to coconut growers in areas where rodent problem exists. |
| | | | |

7. Review of literature :

Among the non insect percunial pests of coconut, rats are considered as a major pest, damaging the tender coconuts even upto 50 percent in the yield. Recent studies indicated that Warfarin as blocksw or mixed with baits are effective in eliminating the problem and damage over 90% in laccadive island (Tampan 1975). Then they don't have bait shyness.

8. Technical programe

A preliminary trial will be conducted on acceptance of habits by the rats attacking coconut palm, with following treatments.

- T1 Marfarin cake (3 Nos. per paim)
- T2 Varfarin mixed with fresh tapicea @ 1:19 (proportion 5 Nos. (25 cm cubes) placed in a barboo tube.
- T3 Warfarin mixed with wheat flour (1:19) in 1% Groundnut oil 1-10 gms/tube.
- T4 Varfarin nixed with rice grain flour (1:19) in 1% groundmut oil (5-10 gn/tube).
- T5 Warfarin wixed with maida flour (1:19) in 1% jaggery.
- 1/ T6 Zine phosphide 26 mixed with Tapioca.
 - 27 Zinc phosphide mixed withwheat flour (1:19) in 16 groundaut oil (5-10 gm/tube)

- T8 Zinc phosphide mixed with rice grain flour (1:19) in 1% groundnut oil.
- T9 Zinc phosphide mixed with maida flour (1:19) in 1% jaggery.
- T10 Control (no chemical baiting control).

These baits in tubes will be placed on the crowns of palms which are frequented by rats.

Eased on the results of the above preliminary trial and information gathered on preference acceptance of baits by rats the following trial will be conducted, with the following treatments.

- T1 Metal banding with 30 cm wide 0,1 sheet on trunk of the palms.
- T2 Baitingon the crown on palm (the suitable bait will be selected from the previous trial)
- T3 Baiting on the ground.
- T4 Rat trap on crown of palms (wonder trap)
- T5 Gillotins trap on erown
- T6 Rat trap on ground.
- T7 Control (No treatments)

Pre-treatment data on yield of palms will be collected, Post-treatment observations on rats died, increase in yield etc. will be recorded.

- 9. Date of start : September 1977
- 10. Likely date of completion : 1979
- 11. Facilities required : Nil
- 12. Approximate cost : Rs.1000/-.
- 13. Signature of

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

Fifth FRC. S.No. 330.

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KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

| | | Faculty of Agriculture | | Department of Plant Pathology. |
|--------|-----|--|-----------------|---|
| | 1 0 | Project Title | 0.0 | To investigate and to identify the casual organism responsible for causing immature button sheding in coconuts. |
| | 2. | Project No. | 0 0 | Ag.2.8. Path.1. |
| | 3. | Ngue and Designation of | ` | |
| | | a) Project Leader | e a | T.C.Radhakrishnan, Asst.Professor (P.P) |
| | | b) Associates | ÷ c | |
| ∧ r | | Objective T-history Longborn | e o | It has been reported that <u>Phytopthora</u> <u>palmivora</u> causes button shedding in coconuts. There is also reports stating that <u>Collectotrichun</u> <u>spp.</u> is also involved in causing button shedding. Hence it is |
| L | 12 | | | necessary to identify the casual organism. |
| | 5. | Practical utllity | 0 | If the casual organism is found out the appropriate fungicide can be administered to control the disease. |
| | 6, | Short review of literature | с Э | |
| | | An abnormal shedd be due to fungal environmental fac | i1 | ng of large number of button may nfection or physiological or ors (Gadd 1923). |
| | 7. | Technical programe | | 2. d |
| - F-1 | | using different r dextrose agar etc | ne();]] | l organism from affected bottons lia like czapack dox, Peptone- identifying the casual agent the organisms and in iumature r behaviour. |
| | 7. | Date of start | | : 1978 . |
| | 8. | Likely date of completi | 01 | n: 1980. |
| | 9. | Estinated nan months | | : 20 months |
| | 10 | .Facilities required | | : Existing facilities. |
| | 11 | Financing organisation | | : Kercla spricultural University. |
| | 12 | .Approximate cost | | : Rs,150/ |
| | 13 | .Signature of:- | | |

Sd/- Sd/- Sd/- Sd/-Principal Investigator Head of Department Director of Research Fifth FRC, S.No. 331.

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KERALA AGRICULTURAL UNIVERSITY RESEARCH PROJECT

| | Faculty of Agriculture | | Department of Plant Pathology. |
|-----|---|-----|--|
| 1. | Project Title | 00 | Role of bacterial in the causing of bud rot disease of coconut. |
| 2. | Project No. | 00 | Ag.2.8. Path.2(i) |
| 3. | Name and designation of a) Project Leader b) Associates | | T.C.Radhakrishnan, Asst.Prof.(P.P) |
| A . | Objective | 000 | It has been reported that <u>Phytopthora palmivora</u> is causing the disease. But there are reports that <u>P.Palmivora</u> is causing only Secondary infection. There are reports that bacteria is also associated in the causing of the disease. Hence it is necessary to identify the role of bacteria in causing the disease. |

5. Practical utility

: Cost of unnecessary spraying of Bordeaux mixture in controlling the fungus can be avoided if bacteria is really playing the important role.

6. Short review of literature:

"In Jamaica and other islands of the West Indies and in Ceylong bud rot due to Phytophthora exist (Petch 1906: Ashby 1920) but cases suspected of bacterial origin are also reported. According to observations Tuclear; Reinking and other:sbacterium associated with the disease is a saprophyte. K.P.V. Menon & Pandalai 1960.

7. Pechnical Programme

: Palms with Bud rot infection will be selected. The organism responsible for causing the disease will be isolated separately on specialised media. These organisms will be inoculated on healthy trees separately and combined form. The role of bacterial alone will be assessed. 8. Date of start : 1978
9. Likely date of completion : 1983.
10. Estimated man months : 30 months.
11. Facilities required : Bacterial colony counter will be essential.
12. Financing organisation: Kerala Agricultural University.
13. Approximate cost : Rs. 1500/-.

Signature of

Sd/- Sd/- Sd/-Principal Investigator Head of Division Director of Ressarch.

Fifth FRC. S.No. 332.

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KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

Faculty of Agriculture : Department of Plant Fathology

| 1. | Name Centr | the | Research | 00 | Coconut Zunarak | Research on. | Station, | |
|----|---------------|-----|----------|----|--------------------|-----------------|----------|--|
| | | | | | | | | |

- 2. Project No. : Ag.2.9.Path.2(ii)
 - : Relationship between night temperature and the incidence of bud rot of coconut.
- 4. Name and designation of

3. Title of Project

b) Associate

- a) Project leader : G.Mathai, Assistant Professor (Plant Pathology)
 - : P.K.Sathia Rajan, Associate Professor (Plant Pathology)
- 5. Objectives : To study the relationship between night temperature and the incidence of but rot infection in field conditions as a preliminary to forecasting the disease.
- 6. Practical Utility : Bud rot disease of coconut is causing serious damages to the coconut palus as a whole. The information obtained will be useful as a preliminary to forecasting the disease.
- 7. Short review of literature:

The occurrence of bud rot disease was directly related to the microclimate of the palms, relative humidity and temperature in the leaf axils. The micro climate of young palms 5 - 20 years old was more favourable for the incidence of the disease. The pathogen survived in the infected tissues for over 5 months (Radha, Thomas Joseph, 1974). It is found necessary to ascertain the night temperature and humidity which are critical for the initiation of the disease.

- 8. Technical Programe :
 - 1) 100 coconut palms of the age group 5 20 years available in the coconut research station farm, Kumarakom will be located and marked as test plants. Incidence of bud rot disease will be recorded at fortnightly intervals by noting the symptoms.

- 2) The minimum day and night temperature will be recorded daily.
 3) Relative humidity will also be recorded daily.
 4) The incidence of the disease will then be correlated with the worther data so obtained.
 9, Data of start is Coptember 1977
 10. Likely data on completion is 7 years
- 11. Additional facilities required : Nil
- 12. Approximate cost : Nil
- 13. Signature of

| St. L. / com | 2 đ / - | Sđ/ |
|----------------|--------------------|----------------------|
| Project Leader | Head of Department | Director of Research |

Fifth FRC. S.No. 333

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KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

| | | - | - The second s |
|----|--------------------------------|--------|---|
| | Faculty of Agriculture | | Department of Plant Pathology |
| 1. | Name of the Research Centre | 5 0 | Coconut Research Station, Kumarakom. |
| 2. | Project No. | 00 | Ag.2.9. Path 2 (iii) |
| 3. | Title of Project | ð C | Role of bacterial in the incidence of bud rot disease of coconut and its relationship with <u>Phytopthona</u> <u>palmivora</u> in causing the disease. |
| 4. | Name and designation of | | |
| | a) Project Leader | 0 | Associate Professor (Plant Pathology) |
| | b) Associate | 00 | Assistant Professor (Plant Pathelogy) |
| 5. | Objectives | | It is sug pected that the bacteria are secondary invaders and they play a major role in aggravating the symptoms. The project ains to confirm the role of bacteria in causing and aggravating bud rot diseases. |
| 6. | Practical utility | 0 | To take appropriate measures for the control of the disease. |

7. Short review of literature:

Radha and Thomas Joseph (1974) reported that the incidence of the disease is related to micro climate of the palm, relative humidity and temperature in the leaf axil. Micro climate of young palms (5 to 20 years old) was more favourable for the incidence of disease. Infection cycle on coconut was completed in 6 days under favourable condition of temperature $(22 - 24^{\circ}c)$ and relative humidity (98 - 100%) <u>Phytophora palmivora</u> caused dry rot of coconut crown. The wet rot observed in later stage of the disease was probably due to the activity of secondary invaders like spicies of Pseudomonas, Xanthomonas

- 8. Technical Programme
 - a) <u>Isolation of the causative organism</u>: All the organisim associated with the disease will be isolated and purified by the usual methods.

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b) Inoculation of these organisuns on healthy young palms and seedlings in singly and in combination with Phytopthora. This will be done during different seasons of the year (December - January, April - May, July - August). c) iscessment of symptoms produced and extend of denare. d) Noting the temperature and hunidity favourable to disease production. e) If the role of bacteria is confirmed, the role of vocterial antibiolic on the control of the disease will be studied along with OFMER CHEMICALS. Date of start : From the date of approval of the 9. project. 10. Likely date of : 2 years from the date ofstart. completion 11, Gditional facilities required : An inoculation charber with a gas burner and laboratory facilities. 12. Approximate cost : Rs. 10, 000/-

13. Signature of

5d/- Ed/- Ed/-Project Labder Head of Department Director of Research

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KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

| 1. | Project Code No. : | Ag.2.8. Path. 3. |
|-----|---|--|
| 2. | Name and address of the: Research Institute | COCONUT RESEARCH STATION, PILICODE. |
| 3. | Title of the project : | Studies on Sten Bleeding in Coconut. |
| A . | Name and designation of Principal Investigator : | P.Varadarajan Nair, Assistant Professor (Plant Pathology) |
| 5. | Name(s) and designation(of Associates : | s) Dr.P.K.Narayanan Nanbiar, Associate Professor (Chenistry) |
| 6. | Location : | Coconut Research Station, Pilicode, Nileshwar. |
| 7. | (a) Objectives : | To find out the causes and control measures of the sten bleeding |

(b) Practical Utility :

Stem bleeding, which has become one of the major coconut disease, is known to occur in nearly all coconut growing regions of Kerala. It may occur sporadically in isolated palus or gardens or endimi-cally in certain areas. The extent of damage varies from reduction in yield to complete death of the palms.

disease.

The cause and cure of this disease remain un-di understood yet. Detailed investigations proposed at present aim to find out lasting solutions to this devastating disease.

Technical Programme.

(A) SYMPTAMATOLOGY

- a) Age of the palm and relation to disease development. b) Bearing capacity in relation to disease occurrence. c) Excavation of root sector - study of the root-system of healthy and diseased palms. It is proposed to compare the rot system of healthy and diseased palms for:
 - 1. Extent of damage to roots if any
 - 2. Root regeneration capacity
 - 3. Spread of root system.
 - 4. Any other important differences noticed.

Steven buding

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Half yearly observations to be taken up.

- d) Leaf petioles Examination for discolouration or necrosis.
- e) Bud portion Exclaimation for discolouration or necrosis.
- f) Nut shedding Observations to see whether nut shedding is the initial symptoms and examination of such shed nuts.
- g) Tondar nuts Summinstion of husk to find out any melforanticesor internal necrosis.

h) Sten - (1) Splitting root to grown portion for locating metrosis for browning.

(2) xanination of vascular bundles to find out whether clogging of conducting tissues present.

B. Inalysis of soil and law samples.

Soil and leaf analysis to be conducted to coupare healthy and discused palms for MIK, Co., Mg and trace elements content.

C. Observations on the sensoral variation on starton expression on study and laterite soils.

Monthly observations to be recorded on the machar of leaves, number of spathes opened, number of nuts, extent of increase in the bleeding patch etc. as Pilicode and Nileshwar.

D. Pathogenicity studies.

Isolation of pathogens (Sungal or Bacterial from roots, stem and obsing fluid of the affected polas and pathogenicity studies.

- 9. Date of start : 1377
- 10. Likely date of completion : 1990
- 11. Estimated non-months : 30
- 12. Facilitiesrequired

Laboratory facilities for conflucting pathological studies are not available at present.

Minimum requirement of the equivents and charical for carrying out the work is to be not. Proposals are being sent separately. To special equivant is proposed.

Soil and leaf samples analysis will be conducted at the chemistry laboratory attached to the Cocons Research Station, Pilicode. -24-

13. Financing organisation : KERALA AGRICULTURAL UNIVERSITY, 14. Approximate cost : Rs.15,000/-. 15. Signature of 0 0

Sd/- Sd/- Sd/- Sd/-Principal Investigator Head of Division Director

Second FRC. S.No. 335.

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KERALA AGRICULTURAL UNIVERSITY

RESTARCH PROJECT

| | RESTARCH PROJ SCT | | | | |
|----|---|----------|--|--|--|
| | Paculty of Agriculture | | Department of Plant Pathology | | |
| 1. | Name of the Research Centre | с с | Coconut Research Station, Kumarakon. | | |
| 2. | Project No. | 0.0 | New Ag.2.9. Path. $4(v)$ | | |
| 3. | Title of Project | e. C | Disease resistance trial. | | |
| í. | None and designation of a) Project Leader | ic a | P.K.S. this Bajra, Associate Prof. (Plant Pathology) | | |
| | b) Associate | 0.0 | G.Mothai, Assistant Professor (Plant Pathology) | | |
| 5. | Objectives | | To study the Boot (wilt) disease tolerance of progenies obtained from the crosses Dwarf erange x Toll Green and Dwarf Green & Toll. | | |
| ς. | Practical Utility | 0 n | The efforts inde to screen out a variety/hybrid resistant or tolerant to Root (wilt) disease has become the subject of study during the current parise. Fvolution of such estrain will be Frentest importance in findla- out a solution for the dreaded root (wilt) disease. | | |
| 7. | Short review of literatu | 0* | Orton (1900) obtained linesof 'bea Island' cotton resistant to wilt (<u>Fusarium oxyaporum</u>) by continued screening and sel- ection (Malayen Dwarf' variety of ecconut appeared to be resistant to lethal yellowing of Janaica where as the indigenous 'Janaica Tall' palms were found highly susceptible (White head, 1966). | | |
| 8. | Technical programe | C 3 | | | |
| | Lay ort | 0 | Completely Randomised | | |
| | Flot size | 0 | 4 palms | | |
| | Treatments/ Varioties | 0 | 21 SERTLAL MINISTY | | |

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| Sl.No. | Tr.No. | Details of hybrid progenies | Conss |
|-------------------|------------|--------------------------------|-----------------------------|
| 1 | V1 | 132 x 27S/954 Dwart | f Orange x Tall Green |
| 2 | V2 | B.23 x 27S/1016 | |
| 3 | V3 | 107 x 278/1016 | и |
| \mathcal{L}_{r} | V4 | 127 x 278/954 | 11 |
| 5 | V5 | 144 x Tall 12 | 11 |
| 6 | V 6 | 215 x 41/405 | 11 |
| 7 | V7 | 144 x 27S/954 | 11 |
| 8 | ₩8 | 188 x TC 13 Dwarf | orange x Tall Green |
| 9 | V9 | 182 x 41/613 | 11 |
| 10 | V10 | 175 x 39/3B/531 | 11 |
| 11 | V11 | 2 08/19 x 39 3B-492. I | Dwarf green x Tall Green |
| 12 | V12 | 213/10 x Tall 12 | |
| 13 | V13 | 213/11 x 27 S - 908 | 11 |
| 14 | ₩14 | 2 3 9/1 x 41/405 | 11 |
| 15 | V15 | 189/13 x 27 S/908 | |
| 16 | V16 | 211/10 x Tall 10 | II. |
| 17 | V17 | 133/11 x 2/27 | 11 |
| 18 | V18 | B41 x Tall 12 | $\mathcal{O}_{\frac{1}{2}}$ |
| 19 | V19 | 208/20 x VII/18 | 11 |
| 20 | V20 | 211/11 x VIII/16 | 11 |
| 21 | V21 | Standard | all x Yellow Dwarf. |

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Observations to be recorded:

Morphological characters like number of fully opened leaves, height and girth at Collar are recorded before planting and at half yearly intervals for 3 years.

Observations on the disease conditions of thepalms to be recorded at half yearly intervals starting from the Ist year of planting. The palms will be left for the natural incidence of root (wilt) disease. To fungicidal treatment is advocated. Necessary insecticidel treatments should be given as and when found necessary. All the cultural operations to be followed as per package of practices. Yield datais to be collected at half yearly intervals from the period when bearing starts. The number of nuts in each bunch (Nuts aged 5 months and more) are counted for this purpose.

| 9. | Date of start | 00 | September 1977 |
|-----|-----------------------------------|-----|---|
| 10. | Likely date of completion | 000 | September 1987 |
| 11. | Additional facilities required | 0 0 | The existing facilities at C.R.S. Kumarakom is utilised. |
| 12. | Approximate cost | 00 | Rs. 10,000/- |
| 13. | Signature of: | | |

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

Sixth FRC. S.No. 340.

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KERALL AGRICULTURAL UNIVERSITY

RUSTARCH PROJECT

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|-----|--|---------------|---|
| | Faculty of Agriculture | | Department of Botany. |
| 1. | Name of Research Centre | 0 | Agricultural College, Vellayani. |
| 2. | Project No. | 6.8 | Ag.2.18. Path 4 (vii) |
| 3. | Project No. and Title | c 3 | Diagnotic tests on early detec- tion of root wilt diseases in coconut. |
| 4. | Name(s) of:- | | |
| | (a) Project leader | 0 | A.T.Abraham, Associate Professor |
| | (b) <i>L</i> ssociate | 0 | N.Gopinathan Nair, Associate Professor. |
| 5. | Objective | 0.0 | Standardization of technique for early detection of Root wilt disease in coconut by sap analysis. |
| ٢. | Practical Utility | 00 | A tissue analysis technique will enable the detection of disease, in the very early stages of development and vill make possible the adoption of suitable control measures. |
| 7. | Review of literature | 0 0 | |
| | Technical Programme | 00 | 1. Tissue analysis for the proportion and content of different nutrients. |
| | plus nept n pe on nellie with ervs c pi PI | | 2. Electrical conductivity and PH of sap extracted from fronds, leaflets, stem & root from, root wilt infested palms, apparently healthy ones in infested areas and healthy ones in disease free areas. |
| 9. | Date of start | 0 | 1978 |
| 10. | Likely date of completio | n | : 1981 |
| 11. | Additional facilities required | 0 ; 0 ; | Hil |
| 12. | Approximate cost | a 0 | Rs. (,000/- |
| 13. | Signature of: | | |
| Ţ | Sd/- Project Leader | He | Sd/- ead of Department. |
| | Third PRC. S.No. 3 | | |
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KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

| Faculty of Agriculture | 00 | Department | oî | Plant | Pathology. | |
|------------------------|----|------------|----|-------|------------|--|
|------------------------|----|------------|----|-------|------------|--|

- 1. Name of Research Centre : College of Agriculture, Vellayani.
- 2. Project No.
- 3. Title of the Project : Studies on root (wilt) disease
- 4. Name & Designation of(a) Project Leader
- : Dr.M.Ramanatha Menon, Professor of Plant Pathology.

: Ag.2.18.Path.4(viii)

of coconut.

- (b) Associates
- : Sri.P.K.Sathia Rajan, Associate Professor of Plant Pathology, Coconut Research Station, Kumarakom.

Assistant Profescor/Instructor, Rice Research Station, Kayankulan.

5. Objectives

The exact etiology of root (wilt) disease of coconut is still unidentified and hence measures are undertaken to maintain the vigour of thetrees by adopting proper agronomic and cultural practices. As three are wox no preventive or curative measures against root (wilt) disease, the other alternative is to eradicate the declining palms and to replant with less ausceptible varieties of coconut seedlings. The aim of the present study is to rejuvenate the declining, root (wilt) affected palms by inducing fresh root development by providing proper environments. As a result of the development of fresh healthy roots, the tree will grow more vigorously giving a higher yield and thus making the cultivation economical.

6. Practical utility

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The root (wilt) affected coconut trees became unproductive and so the cultivation has become uneconomical. The results of the study can be recommended to the cultivators and the loss due to the disease can be minimised.

7. Short review ofliterature :

The coconut palm, a typical monocet, having an adventitious root system, produces numerous roots from its bale region throughout its life.

Normally, roots are not formed above the bole region. But due to senescence or water logging the older roots die and under such circumstances the tree produces new roots from the trunk above the soil level. Such roots are termed as serial roots (Menon et al., 1955). Davis (1958) reported that air layering of the trunk near the crown (gootying) can induce rooting from the stem to that oldern plants can be rejuvenated. He suggested that the crown of an older palm can be separated after sufficient roots were induced and replanted as a young palm. Thanpan and Markose (1976) reported that old, severly affected palms could be rejuvenated by inducing root development above bole region. It is reported that the treated palms produced six new leaves within a period of 7 months and the new leaves were healthy without any symptoms of leaf not or root (wilt). The old fronds showed general improvement.

8. Technical Programme :

Root (wilt) affected palms of different age group like 15-30, 30-45 and above 45 years will be selected in two locations, i.e. at Kayankulan sandy area and Kumarakon - reclained area, with -clay loan. Four metre aquare brick walls will be the celimit constructed on all sides of the trees to a height of 1 n above the soil level with adequate provision for drainage and aeration. The bark of the trees will be ringed around at two levels just exposing the atellar region. The rings will be 3 cm wide with an approximate depth of 2 to 2.5 cm. The first ring will be made at 15 cm above the ground level and the second 12-15 cm above the first ring. The exposed regions (rings) and the base of the palms will be covered with river sand and cow dung and the embarkment will be filled with a mixture of well rotten organic matter or green matter, cow dung and sand.

> The recommended dose of N:F:K fertilizer mixture and 2 Kg delomite will be applied for each tree (the quantity of delomite can be increased depending on the pH of the soil). It Kayankulan one set of trees will be irrigated at the rate of45 litres of water twice a week. At Kumarakom, instead of irrigation, one set of trees will be sprayed with one per cent Bordeaux mixture, thrice a year (January, April, May and September). Necessary control trees will be maintained with usual agronomic and cultural practices asper the recommendations of package of practices. The treatment will be continued for a period of five years.

Details of experiment :-

| Lay out | ; Randonised Block Design. |
|--------------|--|
| Treatments | ; ((listed below). |
| Replications | |
| Plot size | : Single tree |
| Note: | : Trees are selected after calibration |
| | for disease intensity and are. |

1) Kayankulam:

Treatments:-

T1 - Control. Usual Package of Practices. NPK at recommended dose + organic matter + delomite.

T2 - T1 + irrigation.

- T3 Ringing + construction of retaining wall + filling with sand, cowdung and organic matter + NPK and delomite.
- T4 T3 + irrigation.
- T5 Ringing + filling + NPK and delomite + construction of retaining well with coconut leaves.

 $T_{-} T_{5} + irrigation.$

(Quantities of FYM, Delonite and NPK are the same under all treatments).

2) Kumarakom:-

The above treatments will be followed but **Py** irrigation will be replaced spraying with 1% Bordeaux mixture, three times a year. The number of plots and replications will be the same as above. It is suggested that the retaining well in T5 at Kumarakom can be made of mud instead of fx coconut leaves.

A separate observational trial (2 trees) can be tried using the sheets of tar druns with sufficient provision for drainage and aeration to know the feasibility of using then in place of constructing brick walls ground the palms.

The condition of the palm at the time of starting the treatment will be recorded.

- (a) No. of leaves. (The youngest fully opened leaf will be tagged)
- (b) Root (wilt) disease intensity
- (c) Leaf rot disease intensity

(d) Yellowing of leaves (intensity)
(e) No. of inflorescence
(f) No. of female flowers.

- (g) Percent setting.
- (h) Yield last year.

The following observations are to be recorded at an interval of six nonths after starting the treatment. - 31 -

- A. Observations on root development (Excavate 1/8 portion of the area and record the following).
 - (a) Ne. of fresh roots formed.
 - (b) Length of newly formed roots.
 - (c) Decary or rotting of roots (orea affected).
- B. Observations of leaf formation.
 - (a) No. of leaves formed after starting the treatment.
 - (b) Rate of leaf formation.
 - (c) Symptoms of diseases (intensity)

i. Root (wilt) ii. Leaf rot.

C. Observation on inflorescence formation.

- (a) No. of inflorescence. (energed/cone out/opened)
 (b) No. of female flowers in each.
 (c) Percent setting.
- E. Observation on yield.

Yield/Tree/Harvest.

- 9. Likely date ofstart : September, 1977.
- 10. Likely date of completion : September, 1982.
- 11. Additional facilities & estimated cost:

The existing facilities at Rice Research Station, Kayankulan and Coconut Research Station, Kumarakon can be utilised. The staff working at the respective research institutions will be responsible for the conduct of the treatment and recording the observations.

Lond:

Equipment:

Cost of construction brick Walls, sand, cowdung, compost, delonite, fertiliser, fungicide etc., cost of application and other expenses.

12. Signature of:

| | Sd/- | | Sd/- | - | Sd/- | | |
|---------|--------|---------|-------|------------|----------|----|----------|
| Project | Leader | Head of | f the | Department | Director | of | Research |

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KERALA AGRICULTURAL UNIVERSITY RESEARCH PROJECT

Faculty of Agriculture : Department of Plant Pathology.

1. Name of the Research Centre L Coconut Research Sub-Station, Balaramapuram.

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- 2. Project No.
- 3. Title of the project
- : Ag.2.10. Path. 5.
 - : "Control of grey leaf blight of Coconut caused by <u>Pestalotia-</u> <u>palamarum</u> Cooke by using newer fungicides".
- 4. Name and designation of
 - (a) Project leader
 - (b) Associates

- : B.Rajagopalan, Asst. Professor.
- : 1.Dr.S.Balakr shnan, Associate Professor, College of Agriculture, Vellayani.
 - 2.Dr.James Mathew, Assistant Professor College of Agriculture, Vellayani.

5. Objectives:-

To evaluate newer fungicides for the control of grey blight disease caused by <u>Pestalotia palmarum.</u>

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6. Practical utility

This disease has spread for and wide and is seen in many of the coconut plantations. This disease reduces the general vitality of thepalm and causes a burnt appearance of the leaves. The aim is to test newer fungicides against the pathogen and to utilize the results for the effective control of the disease.

7. Short review of literature :

Byyce (1930) has reported that cutting and burning of the affected trees spraying with Bordeaux mixture and growing the palms under sanitary conditions will control the disease. Copeland (1931) has reported that improving the drainage condition will control the leaf spot disease. Wilson and Peethambaran (1970) has reported that Cuman was superior to five other fungicides in checking the <u>in vitro</u> growth of <u>Pestalotia palmarun</u>, the cause of coconut leaf spot. Radha (1976) has reported that of the general fungicides tested Bordeaux mixture was the most effective fungicide. 8. Technical Programe :

- 1. Isolation of the pathogen and the maintenance of the pure culture.
- Comparative efficacy of newer fungicides. The following fungicides will be studied: (i) Cuman (ii) Dithane M-45 (iii) Difolation (iv) Benlate (v) Auregofungin (vi) Bavistin (vii) Bordecux nixture.
 - a. Study of the inhibition of spore germination of the fungus, at the various concentration of the fungicidal solution. The effective dose for maximum inhibition of spore germination will be determined. Study of the inhibition of the growth of the fungusby poison food technique. The dose of the fungicide for the maximum inhibition of the growth will be recorded.
- 3. Field evaluation of the above funcicides.

The most effective fungicide will be tested under field condition. The effect of fungicide will be determined on the basis of the intensity of the disease and the No. of infected leaves per tree.

- 9. Date of start : 5/77
- 10. Likely date of completion : 10/78
- 11. Additional facilities required : ---
- 12. Approximate cost : Rs.1,000/-.

Sd/- Sd/- Sd/-Signature of Project Head of the Dept. Director of Research. Leader

Second FRC. S.No. 343.

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KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

| | Faculty of Agriculture : | Department of Plant Pathology. |
|----|--|---|
| 1. | Name of Research Centre: | College of Agriculture, Vellayani. |
| 2. | Project No. | Ag.2.18.Path.7. |
| 3. | Title of project : | Investigation on a new disease of coconut palm - Mid.crown yellowing. |
| 4. | (a) Name and designation of project leader : (b) Associates ; | Shri.P.V.Paily. 1. Dr.M.C. Mair. 2. Dr.M.Rananatha Menon. |
| 5. | Objectives: | To find out the etiology and control measures for the disease. |
| 5. | Practical utility: | |

This disease eventhough noted at Chirayinkil and Varkala similar type of disease occur in various parts of Kerala, especially in the root (wilt) disease affected belt. It will be of immense use to coconut growers if this new disease is identified and proper control measures evolved.

7. Short review ofliterature:

No reports are available regarding the occurrence of nid crown yellowing in coconut palm. A similar disease is reported for oil palm.

- 8. Technical programme in brief:
 - 1) Study of pathogens associated with the disease. Root stem and leaf samples will be critically examined for the presence of pathogens.
 - 2) Nutrient status of the affected palms will be studied by foliar analysis.
 - 3) Effect of different fungicides along with nutrients will be studied in controlling the disease.

Observations to be taken:

- 1) Symptomatology of the disease.

- 2) Pathogens associated with the disease.
 3) Seasonal Variation if any, in the symptom picture.
 4) Effect of different chemicals on the control of the disease.

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9. Date of start : October 1977

- 10. Likely date of completion : 1980.
- 11. Additional facilities required : ----
- 12. Approximate cost : Rs. 15000/- towards contingent charges for three years.

Sd/-Sd/-§d/-Principal Investigator Head of Department Director of Research

Fifth FRC. S.No. 345.

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KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

| Faculty of Agriculture : Department of Plant Pathology. | | | | | |
|---|--|--|--|--|--|
| 1. Name of Research Centre: Rice Research Station, Moncompu. | | | | | |
| 2. Project No. : Ag.2.5.Path.8 (i). | | | | | |
| 3. Title of the project : Relative tolerence of Hybrid verities of coconut to diseases. | | | | | |
| 4. Name(s) and designation of | | | | | |
| a) Project leader : P.Varadarajan Nair, Asst.Prof.(PP) b) Associate : Dr.K.M.Rajan, Associate Prof.(PP) | | | | | |
| 5. Objective : To study the relative tolerance of different hybrid varieties of coconut to root-wilt, leaf rot, bud rot and stem bleeding. | | | | | |
| 5. Practical Utility : | | | | | |
| A knowledge of the above will give an idea about the best hybrid combinations which can be successfully grown in the tract. | | | | | |
| 7. Short review of literature: | | | | | |
| It is reported that some of the hybrid varieties possess some amount of natural tolerance to the dreaded root-wilt of f coconut. | | | | | |
| 8. Technical Programme : | | | | | |
| A field experiment has been laid out in July 1973 with five replications and 10 treatments. | | | | | |
| Treatments are different crosses viz. TxD, TxG, TxLD, TxSS, YDxLO, TxNYG, CCxG, TxTenbli and W.C.T.(control). | | | | | |
| 01 | | | | | |

Observations

- 1. Annual growth measurements.
- Annual growth measurements.
 Disease indexing will be done for root-wilt symptoms at 6 months interval. The occurrence of other diseases such asleaf-rot, bud-rot, stem bleeding etc. will be recorded as and when noted.
- 3. The yield data of individual trees will also be recorded.

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| 9. | Date of start | 0 0 | July | 1973. |
|-----|--------------------------------|--------|----------------------|----------------|
| 10. | Likely date of complet | i | on: | 1778 www.gaute |
| 11. | Additional facilities required | • • | Nil. | |
| 12. | Approximate cost | 0 0 | 0 000 0440 05 | |
| 12. | Signature of: | | | |

Sd/- Sd/- Sd/-

Project Leader Head of Department Director of Research.

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KERALA AGRICULTURAL UNIVERSITY RESEARCH PROJECT

Faculty of Agriculture : Department of Plant Pathology

1. Name of the Research Centre: Coconut Research Station, Kumarakon.

- 2. Project No. : New Ag.2.9. Path. 8 (iv)
- 3. Title of Project : Disease resistance trial.

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- 4. Name and designation of
 - a) Project leader : G.Mathai, Assistant Professor.
 - b) Associate : P.K.Sathiarajan, Associate Prof.
- 5. Objectives : To study the performance of the progenies of apparently healthy W.C.T. palms available at the Coconut Research Station, Kumarakon.
- 6. Practical Utility

It was observed that certain W.C.T. varieties of coconuts available at the Coconut Research Station, Kunarakon shows hardly any symptoms of the root (wilt) disease for quite along time. These apparently resistant trees are assumed to carry agene governing the resistance character. The study proposed will give acute whether any of the progenies of these palms bear a resistance character.

7. Short review of literature:

Study of the distribution of root (wilt) pathogen in developing seed coconuts conducted by Gopinathan Pillay etal (1970) indicated that inoculum from the nuts of severely infected palms gave positive sign of infection on cowpea indicator plants where as that from healthy palms gave negative results. Not much work has been done on the inheritance of disease \mathbf{x} resistance character on coconut.

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8. Technical Programme

Six W.C.T. Palms of the age group 40 - 45 years which are found to be apparently healthy were selected as mother palms. The whole of mature nuts available for harvest during 5/76 were harvested and they were sown in nursery during 7/76. Seventy progenies were obtained from these palms and they were planted during September 1977.

| Lay out | 20 | C.R.D. |
|-------------|----------|--|
| Replication | 00 | 5 |
| Treatments | o | 70 progenies obtained from 6 mother palms with t x YD as standard check variety. |

All cultural operations will be carried out as per package of practices. The palms will be left for the natural incidence of root (wilt) disease. Mecessary insecticidal treatments will be given as and when found necessary. Observation on disease incidence will be recorded from Ist year year onwards. The nature of inheritance of the resistance character will also be studied.

| 9. | Date of start | 0 0 | September 1977 |
|-----|-----------------------------------|-----|---|
| 10. | Likely date of completion | 00 | Septembor 1987. |
| 11. | Additional facilities required | 00 | The existing facilities at C.R.S. Kumarakon can be utilised. |
| 12. | Approximate cost | 0 0 | Nil |
| 13. | Signature of | 00 | |

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

Sixth FRC. S.No. 349.

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KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

Faculty of Agriculture : Department of Plant Pathology.

- 1. Name of the Research Centre
- 2. Project No.
- 3. Title of Project
- : Coconut Research Station, Kunarakom.
- : New Ag.2.9. Path. 8 (vi).
- : Study of the intensity of various diseases affecting coconut and assessing the loss in yield due to the disease.
- 4. Name and designation of
 - a) Project leader
 - b) Associate : PK Sathi
- 5. Objectives
- 6. Practical utility

- : G.Mathai, Assistant Professor (Dlant Pathology)
- : P.K.Sathia Rajan, Associate Prof. (Plant Pathology).
- : To find out the intensity of various diseases affecting coconut in the coconut research station, Kunarakom and to assess the loss in yield due to the disease.
- : The information obtained will through light on the nature and occurrence of the disease so that timely control measures shall be adopted to minimise the loss.
- 7. Short review of literature:
 - 1) Pillay and Pushpadas (1965) reported that the Kerala root (wilt) disease is restricted to peaty reclained
 - 2) A survey conducted by Pillay and Fushpadas (1966) in the vicinity of rivers revealed that the root (wilt) disease was more in river bank plantations, the spread of disease was slower where the river water become more saline and acidic. According to then most wilt affected palms were severely attacked by leaf blight and many by leaf rot.
 - 3) Lal (1968) reported that Root (wilt) and leaf rot diseases caused major losses in yield. But rot, sten bleading, Improper farm management etc. are added to losses.
 - 4) Palms affected by leaf rot yielded on average of 70% lesssthan healthy palms, and palms affected by root (wilt) disease yielded 43-82 percent less depending on the stage of development of the disease (Radha <u>et. al. 1962.</u>)

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It may be seen that intensity and losses due to the disease very in different locations and as such the study is taken up in the reclaimed kari areas of Kuttanad.

8. Technical Programme :

The intensity of the disease like root (wilt), lear rot, Bud rot, sten bleeding and grary blight prevalent in the grown up bulk palms in Field Nos. I, II, III and IV of Coconut Research Station, Kumarakom will be assessed by sing standard intensity scores as described below.

1. Root (wilt):

| Flaccidity | 0-5 |
|------------|-----|
| Yellowing | 0-3 |
| Mecrosis | 0-2 |

Disease Index is to be calculated by the formula described by George and Rodna (1973).

| <u>]</u> | (F) + | Ϋ́ + | \mathbb{M}) | 10 | |
|----------|-----------|------|----------------|-----|------|
| | Tota | l No | • of | 100 | ves. |

| 2. Leaf rot: i) | All healthy leaves | = () |
|-------------------|---|------|
| ii) | Upto 25 percent of leaf are affected | = 1 |
| iii) | " 30 " | = 2 |
| iv) | above 50 " | = 3 |
| 3. Bud rot: i) | Healthy | = 0 |
| ii) | Initial stage of attach | = 1 |
| iii) | Attackedbadly, tree recoverable | = 2 |
| iv) | Attack resulting in the death of plant | = 3 |
| 4. Stem bleeding: | | |
| i) | Healthy | = 0 |
| ii) | Initial bleeding sympton | = 1 |
| iii) | Partial coalition of bleeding patches | = 2 |
| iv) | Advanced stage of infection | = 3 |

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5. Grey blight:

| i) | Healthy with less than | | |
|------|---|---|---|
| | 5 percent leaf area infected | | 0 |
| ii) | Above 5 percent and below 25% leaf area infected | | 1 |
| iii) | above 25 percent and below 50% leaf area infected | = | 2 |
| itz) | Above 50% loof area infactod | | |

iv) Above 50% leaf area infected (Advanced stage of infection) = 3

The observations on disease intensity will be recorded at quarterly intervals and continued for three years. The yield of nuts of the test palms are also recorded.

| 9. | Date of start | 00 | Immediately after the project. | approval of |
|-----|--------------------------------|--------|--------------------------------|-------------|
| 10. | Likely date of completi | Loi | n: 3 years | |
| 11. | Additional facilities required | 0.0 | Nil | |
| 12. | Approximate cost | 0 | Nil | |
| 13. | Signature of | e 0 | | |

Sd/-Sd/-Project LeaderHead of DepartmentDirector of Research

Fifth FRC. S.No.351.

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7. Short review of literature: A lot of work has been carried out at CPCRI to find out the ctiology and control of the disease. Till now the etiology of the above disease has not been established beyond question and no effective control neasures have been evolved.

8. Technical programe (in brief)

- 1. It is proposed to induce the disease in healthy tracts of Trivandrum area by suitable soil mendments and inoculation of healthy polts with <u>Ehizoctonia</u> <u>sp</u>. This fungue is already reported on roots of arecanut palms in disease affected areas. The soil amendments are required to activate parasitisation of the roots by the fungus.
- (Slacky the 2. Fungicidal and soil amendments will be tried in discase affected areas on disease affected palms, in cultivators fields. Soil amendments will be worked out based on soil analysis and foliar analysis of affected palms.

00

- Date of start 9. : January, 1978 or as soon as he sanction is obtained.
- 10. Likely date of completion: 1981
- 11. Additional facilities required : Nil
- 12. Approximate cost : Rs.5000/- for first year for three years Rs. 10,000/-.

Sd/-Sa/-Sd/-Principal Investigator Head of Department Director of Research.

Fifth FRC. S.No. 352

-44-KERALA AGRICULTURAL UNIVERSITY

RESEARCH PROJECT

| Faculty of Agriculture | 00 | Department of Plant Pathology |
|--|---------------|---|
| 1. Name of Research Centre | 0 0 | College of Agriculture, Velleyani. |
| 2. Project No. | 00 | Ag.2.18.Poth.9. |
| 3. Title of Project | 0 0 | "Scheme for the control of yellow leaf disease of arecanut paln". |
| 4. Name(s) and designation of (a) Project leader | 0 | Sri.P.V.Paily, Associate Prof. of Microbiology. |
| (b) Associates | 00 | 1.Dr.M.Ramanatha Menon, Prof. of Plant Pathology. |
| | | 2.Snt.L.Rema Devi, Assistant Professor of Plant Pathology. |
| 5. Objectives | 0 0 | To find out the etiology of yellow leaf disease of arecanut palm in order to evolve suitable control measures. |
| 6. Practical utility | | The etiology of the yellow leaf disease of arecanut palm is not known. The disease is prevalent in the central parts of Kerala State (in the Districts of Trivandrum, Kottayan, Quilon, Alleppey, Ernakulan and Trichur) and also in the Malanad area of Karnataka State. Eventhough the disease affected palms are not killed on right, the production of nuts get reduced both in quality and in quantity and within a few years the palm succumb by the disease. As a result of the incidence of the disease, the cultivation of arecanut has become uneconomical. The results of the studies will throw more light on the etiology of the disease which will be helpful in formulating suitable control measures. |

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MER.IA AGRICULTURAL UNIVERSITY

REDIARCH PROJECT

| | TIO9.201 |
|---|---|
| Faculty of Agriculture | : Department of Tlant Pathology Section in Microbiology. |
| 1. Nene of Research Centre | : College of Agriculture, Vellayani. |
| 2. Froject No. | : Ag.2.18.Proc.Tech.i(iii). |
| 3. Title of the Project | : Microbial studies on coconut products. |
| 4. Name and designation of | |
| (a) Project Lesder | : To be posted. |
| (b) Associates | |
| 5. Objectives | 7 1 |
| (1) Study of extent of coconut leaves used damage is to a cons for preventing it w for study the effect organic acids on co drying. | nicrobial damage of plaited for thatching. If the iderable extent, a method ould be worked out. |
| organic acids on co drying. | of opplication of non toxic pra as a protectont during |
| (3) To study the extent | of bacterial spoilage of cut |
| 6. Practical Utility | 0 0 |
| (1) If the problem is nadequate protectant thatched roofs. | ainly dicrobial in origin, an should prolong the life of |
| toxin producers show contamination of the other carcinogens. | bial growth on copra - especially Aspergillus flowus and other ald reduce chances of final product (oil) by toxins and Also Aff flowcurs of microbial minated from the oil extracted |
| order to increase th | In the kitchen for culinary by to nicrobial attach. In We shelf life of such coconut, at should be of value. |
| 7. Short review of literature: | |
| (1) Experiments conduct suggest that ecconu | ed at C.P.C.R.I. Kasargode t leaves boaked in saline |

suggest that ecconut leaves boaked in saline water prior to plating withstand the combined action of rain, wind and sun better than the unspaked leaves of those socked in non-saline water.

- 2. Acotic acid has been suggested as a "reservative for "reventing deterioration of co"ra during drying.
- 3. No information is available regarding "revention of s"oilage of coconut used for culinary "ur"oses. Lacterial like <u>Serratia</u> <u>marcescens</u> have often been re"orted associated with such ecconut, to be res"onsible for the dee" "ink colour that is often encountered on storing cut coconut in Kitchen.

8. Technical Programme:

- 1. Samples of "laited leaves will be collected at monthly intervals from thatchings and microbes associated with them will be isolated and characterized. Their ability to distinterrate leaves individually and synergistically will be studied under naturally existing conditions and selected conducive conditions. Their cellulose and lignin decombosing auility will also be assessed. Suitable "rotectants like mineral oil, coal tar ete will be screened for their efficacy in Preventing s oilage. Fesoaking of the leaves in saline and fungicidal solutions will also be tried out.
- 2. CoPra, Prior to drying will be treated with different non-toxic organic acids and their efficacy in Preventing microbial damage will be assessed. Rising coPra in brine and other food Preservatives will also be studied for their efficacy in Preservation.
- 3. The methods in item 2 above will also be studied on coconut to be used for culinary "ur" cses.

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Since the different organic acids or other food Preservatives to pe tried might interact with compounds in the ecconut to give rise to now commounds which may or may not be toxic, safety tests will have to be carried out with the Preserved "roducts. To check for this, "reserved shalles or extracts there of will be fed to or incoulated into scall animals, meferably white tice, and toxicity symptoms, if any, will be observed and studied. Only if lack of toricity of these products is stablished by such tests will they be fit for human consumption.

- 9. Date of start : When the requisite staff is "osted.
- 10. Likely date of couldtion Three years from the date of start.
- 11. Idditional facilities required:

One Associate Professor and one Instructor to be Posted. Small animals and an animal house will have to be mintained. Required Chesicals and Preservatives.

12. Impoximits cost

: Rs.1,00,000 for 3 years, including staff extenses and laboratory facilities.

13. Signature of

| 7 | SD/ | | SD/ | SD/ | |
|---------|---------|---------|----------|-------------|--|
| ~roject | Lender. | Head of | f DePart | Director of | |
| | | | 1t. | Richarsh | |

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KERALA AGRICULTURAL UNIVERSITY RESEARCH PROJECT

1. Name of the Centre : Coconut Research Station, Nileswar. 2. Project No. : Ag. 1.8. AGRON. 12. 3. Title of the experiment: Studies on the possibility of nultiple cropping including rice in unirigated coconut gardens using a moisture rodulation (water harvesting) technique. 4. Date of commencement : May, 1977. 5. Expected duration : 2 years. 6. a) Name of project leader and designation: N. Neelakantan Potty, Associate Professor of Agronomy. b) Associates 0 7. Objectives : 1. To find out the possibility of multiple cropping including rice in coconut garden. The experiment envisages exploring the possibilities of i) Taking two rice crops in coconut gardens. ii) Intensive land utilisation in dry areas. iii) Most economic cropping pattern in coconut garden. iv) Effect of intensive cropping and moisture modulation (water harvesting). 8. Practical Utility Successful raising of annual intercrops in unirrigated

coconut gardens is practically impossible due either to excessive moisture after monscon has recorded. Therefore, any method which will facilitate raising of two or more crops successfully will be of benefit to the cultivators as it will increase the net return/acre. In addition successful raising of rice in coconut garden will reduce the gap/requirement and production of x food crop. Over and above, the residual management study may provide valuable information on productivity improvement of ecconut gardens. The present study may also give a viable cropping pattern for unirrigated beconut gardens.

9. Review of literature :

Periher (1972) had formulated a technique of water harvesting to raise one crop each in successive kharif and rabi season in creat of low rainfall. The principle involved is to create slopes on either sides from which rain water will flow down from sides to the cultivated area.

10.Technical programme principle:

The land in between ecconut rows will be laid out in to trenches of (4 x (n x 35 c.) and beds. This will create a noisture gradient to the trench. This moisture gradient will help to take the second crop in trenches. In rainy secson (Ist crop) moisture of the beds will be thus controlled for successful raising of crops with loss water requirement. In the trench rice will be taken. In the first season the most suitable variety and fertilizers cose will be identitied. In the second season suitability and adoptability of crops including rice will be studied in tranches. The system of land transformation is expected to completely tap the rainfall resource to the maximum advantage. It is expected to tap the meagre North East Monsoon also to full advantage. Thus possibility of raising successfully two or three crops (under unirrigated condition) will be investigated. The crop and the cropping pattern cost aconomically suited will thus be selected.

Treatments

On Beds

Ict crop season IInd season Ginger Turmeric Tapioca Cowpea Sweek potato Groundnut Season um Sweet potato Cowpea



800861

] 1 trenches

2nd season 3rd seasor

Sweep potato

Groundnut

Blackgran

Seasanun

Seasanun

Cherbs an neers ny ou Ker land cultur han of all outs and Ma bind.

Ist season Rice Rice Rice Rice Rice Rice Seasanun Rice Rice Rice Sweet potato Horsegram Rice Groundnut Rice in

51

- 52

flat bed

control (No inter crop)

Thes | treatments with and without residue management will be laid ut in split plot design with four replication both at Cocom t Research Station, Pilicode and Nileswar to find out the sesibility in two soil type.

11. Date of start : June 1977

12. Likely dat of com letion : March 1979

13. Additional facilities equired : Nil

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

Sd/-

Sd/-

Sd/-

Project Leader Head of Department Director of Research

Second 1 RC.