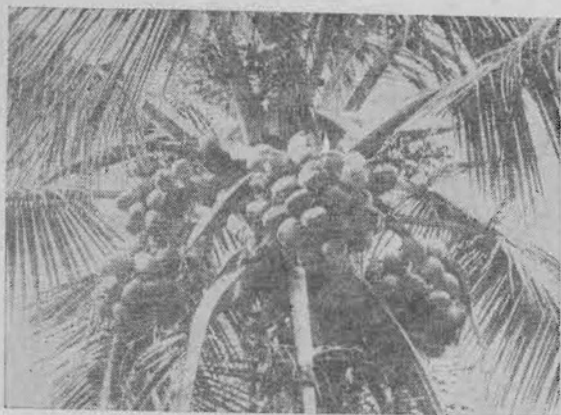


Pamphlet No. 1

COCONUT

PACKAGE OF PRACTICES



To
CENTRAL PLANTATION CROPS
RESEARCH INSTITUTE

KASARAGOD 670 124

Kerala India

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COCONUT

PACKAGE OF PRACTICES

1. Introduction :

The coconut palm, *Cocos nucifera* L., is one of the most beautiful and useful palms in the world. It is important in that it provides a variety of useful products. Every part of the tree is being utilised for some purpose or the other. On account of this, it is called **Kalpavriksha**, the "tree of heaven"--the tree that provides all the necessities of life.

India ranks third both in terms of area and production of coconut among the different coconut producing countries in the world with 1.08 million hectares and 5677 million nuts. India's per hectare yield of coconut is only 5249 nuts which is considered very low compared to its potential. The main reason for such low yield is that the cultivators do not pay much attention to its culture. In the current situation of edible oil shortage in the country, there is enormous scope for improving the existing plantations of coconut and for extending the area under this crop.

2. Climate and soil :

The coconut palm is found to grow under varying climatic and soil conditions. It is essentially a tropical plant, growing mostly between 20° N and 20° S latitudes. The limits to altitude upto which coconut can be grown successfully are set by the latitude also. The farther one goes from the equator, the more is the palm confined to low lands. Near the equator, productive coconut plantations

can be established upto an elevation of about 1000 m. The palms tolerate wide range in intensity and distribution of rainfall. However, a rainfall of about 200 cms per year and well distributed throughout is the best for proper growth and maximum yield.

3. Cultivars and hybrids:

Coconut palms are broadly classified into two groups, the Talls and the Dwarfs. The Tall varieties are the common type that occur throughout the world. The different cultivars of the Talls are known by the place where they are largely cultivated. The Tall cultivars that are largely grown in India are the West Coast Tall and East Coast Tall. The Dwarf varieties are shorter in stature and life span as compared to Talls. They start bearing earlier compared with Talls. The size of the nut and the quality of copra are inferior to Talls. The Dwarf varieties occur with three nut colours, green, yellow and orange.

The hybrids between Tall and Dwarf forms show hybrid vigour for growth and nut yield. As a consequence, hybrid seed gardens have been established or are being established in most of the coconut growing states. The hybrids are produced in two ways, with Talls as female parent (TxD) with Dwarfs as female parent (DxT). Among these two hybrids, DxT is found to be superior both in yield of nuts and copra content, and more uniform in bearing. For further details refer Pamphlet No. 16.

4. planting material:

Selection of seednuts and seedlings is of utmost importance in coconut as the performance of the new

progeny can be evaluated only several year after planting. Should the seednuts and seedlings happen to be of poor quality, the new plantation will prove to be uneconomic, causing considerable loss of time and money to the grower. The fact that the coconut is a cross-fertilised palm and that it does not breed true, makes the selection of seednuts and then of seedlings in the nursery all the more difficult and important. By means of a series of selections made at different stages, it is possible to eliminate poor quality seednuts and seedlings.

For details regarding selection procedure and nursery techniques, refer pamphlet No. 6.

5. Establishing plantation:

5.1. Selection of site: Shallow soils with underlying hard rock, low lying areas subject to water stagnation and clayey soils are to be avoided as it will be difficult to raise successful cocount plantations under such conditions. However, in lands reclaimed by heaping alternate layers of sand and clay, coconut thrives well. Proper supply of moisture either through well distributed rainfall, percolation of water or irrigation, and sufficient drainage are essential for coconut.

5.2. Preparation of land and planting: Preparation of land for planting coconut depends to a large extent on soil type and environmental factors. If the land is uneven and full of shrubs, the shrubs have to be cleared and land levelled before taking pits. The depth of pits will depend upon the type of soil. In laterite soil with rocky substratum, deeper and wider pits, 1.2m x 1.2m x 1.2m, may be dug and filled up with loose soil, powdered cowdung and ash

upto a depth of 60 cm before planting. In loamy soils with low water table, planting in 1m x 1m x 1m pits filled upto 50 cm depth is generally recommended. However, when the water table is high planting at the surface or even on mounds may be necessary. Even while planting at the surface or mounds, digging pits and filling has to be done.

5. 3. Spacing: Spacing of palms requires careful consideration. A spacing of 7.5 to 9.0 m may be adopted depending on the crown size. This will accommodate 177 to 124 palms per ha under the square system of planting. If the triangular system is adopted an additional 20 to 25 palms can be planted. Also a hedge system can be adopted giving a spacing of 5.0 to 5.5 m along the rows and 9 to 10 m between the rows.

5. 4. Time to planting: In well drained soils where water stagnation is not a problem, seedlings can be transplanted with the beginning of south-west monsoon. If irrigation facilities are available, it is advisable to take up planting at least a month before the monsoon sets in so that the seedlings get well established before the onset of heavy rains. Planting can also be taken up before the north-east monsoon. In low lying areas subject to inundation during monsoon periods, seedlings are better transplanted after the cessation of the monsoon. In sandy soils burying of coconut husks in the pits before planting helps better establishment of the seedlings.

5. 5. Care of young palms: Sufficient attention will have to be paid to the young palms in the early years of growth.

The transplanted seedlings should be shaded and irrigated properly during the summer months. Irrigation with 45 litres of water once in 4 days has been found to be satisfactory in sandy soils. Provision of proper drainage is also equally important in areas subject to waterlogging.

5. 6. Manuring: An annual application of 500 g N, 320 g P_2O_5 and 1200 g K_2O per palm is generally recommended for adult plantations. Fertilizers like urea, ultraphos, rock phosphate, muriate of potash, sulphala, Factamphos and commonly available fertiliser mixtures may be used to supply the required quantity of nutrients. Fertilisers may be applied in two split doses. After the receipt of summer showers one - third of the recommended dose of fertilizers may be spread around the palms within a radius of 1.8 m and forked in. Circular basins of 1.8 m radius and 25 cm depth may be dug in July - August and green leaf or compost spread in the pits. The remaining fertilisers may be spread over the green leaf or compost in the first week of September and the basins covered.

Regular manuring from the first year of planting is essential to ensure good vegetative growth and early flowering and bearing, and high yields. The first application of fertilisers should be done three months after planting when the south-west monsoon ends on the West Coast, if seedlings are planted before the rains in May-June (see Table). During the second year, one third of the dosages recommended for adult palms may be applied in two split doses in May and September-October. This dosage may be doubled during the third year. From the fourth year onwards fertilisers may be applied at the rates recommended for adult palms.

Fertiliser recommendations for coconut (gm/tree)

	May - June			September - October			
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
First year	...	Planting in May-June		50	40	135	
Second year	...	50	40	135	110	80	270
Third year	...	110	80	270	220	160	540
Fourth year onwards	...	170	120	400	330	200	800

Under average management a minimum of 340 g N, 170 g P₂O₅ and 680 g K₂O may be applied per tree in two split doses, one - third in May-June and two - third in September - October,

When the recommended levels of nutrients are applied continuously, the soil available P₂O₅ is tend to go up. When it is more than 80 ppm, application of P₂O₅ can be slipped off for a few years till the level comes down to 60 ppm.

In addition, 1 kg of dolomite or 0.5 kg of magnesium sulphate per palm per year may be applied in acidic soils. Dolomite or lime may be broadcast in April-May in the basins and incorporated into the soil by forking and should not be applied with other fertilisers. Magnesium sulphate can be applied along with other fertilisers in the basins in September.

For areas with agroclimatic conditios as that of Kayangulam, 500 g N+300 g P₂O₅+1000 g K₂O along with 500 g MgO (3 kg Magnesium sulphate) per palm per year may be recommended for coconut.

It will be advantageous to supply large quantities of green leaf or compost where the soil is poor in organic matter content. The pits should be cleared of weeds periodically. Soil washed down by rains which may cover the collar of the seedlings should also be removed. The pit should be widened every year before the application of manure. The pits should be gardually filled up as the seedlings grows. The palms should be frequently examined for any insect attack or fungus disease and necessary remedial measures should be taken promptly.

5. 7. Irrigation : The coconut palm responds to summer irrigation. Under West Coast conditions, 6 cm irrigation once in two weeks during summer months has been found to be beneficial in sandy loam soils in increasing yields. In sandy soils where the water holding capacity is low, 2 cm irrigation once in 4 or 5 days will be beneficial.

5. 8. Intercultivation : Regular intercultivation and adequate manuring are very essential to step up and maintain the production at a high level. Tillage operations like digging the garden with 'mammotty', ploughing, forming small mounds in August-September and spreading them in December-January and making shallow basins with a radius of about 2 m at the beginning of monsoon and filling up at the close of monsoon are beneficial to the trees. In sandy soils, which are generally of low fertility and do not have a luxuriant growth of weeds, regular intercultivation may not be necessary, but in other soils which permit rank growth of weeds, inter-cultivation will be necessary to keep weeds under control. Method of intercultivation will depend upon local conditions, availability of labour, size of holding, soil type, topography and distribution of rainfall.

5. 9. Cover cropping : Cover cropping is recommended to prevent soil erosion in coconut gardens. This will also add organic matter to the soil. Leguminous crops such as *Mimosa invisa*, *Stylosanthes gracilis*, and *Calapogonium mucunoides* are generally recommended. Green manure crops like sunhemp and kolinji can also be raised and ploughed in during August-September. These crops can be sown in April-May when premonsoon showers are received.

5. 10. Inter and mixed cropping : A variety of intercrops like pineapple, banana, elephant foot yam, groundnut, chillies, sweet potato and tapioca can be raised in coconut gardens after the palms attain a height of 5 to 6 meters. In older plantations, cacao, pepper, cinnamon, clove and nutmeg can be grown as mixed crops. In places where rainfall is not well-distributed, irrigation may be necessary during summer months. However, these crops are to be adequately and separately manured in addition to the manures applied to the coconut palms.

5. 11. Mixed farming : Milk is scarce in areas where coconut is extensively grown mainly because of nonavailability of fodder. Mixed farming by raising fodder grasses such as hybrid napier or guinea grass along with leguminous fodder crops such as *Stylosanthes gracilis* has been found to be profitable. Raising the above crops in one hectare of coconut garden can support four dairy animals. The animals supply large quantities of cattle manure which, when applied to improve the soil fertility considerably. Maintaining five milch cows in an area of 1.3 ha of coconut garden gives an additional net income of Rs. 2850 per year. The yield of the palms was also increased.

6. Plant Protection :

6. 1. Pests : The major insect pests of the coconut palm are the rhinoceros beetle, *Oryctes rhinoceros*, the leaf eating caterpillar, *Opisina arenosella* (= *Nephantis serinopa*), the red palm weevil, *Rhynchophorus ferrugineus* and the root eating cockchafer, *Leucopholis coeophora*.

6. 1. 1. Rhinoceros beetle: This is the most serious pest, which has an ubiquitous distribution. The adult beetle bores through into the unopened fronds and spathes. The affected frond when fully opens will show characteristic geometric cuts. Infestation on spathes often destroys the inflorescence and thus prevents production of nuts. The beetle breeds in a variety of materials such as decaying organic debris, farm yard manure, dead coconut stumps and logs and compost. The total duration of life cycle of this pest is about six months.

Rhinoceros beetle is a prolific breeder and it can multiply wherever there are accumulation of decaying organic debris. As such, maintenance of sanitation in coconut gardens by proper disposal of decaying organic debris is an important step in the management of rhinoceros beetle. Mechanical method of control is possible by extracting the beetles with beetle hooks, without causing any further injury to the growing point of the palm. Filling the innermost three or four leaf axils of palms with a mixture of 5% BHC dust and sand in equal proportions is an effective prophylactic measure. Three applications in April, September and December are adequate to give sufficient protection to palms in heavily infested tracts. Treatment of all the possible breeding sites of the beetle with 0.01% BHC or Carbaryl is an effective method of controlling the immature stages of the pest. For 3m³ of breeding material, 350 g 50% BHC/ carbaryl have to be used. Large scale field trials using 0.01% BHC conducted in cultivators fields have shown remarkable reduction in the pest infestation. The resultant increase in yield obtained due to pest control operation was 5 to 8 nuts per palm per year. Release of

the exotic predator *Platymiris laevicollis* were found to give substantial reduction in pest infestation on the palms. Adoption of all the proven methods of beetle control in an integrated manner would give quicker reduction in pest infestation.

6. 1. 2. Leaf eating caterpillar: Leaf eating caterpillar is another serious pest of coconut in the coastal and backwater tracts. In recent years this pest got access into certain interior tracts as well and assumed severe proportions. The caterpillars live on the under surface of leaflets inside silken galleries and feed voraciously on the chlorophyll, containing functional tissues. This affects the health of the palm adversely and results in reduction of yield. The severity of infestation by this pest will be marked during the summer months from February to June. With the onset of South West monsoon the pest population begins to decline.

Spraying of infested palms with 0.2% BHC or 0.05% malathion on the lower surface of leaves (1 kg of 50% BHC WP. or 500 g of 25% malathion in 250 l of water), so as to give a thorough coverage to the larval galleries would give satisfactory control of the pest. Chemical control treatment is generally adopted only in cases of severe outbreaks of the pest. The treatment may be done at quarterly intervals in March, June, September and December depending on the abundance of the pest in the field.

As this pest is subject to parasitisation by a good number of indigenous larval and pupal parasites its biological suppression also is quite feasible. Mass

multiplication, liberation and colonisation of indigenous and/or exotic parasites in the infested fields would control the pest population. The zonal parasite breeding stations established in the major pest-infested regions are mass culturing and releasing different species of larval and pupal parasites of the pest. The Bio-control laboratory at CPCRI maintains cultures of important species of parasites for supply as nucleus culture material to the zonal parasite breeding stations for mass multiplication and release infested gardens.

6.1.3. Red palm weevil: Red palm weevil is the most dreaded pest of young coconut palms. Generally, palms of the age group 5-20 years are affected by this pest. Since the pest is a tissue borer its detection in early stage of infestation is rather difficult. The major diagnostic symptoms of red palm weevil infestation are the presence of holes, oozing out of a viscous brown fluid and extrusion of chewed up fibres through the holes, longitudinal splitting of leaf bases and wilting of inner leaves. Some times the gnawing sound produced by the grubs feeding inside will also be audible. Quite often, the infestation would become evident only when the growing point of the palm is damaged and the crown has toppled.

Affected palms can be saved by injection of Pyrethrin piperonyl butoxide (pyrocon-E) or carbaryl (Sevin) at 1% concentration. Ten milli liter Pyrocon-E or 20 g of 50% sevin in one litre water per palm should be introduced into the trunk through a hole above the infested portion, using an auger and funnel. All the holes on the affected stem should be plugged before injecting the insecticide suspension to the palm. If the pest infestation is through the

crown, the insecticide suspension should be slowly poured in after cleaning the crown of all affected materials. Trichlorphon or endosulfan 0.2% is also found to be effective in controlling this pest. A prophylactic treatment of filling all the leaf axils of young palms with BHC or Chlordane 5% dust and sand mixture in April, September and December reduces the weevil infestation.

Coconut logs 50 cm long, split longitudinally and cut surfaces smeared with fresh toddy fermented with yeast and acetic acid are effective traps. Weevils thus trapped can be collected and killed.

Entry of this pest through the cut ends of leaf base can be prevented by leaving a length of 120 cm of petiole while cutting leaves, particularly from palms of the susceptible age. Cutting steps on the stems for easy climbing also has to be discouraged as a precautionary measure to avoid entry of the pest through injured tissues. Palms affected by leaf rot/bud rot diseases are more prone to weevil infestation. As such, they are to be treated with an insecticide as well after the fungicidal treatment.

Dead palms should be cut and burnt. An intergrated approach involving all the proven methods of weevil control is quite feasible in maintaining gardens free of pest infestation.

6.1.4. Root-eating cockchafer: The soil inhabiting "white grubs" cause damage to the roots of coconut. Besides coconut, it infests tuber crops like tapioca, colocasia, sweet potato etc. grown as intercrops in coconut gardens. The leaves of affected palms become sickly pale yellow. In

cases of heavy infestation there will be immature nutfall as well.

Tilling or deep ploughing of infested soil will reduce the pest population to a great extent. Soil application of 5% aldrin or BHC or Chlordane dust @ of 120 kg per ha twice a year in April-May and August-September will control the pest. The insecticide is to be broadcast and incorporate into the soil by tilling or ploughing.

6. 1. 5. Minor pests: Among the less serious pests of the coconut palm the slug caterpillars like *Contheyla rotunda* and *Parasa lepida* at times appear in sporadic proportions and assume the status of serious pests in certain tracts. Spraying the palms with 0.1% BHC or Carbaryl would result in satisfactory control of these pests.

The coreid bug (nut criakler) *Paradasynus rostratus* has become a serious problem in many parts of Kerala. It causes damage to the buttons and tender nuts. Nuts are shed in severe cases of infestation. Even those nuts which are retained in the bunches become deformed with the characteristic crevices on the husk just below the perianth. There will also be gummy exudation from such crevices. Majority of such nuts will be totally barren or with only partial kernel development. Spraying 0.05% carbaryl or trichlorphon or 0.1% BHC or endosulfan on the crown avoiding the newly opened inflorescences will reduce pest incidence.

6. 1. 6. Mammalian pests: Rats damage tender nuts and cause severe crop losses in many places. Shed tender nuts with the characteristic holes can be located at the base of

the affected palms. Rats can be controlled by providing mechanical barriers (bands), poison baits and traps. G. I. sheet bands, 40 cm wide, fixed around the trunk of palms at a height of 2 m from the ground will serve as mechanical barriers for rats. The rats can be baited using poisons such as zinc phosphide and antiblood coagulants like warfarin compounds. Rat burrows in the field can be fumigated with aluminium phosphide tablets.

Coconut bunches can be protected from the ravages of frugivorous bats (*Pteropus edwardsii*) by covering the bunches with the thorny twigs of the wild plant, *Ziziphus* sp.

6. 2. Diseases:

The coconut palm is affected by a number of diseases, some of which are lethal while others gradually reduce the vigour of the palm causing severe loss in yield. The following is a brief account of the important diseases of coconut in our country.

6. 2. 1. Bud rot: This disease caused by a parasitic fungus, *Phytophthora palmivora* has been reported from all coconut growing states. The first symptom of the disease is the yellowing of one or two young leaves surrounding the spindle. The spindle withers and droops down. The tender leaf bases and the soft tissues of the crown rot into a slimy mass of decayed material, emitting a foul odour. The disease proves fatal if it is not checked in the early stage. Even after the death of the central bud the outer leaves and bunches may continue to remain intact for many months. Palms of all ages are susceptible to the disease, but it is more frequent in young palms. The

disease is rampant during the monsoon when the atmospheric temperature is low and the humidity is high.

If the disease is detected in the early stage when the spindle is just withering, Bordeaux paste (100 g of copper sulphate and 100 g quick lime each dissolved in 500 ml of water separately and mixed together to make 1 litre) should be applied on the crown after removing the infected tissue and a through cleaning. The treated wound should be given a protective covering till the next normal shoot emerges. Badly affected trees which are beyond recovery should be cut and burnt. As a prophylactic measure, all the healthy palms in the vicinity of the diseased one should be sprayed with 1% Bordeaux mixture.

Preparation of Bordeaux mixture (1%): Dissolve 1 kg of copper sulphate crystals in 50 litres of water. In another 50 litres of water prepare milk of lime with 1 kg of quick lime. Pour the copper sulphate solution into the milk of lime slowly, stirring the mixture all the while. Test the mixture before use for the presence of free copper (which is harmful to the palm) by dipping a polished knife in it. If the blade shows a reddish colour, add more lime till the blade is not stained when dipped afresh in the mixture. Always use wooden, earthen or copper vessels for the preparation of Bordeaux mixture.

6. 2. 2 Leaf rot: This disease, caused by the fungus *Bipolaris halodis*, is mostly prevalent in the southern districts of Kerala and generally occurs on palms already affected by root (wilt) disease. The first symptom of the disease is blackening and shrivelling up the distal ends of

the leaflets in the central spindle and in some of the younger leaves. Later, the affected portion breaks off in bits giving the infected leaves a fan-like appearance. If no protective measures are taken, each new leaf of the diseased tree gets infected with the result that a stage is soon reached when all the leaves of the tree show disease symptoms. The reduction in leaf surface adversely affects the yield.

Spraying the leaves with 1% Bordeaux mixture or any other proprietary copper fungicide such as 0.5% Fytolan or the organic fungicide 0.3% Dithane M-45 after removing all affected material once in January, April-May and September controls the disease.

The table below shows the beneficial effect of fungicidal spraying in reducing leaf rot incidence.

Mean percentage of leaf rot affected palms in an area given regular fungicidal spraying (1976-'81)

1976	1977	1980	1981
40.17	32.0	20.9	7.8

6. 2. 3. Leaf blight or grey leaf spot: This fungal disease caused by *Pestalotia palmarum* is common in most of the coconut growing states. The disease symptoms develop in the mature leaves of the outer whorl. Minute yellow spots encircled by greyish bands appear on the leaf surface which later become greyish white. These spots coalesce into irregular necrotic patches. Complete drying and

shrivelling of the leaf blade are common when the infection is severe.

Removal of the older affected leaves and spraying the foliage with 1% Bordeaux mixture will check the spread of the disease.

6.2.4. Mahali or fruit rot and nutfall: Shedding of female flowers (buttons) and immature nuts are the symptoms of the disease. Lesions appear on the young fruit or buttons near the stalk which later develop into a decay of the underlying tissues.

The disease is caused by the fungus *Phytophthora* sp. which appears as whitish webby growth on the surface of the affected part. The pathogen is more active during the rainy season when the atmospheric conditions are favourable for its growth.

A premonsoon spraying followed by one or two sprayings at intervals of 40 days is generally advisable. Spraying the leaves with 1% Bordeaux mixture or any other effective copper fungicide such as Fytolan (0.05%) will control the disease. The shed nuts should be collected and burnt.

6.2.5. Stem bleeding: The typical symptom of the disease is the exudation of a reddish brown liquid through cracks developing on the trunk. The first cracks are generally noticed in the lower portion of the stem but they spread throughout as the disease advances. On drying, the liquid turns black. The tissues around the bleeding points start decaying first which later develop into a

general decay of the tissues underneath the bark. Fatal instances of stem bleeding are not uncommon.

The cause of the disease is unknown. The fungus *Ceratostomella paradoxa* has been found to be associated with the disease. It is believed that physiological disorders may have a major role in the occurrence of the disease.

The damage to stems can be checked to a certain extent by completely removing the affected tissues using a chisel and dressing the wound with hot coal tar or Bordeaux paste.

6.2.6. Anabe roga: This disease is caused by the fungus *Ganoderma lucidum*.

The older leaves which start drooping and withering remain suspended around the trunk for several months before they are shed. Younger leaves remain green for sometime. The trees become barren due to the suppression of the inflorescence. The crown is reduced in size and the new leaves become smaller and yellowish in colour which finally wither as the bud decays.

The palms in certain areas of Karnataka, in addition to these symptoms, show bleeding patches around the base of the trunk. A brownish gummy juice exudes from these patches which slowly results in the death of the outer tissues of the trunk. As the infection advances higher up the trunk, fresh bleeding patches develop above the older ones. The tree succumbs to the disease in about two years. The sporophores (fruiting body) of the fungus are not commonly met with, but may sometimes be seen under the scaling bark close to the ground on diseased palms.

The disease can be kept under control by destroying the infected palms and preventing the spread of the fungus by digging isolation trenches about 50 cm wide and one meter deep, two meters away from the diseased palms.

6.2.7. Root (wilt) disease: The root (wilt) disease has been prevalent in the state of Kerala for nearly 100 years and is believed to have made its appearance after the great floods of 1882. It has now established itself almost contiguously in seven districts, viz., Trivandram, Alleppey, Quilon, Kottayam, Idukki, Ernakulam and Trichur. It has also made its sporadic appearance in the districts of Malapuram, Palghat and Calicut and in some groves in the neighbouring state of Tamil Nadu.

The important visual diagnostic symptoms of the disease are abnormal bending or ribbing of the leaflets, termed as 'flaccidity', a general yellowing and marginal necrosis of the leaflets. The yield is reduced considerably on account of the disease. The nuts are smaller and the kernel is thin. The oil content of copra is also reduced. The exact cause of the malady is not known clearly though association of fungi, bacteria and virus have been implicated. To reduce the loss due to the disease and to contain it to the extent possible, the following measures are recommended:

- i) Removal and burning of severely diseased uneconomic palms (yielding less than 10 nuts per year)
- ii) Application of NPK fertilizers at recommended dose, Magnesium sulphate @ 1 kg per palm per year and organic manures
- iii) Irrigation during summer months

iv) Control of leaf rot, which is usually noticed on root (wilt) affected palms, by fungicidal spraying.

6.2.8. Thatipaka disease of Andhra: The disease derives its name from the Thatipaka village of East Godavari District where it made its first appearance following the cyclone of 1949. Palms in the age group of 26-60 years are most susceptible.

Development of an abnormally large crown with dark green inner leaves and higher yield is the precursor of disease incidence. Subsequently the crown becomes smaller in size producing progressively shorter leaves. The stem begins to taper. The leaves give a fasciated appearance due to improper unfolding of leaflets. The affected trees produce smaller bunches with atrophied barren nuts. The cause of the disease is not known.

6.2.9. Thanjavur wilt: The disease was first noticed in the coastal areas of Thanjavur district following the cyclones of 1952 and 1955. It has now spread to all the coconut growing districts of Tamil Nadu.

Decay of root system, flaccidity of spindle leaves, browning of outer leaves, arrested fruit set and appearance of bleeding patches on the stem are the salient features of the malady. The affected palms die within 2-3 years. The cause of the disease is not clearly known. However, application of organic manures and irrigation could check the spread of the malady to some extent.

7. Economics:

Coconut is a small holder crop and it is commonly raised homestead gardens. If a farmer adopts the

recommended package of practices he will realise a good and assured income from this crop. The estimated costs and returns for coconut as a mono-crop show that planting of D x T hybrid is more profitable than West Coast Tall variety. The following assumptions have been made in order to work out the economics of coconut.

1. Agro-climatic condition represents South India
2. Palm population: 175/ha
3. Stabilised yield: D x T hybrid 160 nuts/palm
WCT 80 nuts/palm.
4. Labour wages: Rs. 20/working day
5. Costs of other inputs: As per 1981-82 prices
6. Price of coconut: Rs. 1.32/nut

The costs include the value of all inputs including family labour, depreciation, land revenue; water cess and interest on 50% of the total cost for 3 months in a year at the current bank rate. The income or returns include the revenue from the by-products at the present rate.

The estimated figures reveal that in the case of West Coast Tall variety of coconut the initial investment along with the recurring expenditure will be recovered by the end of 12th year of planting while in the case of D x T hybrid the same will be recovered by the end of 9th Year. The WCT variety can give a net profit of at least Rs. 8000 from 13th year and D x T hybrid can give a net profit of at least Rs. 17,000 from 10th year, by taking into consideration of the yield and price fluctuations.

Estimated costs and returns from pure coconut garden. (Rs./ha.)

Year	Costs (Rs.)		Returns (Rs.)	
	West Coast tall variety	D x T hybrid	West Coast tall variety	D x T hybrid
1st year	7,625	9,700	--	--
2nd year	5,260	7,260	--	--
3rd year	6,720	9,040	--	--
4th year	5,350	6,175	--	--
5th year	5,350	6,420	630	4,920
6th year	5,725	6,420	915	9,980
7th year	5,725	6,600	4,850	14,695
8th year	5,930	6,665	13,060	21,960
9th year	6,010	6,790	13,100	27,915
10th year	6,010	6,790	13,250	28,200
11th year	6,010	6,790	13,655	28,570
12th year	6,010	6,790	14,840	30,900
13th year	6,010	6,790	16,015	32,060
14th year	6,010	6,790	16,015	33,240
15th year	6,010	6,790	17,170	35,600
16th year	6,010	6,790	17,195	35,600
17th year				
Onwards	6,010	6,790	19,530	35,600

For further information please write to:

Head, Division of Extension

C.P.C.R.I.

Kasaragod-670 124.

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