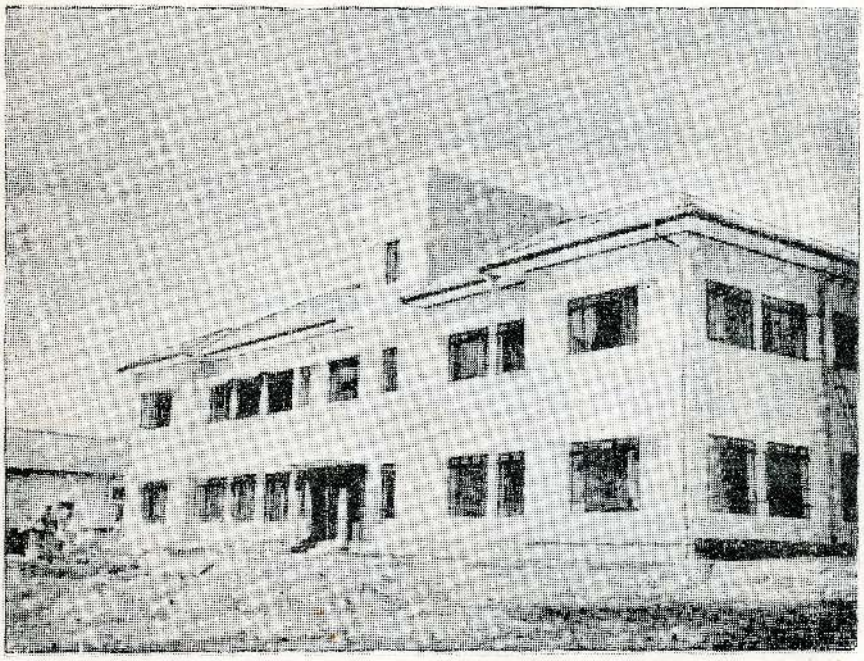
# CEYLON COCONUT PLANTERS' REVIEW



Vol. III No. 2

Published by

The Coconut Research Institute of Ceylon

# COCONUT RESEARCH INSTITUTE OF CEYLON

## COCONUT RESEARCH BOARD

*(As at 1st Aug. 1963)*

### NOMINATED MEMBERS

Representatives of the Low Country Products' Association :
Senator THOMAS AMARASURIYA, O.B.E.
Chairman of the Coconut Research Board.
Mr. C.A.M. DE SILVA.

Senators and Members of Parliament nominated by the Honourable Minister :
Mr. W.I. HUGH FERNANDO, M.P.
Mr. LAKSHMAN JAYAKODY, M.P.

Representatives of the Planters' Association of Ceylon :
Mr. B. WARUSAVITANA
Mr. C.T. VAN GEYSEL, J.P.

Representatives of the Small-Holders nominated by the Honourable Minister :
Mr. L.W.A. FERNANDO, B.Sc.
Mr. A.F. SAMARASINGHE, J.P.

### EX-OFFICIO MEMBERS

Mr. A.V. RICHARDS,
Director of Agriculture.

Mr. B. MAHADEVA, C.C.S.,
Commissioner of Coconut Rehabilitation.

Mr. P. NADESAN, C.M.G., O.B.E.
Chairman, Low Country Products Association.

Dr. M.L.M. SALGADO,
Director, Coconut Research Institute.

Vol. III No. 2 Oct. - December 1962

# The Ceylon Coconut Planters' Review



*A Quarterly Publication of the Coconut Research Institute of Ceylon*

THE
CEYLON COCONUT PLANTERS' REVIEW

Vol. III No. 2 Oct. - December 1962

## CONTENTS



**Price Rs. 1.25**

**Annual Subscription Rs. 5.00**

**Date of Publication 1st August, 1963.**

# The Ceylon Coconut Planters' Review

**Vol. III, No. 2** **Oct.-December, 1963**

## EDITORIAL

### VINEGAR AND CONSUMPTION RESEARCH

The article by the Chemist on a new process of manufacture of vinegar from coconut toddy should be read with interest by our readers. We are glad to have this opportunity of publicising one of the significant contributions by the Coconut Research Institute to research and development of industrial and technological products of the coconut palm. In this connection our readers are also referred to technical publication by Dr. Nathanael entitled "Chemical and Technological investigations on Coconut Products" which summarises the contributions on TECHNOLOGICAL RESEARCH by the Institute from its earliest beginnings.

Since then the functions of the Division were reorientated. The C.I.S.I.R. (the Ceylon Institute of Scientific and Industrial Research), on its establishment, following the development of the Department of Industries, was expected to take over most, if not all, industrial research and it was at one stage seriously proposed that the C.R.I. should farm out its industrial and technological problems to the CISIR. on payment on a cost basis of the estimated cost of projects approved by the CISIR. This proposal however did not materialise and as required by the C.R.I. Establishing Ordinance Technological Chemistry continues to be the concern and responsibility, of the Chemical Division of the C.R.I.

The Chemical Division since the departure of Dr. Child has continued technological and industrial research within the resources and limitations of our funds and staff, while also carrying out *AdHoc* investigations on such problems as these associated with the new processes for control of Salmonella in DC, and advisory work on copra, DC manufacture and

also on related topics, on which a considerable fund of knowledge and experience is available. In this connection it has been recently suggested that the excise regulations should be liberalised so that the usual official routine in obtaining licenses for tapping which cause avoidable delay, is obviated.

When copra markets slump the cry on "consumption research" has been always revived. While we do believe that the production of oil from copra and DC are the main bull wark of the prosperity as also coir fibre, of the Coconut Industry, work on such products as toddy, arrack and vinegar, and even on by-products, such as shell and coir dust, can add their quota, however small, to the sum total of industrial prosperity of the country, and ultimately the stability and the prosperity of the Coconut Industry of Ceylon by diversifying its economy.

The work on the manufacture of a high quality vinegar published in this number is a distinct contribution to the rationalisation of what has been an industry of the modest entrepreneurs, and to the production of a high grade industrial product, equal to the best imported brands, requiring not an exacting knowledge of technique, but within the resources of any industrial small-scale pioneer who is prepared to work under guidance of technologists and experts.

In its adoption on an industrial scale, and that with success, it is an object lesson to those who should develop small industries of this nature in the private sector, while the large scale industries are left to corporations and private enterprise by big industrialists.

We would in this connection call the attention of the Government and of the Excise Department for a liberal excise policy to sponsor industries based on coconut toddy. In this connection it is a matter of gratification that the C.R.I. has made a material contribution to the solution of the problems which were related to Salmonella infestation in DC and its control. A liberal and broad based policy on these matters, and assistance and encouragement and the development and utilization of products based on coconut toddy, may even, let us hope, help the coconut industry to swim to prosperity in a flood of toddy and vinegar.

## Bud Rot of Coconuts

Bud Rot of coconuts has been an elusive pathological problem and though the coconut palms in Ceylon have been remarkably immune from its ravages, like some other coconut growing countries in the world, the problem had appeared in isolated pockets in the Kurunegala—Matale districts. Its heavy and fatal incidence was observed by us in areas both on a recently re-planted young estate, and on a few isolated older bearing

estates, in proximity to rubber (and cocoa) plantations. It was surmised by us that Bud Rot under discussion may be associated wth *Phytophthora palmivora* of rubber and of cocoa, and as we did not have a Pathologist. on our staff, we approached the Department of Agriculture for assistance. We have cause for gratification the responsive co-operation and thank Dr. J.W.L. Pieris, the Pathologist at that time and now Deputy Director of Agriculture (Research) for the very useful pioneer work he did in isolating the fungus, culturing it, and transmitting Bud Rot to coconut seedlings.

Further work is being continued and the present paper by Dr. Pieris records data so far obtained.

It would be of interest to know that the problem of Bud Rot was a special item of discussion at the First meeting of the Technical Working Party on Coconut Production, Protection and Processing held at Trivandrum, India in November 1961 and attended by the Officer-in-Charge, Crop Protection Division of the C.R.I. who contributed a paper which included the present position of Bud Rot in Ceylon.

# THE MANUFACTURE OF COCONUT TODDY VINEGAR BY THE 'GENERATOR' PROCESS

By W.R.N. NATHANAEL,
*Chemist, Coconut Research Institute.*

The use of vinegar as a food commodity is universal. It is indispensable in every household, finding extensive use in the preservation of fruits and vegetables and the preparation of pickles, sauces, chutneys and other manufactured food products.

In general terms, vinegar may be defined as a condiment made from watery solutions of sugar or starchy materials by two separate microbial processes. The first is an alcoholic fermentation of naturally occurring (or converted) fermentable sugars by certain species of yeasts called *Saccharomyces*. The second is the so-called oxidative fermentation of alcohol so produced by species of bacteria called *Acetobacter*.

Owing to the fact that a wide variety of sugary or starchy substances can be used for the production of vinegar, its exact composition would depend on the raw material that has undergone these fermentations, apart from the actual conditions of manufacture, aging and storage. Essentially however, the finished product is a dilute solution of acetic acid containing salts and extracted matter from the source material and certain aromatic minor constituents produced during the fermentations.

## COCONUT TODDY AS RAW MATERIAL

Nearly every writer who has dealt with the subject of the useful products of the coconut, alludes to the vinegar prepared from the juice. Doubtless, coconut toddy by itself is an excellent raw material for the manufacture of high grade vinegar. It needs no fortification with adventitious sugar or salts and possesses the overriding advantage of being a well balanced medium containing sufficient nutriment for the growth and activity of yeasts and bacteria.

A survey conducted about eight years ago of the quality of vinegar produced by the existing industry in Ceylon revealed that much improvement is necessary both in methods of production and the quality of the manufactured product. It was particularly evident that in a number of factories wasteful losses of alcohol and acid took place owing to injudicious handling of the raw material during the various stages of manufacture. The writer has expressed the opinion elsewhere[1] that the

chief difficulty experienced by vinegar makers is their inability to get proper acetification of their toddy, due partly to lack of control during processing, and partly, to the fact that the popular 'Vat Process' of manufacture is not well suited for commercial production.

On the basis of successful laboratory and pilot plant investigations (the results of which have been published in full[2]), recommendations have been made that by employing the "Generator Process" the aforementioned disabilities of the vinegar industry could be gainfully surmounted.

## ADVANTAGES OF THE "GENERATOR PROCESS"

The vinegar 'generator' is designed to provide the maximum surface exposure for a volume of vinegar stock in order to supply enough air for the acetic acid bacteria to efficiently and quickly oxidise the alcohol to acetic acid.

The generator assembly is actually comprised of a feed (or supply) vat, an acetifier and a receiving trough. The constructional and operational details of these have been fully described in one of the Coconut Research Institute Advisory Leaflets[3].

In essence, the generator is a counter-current gas absorber wherein the acetic bacteria cause the oxidation of alcohol to acetic acid. Air for the alcohol oxidation is admitted to the generator below the false bottom through air vents and it circulates naturally owing to the heat of oxidation in the packing chamber.

The vinegar stock from the feed vat is uniformly sprayed over the surface of the inert porous packing medium (maize cobs) at the surface of which the oxidation takes place. The stock which drains off from the packing by gravity into the base of the generator is run out and pumped (or poured) back into the feed vat, from which it is recycled until acetification is complete.

When the vinegar has reached its maximum strength it must be aged before it is bottled, and is at its best quality for table use. The aging is best done in wooden maturation casks or barrels that are kept full and closed, so that destruction of acid by oxidation by the vinegar bacteria does not occur. During the period of aging which should range between 3-6 months, a certain amount of sedimentation takes place which improves the appearance and clarity of the vinegar.

The re-circulating generator has several economic advantages. It may be operated at low cost and is relatively simple and easy to control. There is a distinct saving of factory storage space and equipment. An average size generator assembly could replace about nine vats—each of

thousand gallon capacity. The process is continuous and provides a steady and efficient production of vinegar with low working losses. The process combines speed of action with high fermentation efficiencies resulting in higher acid strengths of the finished vinegar. The medium used in the packing chamber is inexpensive and easily procured. It would not require renewal for at least a year.

The quality of the vinegar produced is good and uniform and the process is hygienic as it takes place in a closed acetifier, whereby insects and putrefactive organisms are excluded.

The analytical characteristics of coconut toddy vinegar manufactured by this process compare very favourably with reputed imported brands of vinegar.

## NEW VINEGAR FACTORY

Laboratory, pilot plant and factory scale experiments, on the 'Generator' process have clearly revealed the potential possibilities of producing a high grade vinegar from the sap of the coconut palm. It has shown promise of removing the principal disabilities of the existing industry by combining speed of action with economy of labour and ease of operation.

A new vinegar factory (Figures I to IV) has been erected at Nainamadama with a Generator and is now in full scale commercial production.

Analytical checks kept over a period of several months at this factory, have shown that the quality of vinegar produced there is very good, with acetification efficiencies in the region of 85 per cent and over.

Every country in the world has its own distinctive liquor industry, and in Ceylon coconut toddy forms the base for the manufacture of arrack. In considering the economics of vinegar production, it is important to note that hitherto this industry has been of subsidiary importance in comparison with arrack manufacture. With the introduction of the continuous generator process, there is every possibility of producing a vinegar from coconut toddy of a standard comparable with the expensive imported proprietary vinegars.

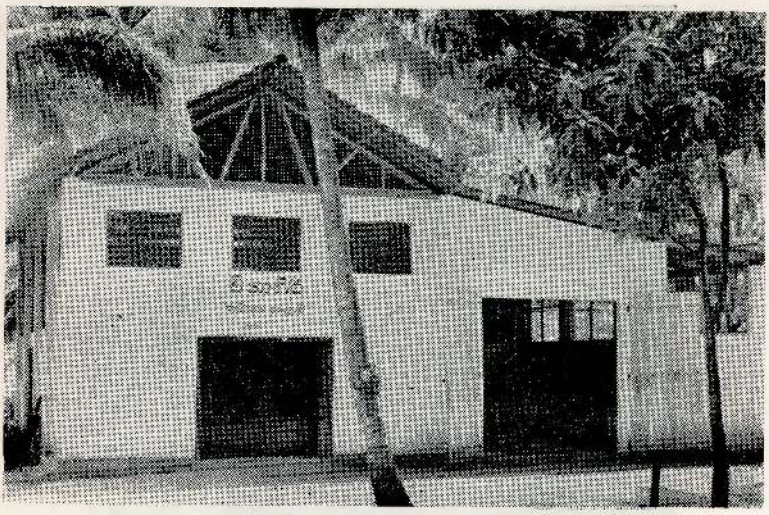
## LITERATURE CITED


1. NATHANAEL, W.R.N., The Commercial Possibilities of Manufacturing High Grade Vinegar from Coconut Toddy. Ceylon Coconut Quarterly, **6**, (3/4), 1955, 81-85.

2. Acetic Acid Fermentation and the 'Generator' Process for the Manufacture of Coconut Toddy Vinegar. Coconut Research Institute Bulletin No. 17 (February 1958).

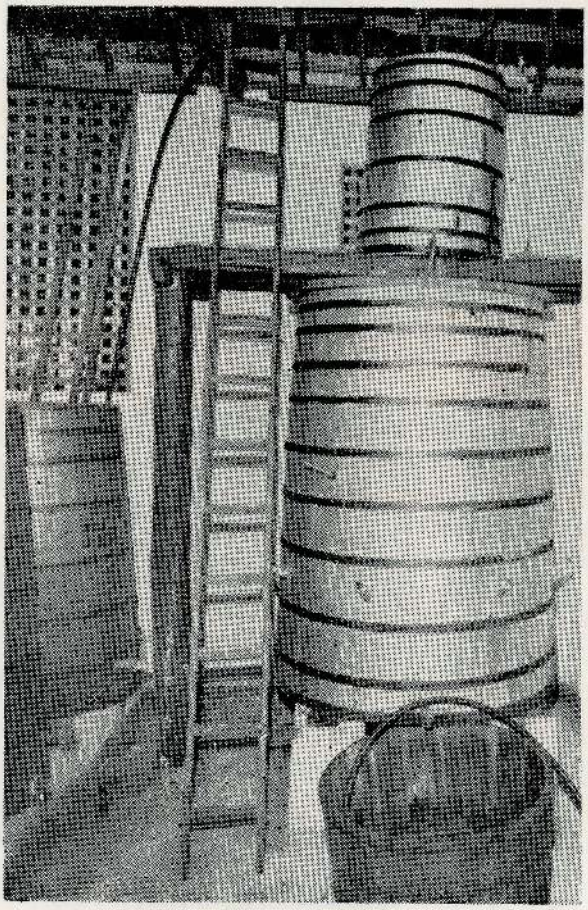
3. The Manufacture of Coconut Toddy Vinegar by the 'Generator' Process. Coconut Research Institute Advisory Leaflet No. 22.

Figure I



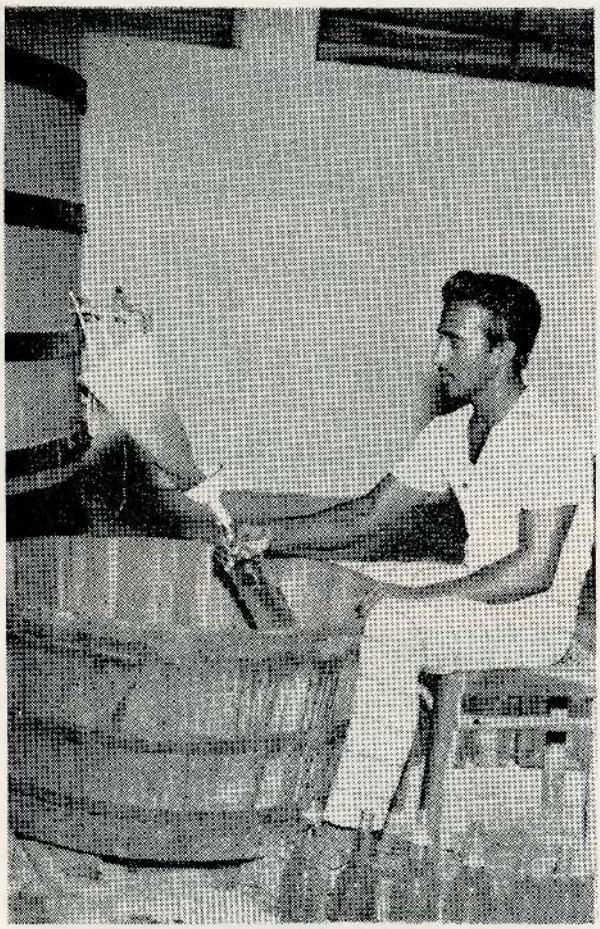
The New Vinegar Factory

Figure II



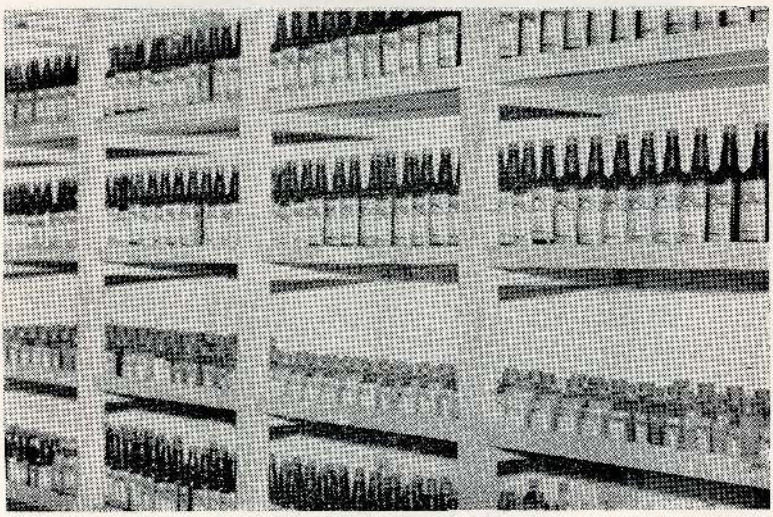
The Vinegar Generator

Figure III



Bottling Generator Vinegar

Figure IV



Bottled Vinegar Ready For Sale

# BUD ROT OF COCONUTS

By Dr. J.W.L. PIERIS,

*Department of Agriculture, Peradeniya.**

## (ADDRESS TO THE KURUNEGALA PLANTERS' ASSOCIATION)

Last year the Director of the C.R.I., Dr. Salgado asked me whether I could give some attention to the problem of bud rot of coconuts which was said to be causing concern in the coconut plantations in this area. Although in the Department of Agriculture we have our hands more than full with disease problems of the crops that we deal with, I agreed to do so especially as I was also dealing with a disease of cacao which is caused by a fungus *P. palmivora* and the bud rot of coconuts is also known to be caused by the same organism.

The term bud rot is now regarded as being applied only to those diseases in which the rot of the bud is the result of a primary infection in or near the bud tissues. Many of the early workers have demonstrated that the bud of coconut palms could be induced to rot by inoculation with species of bacteria and certain weak fungi like *Mucor sp. Thielavia sp.* and *P. palmivora* when the bud tissues are wounded. This technique of inoculation by wounding is however regarded by many workers as insufficient proof of parasitism. Many workers notably Mc Raie in India, Reinkeng in Phillipines have shown that *P. palmivora* which has been isolated from rotting coconuts buds could infect healthy buds of coconut seedlings without wounding and so far this fungus is the one associated with the bud rot of coconuts. In Ceylon Gadd showed the *P. palmivora* can cause bud rot of coconuts when it is inoculated on the tissues of the bud after wounding with a sterile knife. During the last few months we have been able to isolate a culture of *P. palmivora* from a palm infected with bud rot at Moorock Estate and have successfully inoculated with it many coconut *seedlings* without any wounding bringing our evidence of the causal agent of bud rot up to date with those of Mc Raie and Reinking.

The fungus *P. palmivora* is known to cause a number of disease of plants in Ceylon. It causes bud rot and nut fall of coconuts, stem canker and pod rot of cacao and stem diseases, pod disease and abnormal leaf

*Now Deputy Director (Research) Department of Agriculture, Peradeniya.

fall of Rubber. Because of this, till recently we were apprehensive about our cacao which was underplanted to rubber. Work of Orellana in our Division has shown that the strain of *P. palmivora* on cacao does not attack rubber readily and vice versa so that our fears on this account have receded. Our recent cross inoculation experiments agree with the observations of Reinking, Ashby and Gadd in that the *P. palmivora* from coconut can attack cacao pods only with difficulty. However, the cacao strain is capable of attacking coconut although not as readily as the coconut strain. This would therefore indicate that there is a possibility for the disease to pass from diseased cacao to the neighbouring coconut palms.

The foregoing is perhaps academical although not without applied interest.

## Control of the Disease

Although many workers have investigated the problem of coconut bud rot there does not appear to be any fool proof control measures found for this disease. I may briefly mention the control measures so far recommended (Reinking).

1. Tree when once severely infected never recover. Systematical inspection, detection and burning of all diseased crowns must be carried out.

2. Spraying Bordeaux mixture on palms within 25 yards of the infected trees.

3. Interplanting of coconut with cacao should be avoided.

I understood from the Superintendent, Moorock Estate that spraying with copper and mercurial fungicides have been carried out without advantage. Once the disease has attacked the tender tissues of the bud it is not possible to control this disease with sprays. The only chance of saving a tree is if the disease is detected at the very early stages at which time the rot has not reached the bud which could be saved by cutting out the diseased tissues. However in practice the disease is noticed only when it is well advanced. The usual methods of spraying with fungicides are laborious and during rainy weather when the fungus can be expected to be most active the fungicides may be washed off to a large extent. The cost of spraying too frequently is also prohibitive. Perhaps, it is for these reasons that field hygiene and destruction of infected crowns by fire is still our major line of control and spraying has to be confined to the apparently healthy trees, in the immediate vicinity of the affected palms.

Owing to the attendant difficulties of spraying I was considering the possibility of preventive treatment in another way. If we could find a chemical produced in pill or pellet form which could be placed between the young leaves of the central shoot and which will slowly release the chemical with the rains it is possible that the bud could be protected. The chemical has to stand up to at least 10-15 inches of rain and the chemical should be released at a sufficient concentration to inhibit the germination of the sporangia of the fungus. By these means we would be immediately using rain which has been our enemy in this respect to do the spraying for us.

We have tested by a laboratory bioassay technique a considerable number of chemicals and have found that some organo mercurials are effective in regarding spore germination of the fungus even after 14 inches of artificial rain. The most promising of them is a Phenyl mercury urea compound. These compounds are in the form of a powder and an experiment has been laid out at Moorock Estate to test these in the field. We are using 10 grams of each in small cloth bags which are wedged between the youngest leaves of the crown. Five fungicides are altogether tested with untreated controls. However this experiment was upset by an unexpected factor. The crows have been curious about the bags and have removed some of them. We have now repeated this experiment and tied up the bags to the leaves with string this time. However if the chemical works as I stated before it should be available in pellet or granular form and I have asked certain firms whether they could formulate such a compound.

I must emphasise that the evaluation of a chemical on the control of a disease like bud rot in the field is very difficult owing to the very low percentage of infected plants compared with the healthy plants. For the last one and a half years the records of Moorock Estate show that only 105 palms have been infected out of a total of 14,525 palms and all the infected palms were the underplanted seedlings. A better controlled experiment with seedlings using artificial inoculation and fungicides is contemplated at Peradeniya. That Mr. Chairman and Gentlemen is the position we have so far reached with regard to this problem.

Young palms affected by Bud Rot

# MANURING OF YOUNG PALMS*

By D.A. NETHSINGHE,

*Soil Chemist.*

## 1. INTRODUCTION

The recommendations made below are based on the results of two field experiments conducted by the Soil Chemistry Division on the manuring of young palms from the seedling stage—one on underplanted seedlings at Letchemy Estate, Nattandiya, (1939-1957) and the other on seedlings planted on a new clearing of secondary jungle at Ratmalagara Estate, Madampe (Commenced in 1948).

These experiments have clearly shown that regular manuring with a balanced fertilizer mixture containing the three major plant nutrients nitrogen, phosphoric acid and potash is essential for the healthy growth of young palms, both in underplantations as well as in new clearings. Manuring improves vegetative growth, promotes early bearing, and leads to high yields.

In the new clearing at Ratmalagara, 90% of palms treated with complete N.P.K. fertilizer mixture were in bearing by the eight year, whereas only 50% of the palms receiving no fertilizers had come into bearing within this period. Palms receiving the complete fertilizer mixture gave an average of 76 nuts per palm for the 13th year, while those not treated with fertilisers gave only 40 nuts per palm.

Phosphoric acid and nitrogen were found to be the dominant requirements of the young palms during their early stages of growth. This is in accordance with the generally established fact that both these nutrients stimulate rapid plant development. Potash assumed a relatively more important position at bearing stage. Excess nitrogen under conditions of phosphate deficiency made the leaves of young palms highly susceptible to infestation with the fungus disease helminthosporium. Similar observations have been made in the sand-pot culture experiments on coconut seedlings carried out by the Chemistry Division.

The experiment on underplanted young palms at Letchemy Estate showed a similar pattern. Palms receiving the complete N.P.K. treament gave 62 nuts per palm in the 15th year, while those not given any fertilisers showed an annual return of only 30 nuts per palm. The

*This is a revised version of C.R.I. Leaflet No. 8.

latter palms have been treated with the complete N.P.K. mixture since the 15th year (1954), but even after eight years (1962) their annual yield (55 nuts per palm) was considerably lower than that of the palms regularly treated with N.P.K. fertilisers from the seedling stage (76 nuts per palm).

*The systematic manuring of young palms must therefore be considered to be an indispensable item of capital expenditure. No attempt should be made to cut down on the manuring of young palms when prices fall, for neglect during the early stages of growth can lead to permanent retardation.*

Recently, yellowing of palms due to magnesium deficiency has been observed to be wide spread in many coconut growing areas. Second plantations, particularly those on gravelly and light sandy soils, are more likely to develop symptoms of magnesium deficiency. *The inclusion of magnesium fertilisers such as dolomite in all planting holes and in manurial programmes of young replantations or underplantations should therefore be a matter of routine.* (See also Advisory Leaflet No. 43: "On Magnesium deficiency in Coconut Palms").

Seedlings planted in virgin jungle clearings in colonisation schemes have been reported to be attacked by the fungus disease helminthosporium—probably a consequence of phosphate deficiency aggravated by the high content of soil nitrogen generally associated with new clearings. Hence the incorporation of phosphatic fertiliser in planting holes is also recommended below as a routine measure.

## 2. FERTILIZER MIXTURES AND RATES OF APPLICATION

The preparation of planting holes is described in Advisory Leaflet No. 4. "Transplanting". The top soil used for filling each planting hole should be mixed with 2 lbs. ground dolomite and 1 lb. saphos phosphate.

In the case of second plantations (replantations, underplantations and vacancies on bearing land) particularly on very poor or exhausted soils, about 30 lbs. of dried cowdung and 15 lbs. wood ashes may also be mixed in with advantage.

A fertiliser mixture with a comparatively higher proportion of nitrogen and phosphoric acid is recommended for application during the first four years after transplantation of seedlings. Rates of fertilizer application are graduated according to the age of palms. A higher dosage is recommended for second plantations since in these the nutrient status of the soil is likely to be poorer than in new clearings.

| | *Fertilizer Mixture (parts by weight) for young palms* | |
|---|---|---|
| | *C.R.I. Young palms Mixture* | *C.R.I. Mixture "A"* |
| Sulphate of Ammonia (20% N) | 2 | 1 |
| (% N) | (8.2) | (6.9) |
| Saphos Phosphate (27.5% $P_2O_5$) | 2 | 1 |
| (% $P_2O_5$) | (11.0) | (9.5) |
| Muriate of Potash (50% $K_2O$) | 1 | 1 |
| (% $K_2O$) | (10.0) | (16.7) |

| *Time after transplanting* | *Rates of application of C.R.I. Young Palms Mixture* | |
|---|---|---|
| | *New Clearings lbs. mixture* | *Second plantations lbs. mixture* |
| 6 months .. .. .. | — | 1 |
| 1 year .. .. .. | 1 | 1 |
| 1½ years .. .. .. | 1 | 1½ |
| 2 years .. .. .. | 1 | 1½ |
| 2½ years .. .. .. | 1½ | 2 |
| 3 years .. .. .. | 1½ | 2 |
| 3½ years .. .. .. | 2 | 2½ |
| 4 years .. .. .. | 2 | 2½ |

After the 4th year, and until bearing, C.R.I. Mixture "A" should be applied at 2½ lbs. per palm biannually on new clearings, and 3 lbs. per palm biannually on second plantations. When the palms have reached bearing stage, the recommendations in Leaflet No. 36 should be followed.

*In second plantations, it is recommended that young palms be treated with dolomite at the rate of 3 lbs. per palm after the 3rd and 6th years.* Dolomite should not be mixed with the N.P.K. fertilizer mixtures containing sulphate of ammonia. It should be applied separately, preferably at least a couple of weeks after the N.P.K. fertilizers have been applied.

## 3. FREQUENCY, AND TIME OF APPLICATION

Generally, rapidly growing young plants require frequent small applications rather than larger doses at longer intervals. Hence, half yearly manuring is recommended. Where circumstances permit, quarterly manuring using split doses may be adopted with advantage during the initial three years. This can be combined with weeding operations.

Fertilizer applications should always be done when the soil is moist, during the South-west and North-East monsoon periods. Quarterly applications may be done at the beginning and towards the end of each of the monsoon periods.

## 4. METHOD OF PLACEMENT

In the early stages (up to 12-18 months) fertilizers should be applied close to the palm on the weeded surface up to a distance of 1 foot from the base, and the soil turned over with mammoties or mammoty forks. As the palm grows older the area round which fertilizers are applied should be gradually extended up to about 5 feet at flowering.

## 5. CULTIVATION

Leaflet No. 4 gives particulars of other cultural operations necessary for the healthy growth of transplanted seedlings.

Young palms are particularly susceptible to drought conditions Before the onset of dry periods the soil round the palm should be weeded and mulched with coir dust or coconut husks. When coir dust is used to mulch seedlings an area round the base up to six inches should be left unmulched since when coir dust is in contact with the young leaf bases the latter tend to rot.

# PREVENTIVE MEASURES IN THE CONTROL OF THE RED WEEVIL PEST

By U.B.M. EKANAYAKE,
*Crop Protection Officer.*

The Red Weevil, *Rhynchophorus ferrungineus* F., is the most serious pest of young coconut palms in Ceylon and is distributed in all coconut growing areas in the island.

With the emphasis on replanting, its effective control is vital. As the grub begins its life within the palm, it is difficult to detect the pest in the early stages of infestation; and in most cases detection is possible only after the palm has been severely attacked. Thus timely application of remedial measures becomes difficult.

It is seen then, that the best method of control is to prevent the Red Weevil from attacking young palms, that is, by taking proper preventive measures. It is stressed that the preventive measures stipulated below should form an integral part of the routine agricultural practices on all young coconut plantations.

**Preventive Measures**

(*a*) The trees should be kept healthy without wounds or cracks, as the pest lays its eggs in the wounds and cracks that appear on the stem, base of petiole and elsewhere.

(*b*) In each estate, a regular survey of young palms up to 10 to 12 years of age should be carried out by trained labourers to detect the presence of the grubs of the Red Weevil. The following signs are indicative of the presence of the pest:

(1) the withered bud.

(2) the small holes in the stem from which the chewed up fibres are thrown out. This may be accompanied by the oozing out of a brownish viscous liquid.

(3) As the grubs feed they produce a crunching noise, which could be heard if the ear is placed near the trunk of the palm.

(4) The splitting of the petioles near the area of attack.

The labourers should also inspect the palms for wounds. The infested portions should be carefully excavated, the grubs scooped out and the entire surface of the wound dressed up with tar.

This routine operation may be difficult in small holdings due to lack of labour. It should be noted, however, that this is the best method of detecting the pest and should be carried out at least once a month.

(*c*) All wounds should be smeared periodically with tar, as one application appears to be insufficient.

(*d*) It has been observed that Stem Bleeding in young palms may be followed by Red Weevil attack. It is necessary to treat all wounds caused by Stem Bleeding with tar, after the removal of decayed portions.

(*e*) Severely affected palms which do not recover after chemical treatment should be cut and burnt.

Effective control of the Red Weevil is necessary on all young coconut plantations, as the pest causes considerable damage to palms.*

*Readers who are interested to know further details of the life history of this ubiquitous pest of the coconut palm are recommended to read the article "The Red Palm Weevil (*Rhynchophorus Ferrungineus*) in Ceylon" by Hilary F. Goonawardene appearing in Ceylon Coconut Quarterly—Volume IX, Nos. 1/2 (pp. 20-40). The Article on "Red Weevil and its Control" by J.K.F. Kirthisinghe appearing in Ceylon Coconut Planters' Review—Volume I, No. 2 (pp. 11-25) and C.R.I. Leaflet No. 37 "Red Weevil and its Control" revised edition issued in April, 1963 may be read with profit.

—Editor—

# FIELD DAY AT RATHMALAGARA RESEARCH STATION AND ISOLATED COCONUT SEED GARDEN FOR MEMBERS OF THE L.C.P.A.

The members of the Low Country Products Association had a field day at the Research Station at Rathmalagara and the Isolated Seed Garden at Ambanmukalana on 7th January, 1963.

The members first visited the Research Station at Rathmalagara. Dr. D.V. Liyanage, the Botanist of the Coconut Research Institute, explained to the members the progress made in the progeny trials conducted at Rathmalagara. The manurial trials and pasture plot experiments were also examined with interest by the planters. Dr. D.A. Nethsinghe, the Soil Chemist of the Coconut Research Institute, drew the attention of the members to the manurial experiment on young palms in which the harmful effects of imbalanced manuring were clearly visible in the manifestation of a leaf disease —*Helminthosporium incurvatum*.

## ISOLATED SEED GARDEN

The members of the L.C.P.A. visited the Isolated Seed Garden, Rajakadaluwa in the afternoon. They showed a keen interest in this project which is of national importance. (For a description of the Seed Garden please refer C.C.P.R., Volume II, No. 4).

Before departure Dr. Pathmanathan speaking on behalf of the L.C.P.A. said "Results from research work have to be established by years of patient hard work. We congratulate the Director and the members of the Staff of the Coconut Research Institute on the success they have attained in the field of Coconut Research. The market for coconut products is becoming increasingly competitive, and when prices are being adversely affected, the only method to sustain the industry will be to reduce the cost of production by increasing the yield per unit. Planters are no doubt aware that this is a major objective of Research. They will always cooperate with the Institute in all her activities".

A.K. Gunapala.

# CENSUS OF PALMS

By V. VENAYAGAM,
*Advisory Field Officer, Coconut Research Institute.*

All are familiar with a census of population but not in relation to a coconut estate. An operation which needs a little attention, if neglected can affect the total yield of a plantation to a considerable extent.

In a coconut estate great attention is given to times like manuring, soil and moisture conservation measures, drains, weeding, pests and diseases. All these measures, together or independently, can affect the total yield of an estate. The census of an estate is rarely done, or not much of importance is given to this; but to obtain maximum yield from an estate maximum land use must be made. To bring about this, one has to periodically or yearly in case of young plantations take stock of the situation or obtain a census of palms.

In obtaining a census of palms various factors should be carefully considered. In the case of old palms—those that have passed their period of peak production and are not of economic value—however much the manuring or great the attention, the response will not be the same as in the case of young palms. Periodically one may come across a good number of old palms especially in a replanted estate.

All palms in an estate will not be of the same stand or condition. The careful observer will occasionally come across tapering palms. This is characterised by the unsymmetrical and untidy crown, the lower leaves turning yellowish green with a yellowing or a rusting at the tips of the leaflets and the development of a black band just below the crown. Later the sturdy trunk develops an obvious tapering and shows a marked diminution in diameter just below the crown. If detected early there is a possibility of saving the palm; otherwise it is best that it be removed.

One is also bound to come across palms that have been affected by lightning and palms with very narrow stems and poor yield—the rest of the stem wasted away due to an injury or other external causes. These palms are a waste on the land.

As mentioned that all palms would not be of the same stand, there are likely to be a number of weak palms and poor yielding palms. The weak palms should not be difficult for a planter to detect. The general appearance of the palms will present an unhealthy look, with small crowns, poor foliage and few nuts on them. Poor yielding palms also commonly appear sickly, of course with exceptions. Where individual

palm records or block records are maintained, these palms can easily be identified. All attempts should be made to rehabilitate these palms and make them more productive, but if no response is noticed, it is best that these are removed.

On inspecting an estate for obtaining a census for the first time one is liable to notice occasional vacancies, caused by various reasons. This, is another cause for the wastage of good land.

Some of the facts mentioned above should help one to make a very comprehensive census of his estate. This will give him the exact amount of land wasted and the result may be sometimes alarming. To overcome this a constructive programme should be drawn up.

Attempts must be made to remove all unhealthy, poor yielding, tapering, and palms affected by lightning. These palms should be removed out of the estate or cut and burnt, as otherwise, the dead trunks may serve as breeding places for Black Beetle. This operation should be carried out well ahead of the planting season. Healthy seedling of good stock should be planted at the correct season in the vacancies created by the removal of old or unhealthy palms.

By taking a census of an estate regularly one can in a few years time be well satisfied that no land is wasted and be the proud owner of a healthy and productive estate—an asset to every planter.

# COCONUT CULTIVATION IN PUTTALAM DISTRICT

By S. MAHESON
*Advisory Field Officer, Coconut Research Institute*

The people of Puttalam District, to a very great extent, depend on the income derived from coconut plantations.

Most of the coconut cultivation is done on land alienated by the Government. The few privately owned estates and small holdings are to be found on either side of the Colombo—Puttalam Road and in the Kalpitiya area. In recent years several thousands of acres of land have been alienated by the Government for the cultivation of coconuts. These lands form the major middle class colonization schemes, the lower middle class colonization schemes and the Peasant schemes.

In most of these holdings from the very outset the small holders heavily intercropped their lands and little manuring was done. The result was the outbreak of diseases such as Grey Blight in the middle class colonization scheme at Sirambiady and Leaf Blight in the middle class colonization scheme at Vannathavillu. By thinning of catch crops and systematic manuring these diseases have to a great extent been controlled.

In the Kalpitiya area on small holdings as well as on estates peasants do intensive intercultivation of chillies and tobacco. These crops are cultivated on a share or lease basis. The heavy manuring of these crops benefit both the coconuts as well as these crops.

In spite of the large amount of husks available very little husk burying is practised in this district. The bulk of the husks being sold to the several fibre mills in the district. But in recent years with prices of husks fluctuating, more and more people are beginning to adopt the practise of husk burying.

The dominant pests in the district are Black beetle and termites. In recent years Red Weevil has made its appearance particularly in the colonization schemes. Demonstrations and advise on the use of insecticides for the control of these pests are given wherever required and the use of these insecticides is becoming popular.

Waterlogging is another problem in some of the lands. Tracing of drains and advise on opening of these drains is given whenever requested.

Besides these demonstrations are held regarding lining for planting holes cutting and preparing them. The triangular system of planting has become very popular particularly in new lands.

# OUR ADVISORY SERVICE

Always remember we are at your service to help to grow your coconuts well. Please consult our FREE ADVISORY SERVICE.

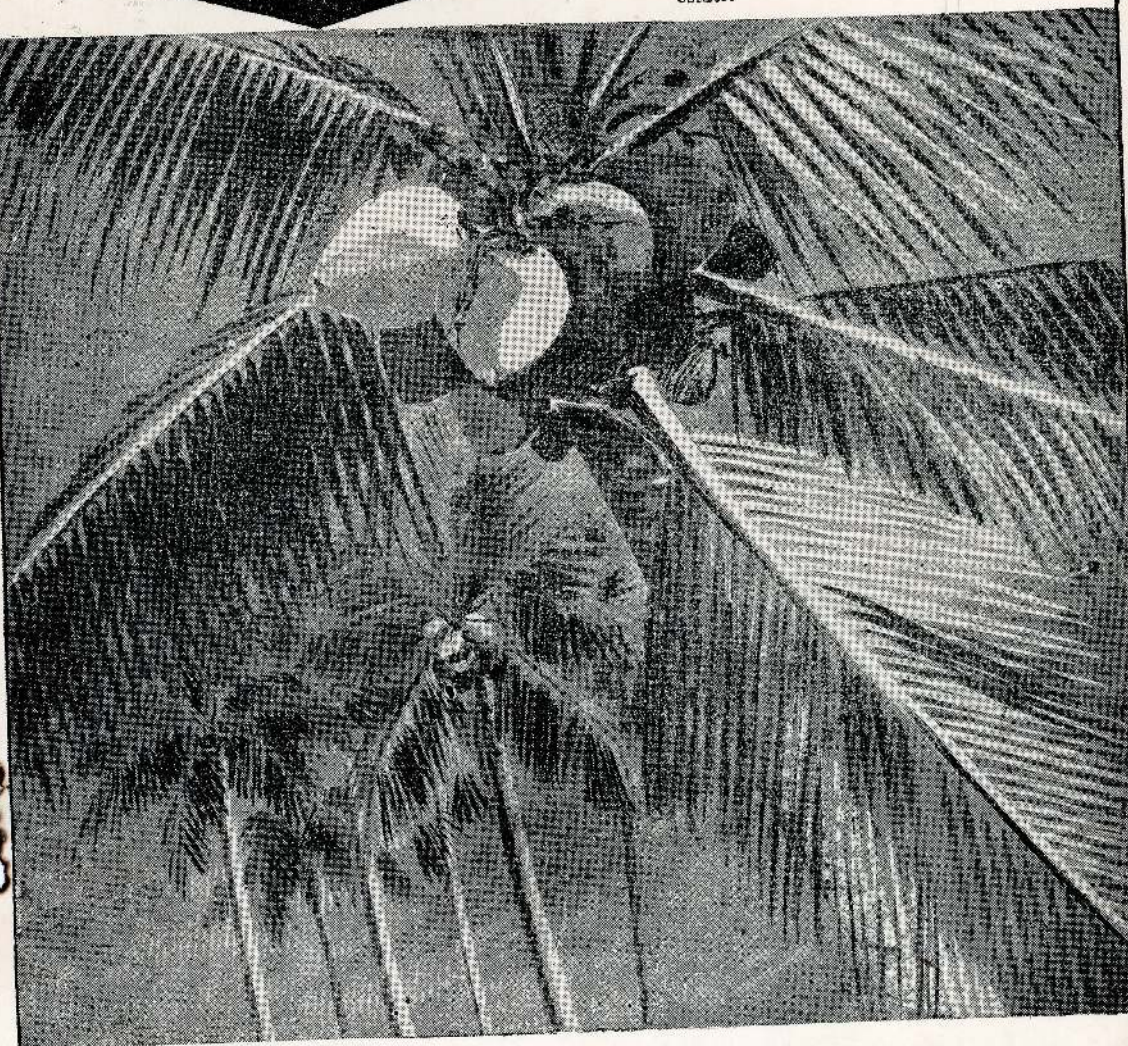
For your convenience a list of our Advisory Field Officers with their ranges and addresses is given below:

| *DISTRICT* | *D.R.O.'S DIVISION* | *NAME AND ADDRESS OF OFFICER* |
|---|---|---|
| **NORTHERN PROVINCE** | | |
| Jaffna and Mannar .. | All Divisions .. .. .. | Mr. V. Venayagam, A.F.O., C.R.I. Demonstration Centre, Pallai. |
| Vavuniya .. .. | All Divisions .. .. .. | Mr. E.N. Ratnam, A.F.O., C.R.I. Demonstration Centre, Alampil. |
| **EASTERN PROVINCE** | | |
| Batticaloa and Trincomalee | All Divisions .. .. .. | Mr. V. Arunasalam, A.F.O., 12, Pioneer Road, Batticaloa. |
| **NORTH WESTERN PROVINCE** | | |
| Chilaw .. .. .. | Pitigal Korale North .. .. .. | Mr. W.L.H.M. Wijegunaratne, A.F.O., 62, Old Town, Madampe. |
| Chilaw .. .. .. | Pitigal Korale South .. .. .. | Mr. L.S. Karunagoda, A.F.O., C.R.I., Lunuwila. |
| Puttalam .. .. | All Divisions .. .. .. | Mr. S. Mahesan, A.F.O., C.R.I. Demonstration Centre, Mundel. |
| Kurunegala .. .. | Weuduwili Hatpattuwa .. .. | Mr. S.A. Swamy, A.F.O., Station Mills, Station Road, Kurunegala. |
| Kurunegala .. | Hiriyala Hatpattuwa and Wanni Hatpattuwa | Mr. J.G. de Silva, A.F.O., C/o Post Master, Ibbagamuwa. |
| Kurunegala .. .. | Katugampola 'A' consisting of the following Korales: Medaketiya, Kiniyama, Karandapattu and Yagampattu | Mr. S.B. Karunaratne, A.F.O., C.R.I. Demonstration Centre, Hettipola. |
| Kurunegala .. .. | Katugampola 'C' consisting of the following Korales: Pitigal Korale, Medapattu Korale East and Medapattu Korale West | Mr. W.B. Dunston Fernando, A.F.O., Hettirippuwa, Lihiriyagama. |
| Kurunegala .. .. | Dambadeni Hatpattu .. .. | Mr. G.P.M. Amarasinghe, A.F.O., New Road, Allawwa. |

| DISTRICT | D.R.O'S DIVISION | NAME & ADDRESS OF OFFICER |
|---|---|---|
| **WESTERN PROVINCE** | | |
| Colombo .. .. | S.K. West Medapattu, S.K. West and Adikari Pattuwa | Mr. T.D.J.R.D. Peiris, A.F.O., No. 8, Welaboda Road, Gampaha. |
| Colombo .. .. | Siyane Korale East .. .. .. | Mr. K.M. Francis, A.F.O., Negombo Road, Nittambuwa. |
| Colombo .. .. | Hapitigam Korale .. .. .. | Mr. W.J.P.M. Lowe, A.F.O., No. 32, Wewaldeniya Road, Neligama, Mirigama. |
| Colombo .. .. | A.K.K. North 'A', A.K.K. North 'B', A.K.K. South and Colombo Mudaliyar's Division | Mr. C.A. Fernando, A.F.O., No. 156, Sri Wickramarajasinghe Road, Kurana, Negombo. |
| Colombo and Kalutara .. | Hewagam Korale, Sulpiti Korale and all Divisions in Kalutara District .. .. | Mr. P.A.H. Gomes, A.F.O., No. 115, Demaladuwa, Piliyandala. |
| **SOUTHERN PROVINCE** | | |
| Galle .. .. .. | All Divisions and Weligam Korale .. | Mr. D. Weerasekera, A.F.O., C.R.I. Demonstration Centre, Koggala, Habaraduwa. |
| Matara .. .. | All Divisions except Weligam Korale .. | Mr. P.A. Wijewickrame, A.F.O., C/o Mr. D.D. Gamage, Pilidauwa Lane, Uyanwatta, Matara. |
| Hambantota .. .. | All Divisions .. .. .. | Mr. W. Weeraratne, A.F.O., Lunuma, Ambalantota. |
| **SABARAGAMUWA PROVINCE** | | |
| Kegalle .. .. | All Divisions .. .. .. | Mr. L.D. Thambugala, A.F.O., Edurupotta, Kegalle. |
| Kandy and Matale .. | All Divisions .. .. .. | Mr. P.D. Wijesinghe, A.F.O., C/o Mrs. C. Weerakoon, Weerakoon Gardens, Kandy. |

# Gramevin
## ensures healthy weed-free estates

All estates have weed problems—weeds which deprive the soil of its fertility and moisture, and result in poor yields. Many such weeds as cooch, illuk and nut grass are most difficult and uneconomical to control manually. The best answer to these weed problems is the use of **'Gramevin'**—a Shell weedkiller. **'Gramevin'** is effective against all grassy weeds. Use **'Gramevin'** and ensure that you get the maximum crop from your estate.



This is a healthy weed-free estate

**Shell Chemicals**

SHELL

# COCONUT RESEARCH INSTITUTE PUBLICATIONS

The following publications are now available.

1. *Ceylon Coconut Quarterly*. Published bi-annually in combined double numbers.
   Subscription—**Rs. 4/50** per annum or **Rs. 2/50** per copy.
   Overseas Subscription—**Rs. 15/-**.

2. *Ceylon Coconut Planters' Review*. A popular quarterly publication.
   Subscription—**Rs. 5/-** per annum or **Rs. 1/25** per copy.

3. Back numbers of the *Ceylon Coconut Quarterly*. Available issues and prices on application.

4. *Pol Pawath*. (Quarterly Journal in Sinhala). Issued to applicants free of charge.

5. Advisory Leaflets. Issued to applicants free of charge.

## ORDER FORM

*The Chief Administrative Officer,*
*Coconut Research Institute,*
*Lunuwila.*

I enclose Rs.....by Cheque/P.O./M.O. being subscription to the *Ceylon Coconut Quarterly* and/or *Ceylon Coconut Planters' Review* for the following issues:

*Ceylon Coconut Quarterly*.....

.....

*Ceylon Coconut Planters' Review*.....

.....

Please send the above to the following address:

.....

.....

(*Block Capitals*) .....

.....

.....

*Signature*.....

C.A.C. 560-11/63

*Date*.....

# COCONUT RESEARCH INSTITUTE OF CEYLON

## STAFF

(as at 1st Aug. 1963)

Director

Dr. M.L.M. Salgado, B.Sc. (Lond.), Ph.D. (Cantab.), Dip. Agric. (Cantab.).

### Soil Chemistry

Dr. D.A. Nethsinghe, B.Sc. (Ceylon), D.Phil. (Oxon.), A.R.I.C., Soil Chemist.

### Chemistry

Dr. W.R.N. Nathanael, M.Sc. (Lond.), Ph.D. (Lond.), A.R.I.C., Chemist.

### Botany

Dr. D.V. Liyanage, Ph.D. (Manch.), B.Sc. (Lond.), Botanist.

### Agrostology

Mr. K. Santhirasegaram, Ph.D. (Adl.), Agrostologist (on overseas study leave).

Mrs. N. Rajaratnam, B.Sc. (Ceylon), Research Assistant (Acting).

### Crop Protection

Mr. U.B.M. Ekanayake, B.Sc. Agric. (Ceylon)

### Planting

Mr. P.D. Lawrence Fernando, Planting Officer.

### Advisory

Mr. C.A. Wickramasuriya, B.Sc. (Ceylon), Chief Advisory Officer.

### Administration

Mr. S.C. Kahawita, B. Com. (Lond.), Chief Administrative Officer.

### Biometrics

Mr. V. Abeywardene, Biometrician.

### Publications

Mr. A.K. Gunapala, B.A. (Ceylon), Publications Officer

PRINTED BY
THE COLOMBO APOTHECARIES' CO., LTD.
COLOMBO