

Strategies to Combat Root (Wilt) Disease in Kerala

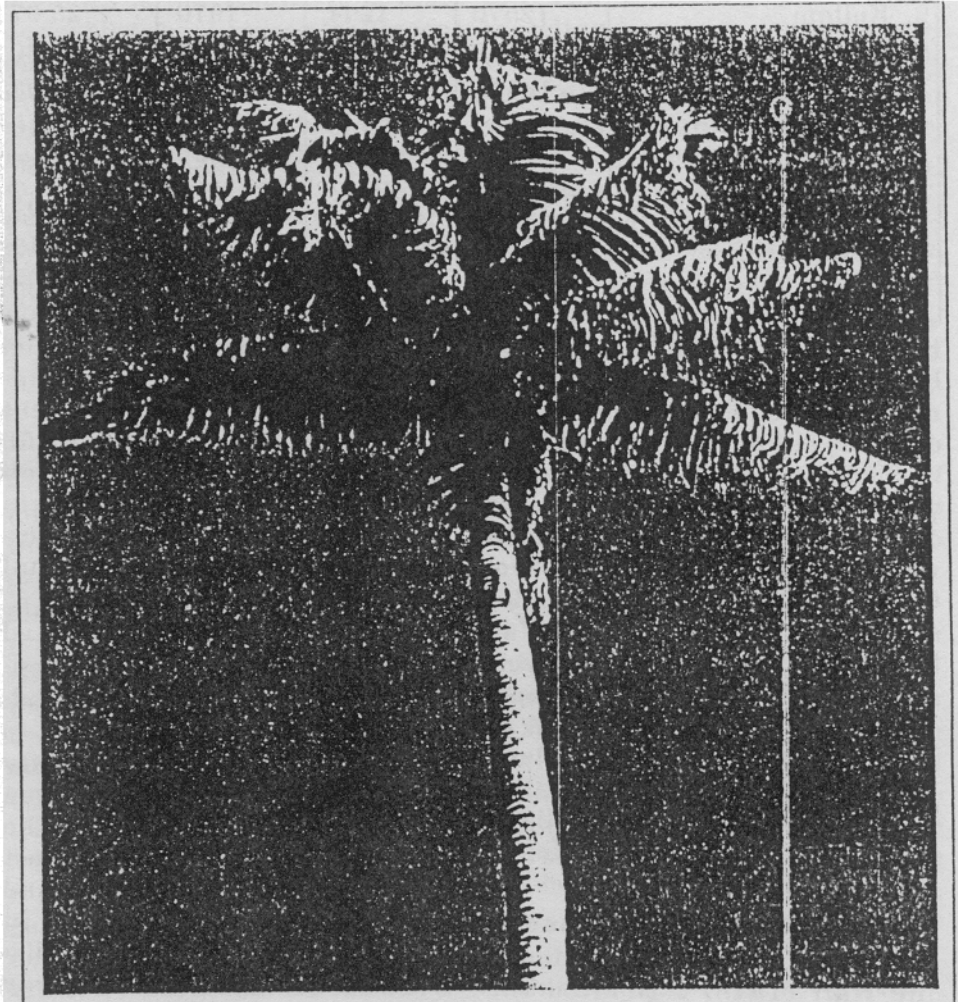
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The century old root(wilt) disease which appeared in three isolated pockets in Kerala became significantly manifested after the great floods of 1882. The earliest record of the outbreak of the disease was from Erattupetta area of Meenachil taluk, Kottayam district in around 1874. Later this was reported from Kaviyoor and Kalloopara of Thiruvalla Taluk. Now it has spread to an area of 4.68 lakh hectares, which is about 50 percent area under coconut in Kerala. The disease occurs in a contiguous manner in eight out of the fourteen districts in Kerala and sporadically in the northern districts of the state and the border districts of Tamil Nadu. The root(wilt) disease is a non-lethal but debilitating and palms of all age groups are affected. As per the coconut root(wilt) survey, 1996 the disease intensity in the contiguous diseased tracts ranged from 2.09 percent in Thiruvananthapuram district to 48.03 percent in Alappuzha district (Anon-1996). The mean percentage disease intensity in the above eight diseased districts is 24.05 percent

Symptoms

The most consistent and diagnostic symptom of the disease is the characteristic bending of the leaflets termed 'flaccidity'. Foliar yellowing and marginal necrosis are the other associated symp-



Root (wilt) affected palms

toms. Rotting of root system, drying up of spathe and necrosis of spikelets are also observed in certain cases. Delayed flowering and even nonflowering is observed in palms contracting the disease in pre-bearing age. There is reduction in the yield in the affected bearing palms. The disease is prevalent in all major soil types. The nuts from diseased palms have thinner husks and fibers which are weaker and less firm. The kernel is thinner and never

dries into hard brittle copra but remains soft and flexible. The oil content is very much reduced and the oil loses its flavour as well.

Etiology

The cause for the disease is yet to be proved beyond any doubt. A number of biological agents such as fungi, bacteria and nematodes were reported to be associated with the disease in the past. Presence of mycoplasma like organisms (MLOS) in the sieve tubes of

Table.1 Coconut-root (wilt) intensity

Sl. District	Total No. of palms (000 Nos)	Disease advanced (000 Nos)	Disease early (000 Nos)	Percentage of palms incidence
1. Thiruvanthapuram	20901	185	252	2.09
2. Kollam	12570	1294	1970	25.97
3. Pathanamthitta	6349	779	1621	37.80
4. Alappuzha	14185	2057	4756	48.03
5. Kottayam	8802	980	2406	38.46
6. Idukki	6224	825	1264	33.56
7. Ernakulam	15313	1461	3594	33.01
8. Trissur	17654	407	687	6.19
Total	101988	7988	16550	24.05

tender roots, submeristem, leaf bases of developing leaves and rachilla of tender inflorescence of diseased palms had been reported by Solomon *et al* in 1983. Constant association of mycoplasma like organisms with diseased palms was established by the scientist of Central Plantation Crops Research Institute. Recent work in the Kerala Agricultural University indicates soil factors, especially presence of heavy metals as the cause for the disease. However, further research is essential to prove the same conclusively and to establish the etiology of the disease beyond any doubt.

Intensity of the Disease

A study conducted by Menon and Nair (1948) estimated the crop loss due to the disease at 56 lakhs coconuts annually. Another survey concluded in 1976 estimated the loss due to root(wilt) as 340 million nuts. A detailed survey under the joint auspices of Coconut Development Board, Central Plantation Crops Research Institute, Kerala Agricultural University and State Agricultural Department was conducted in 1984. According to this the disease had spread to an extent of 4.1 lakh hectares in the eight southern districts of Kerala. The disease intensity in the con-

tiguous diseased tract ranged from 1.5 percent in Thiruvananthapuram district to 75.6 percent in Kottayam district (Anon. 1985). According to this survey the mean intensity of disease occurrence in these eight districts was 32.37 percent and the estimated annual loss was 968 million nuts.

A recent survey was conducted in 1996 by the Coconut Development Board and the State Agricultural Department. According to this survey the disease intensity has reduced to 24.05 percent from 32.37 percent (Anon. 1996). The disease intensity is the highest (48.03%) in Alappuzha district and the lowest in Thiruvananthapuram (2.09%) district (Table 1). In the above study the diseased palms were grouped into two categories viz disease early and disease advanced palms.

Alappuzha district has 20.57 lakhs disease advanced palms and 47.56 lakhs disease early palms whereas Thiruvananthapuram district has 1.85 lakh disease advanced palms and 2.52 lakh disease early palms. According to the survey the total number of disease advanced palms is 79.88 lakhs. These are the uneconomic palms which needs to be removed urgently.

The total number of disease

early palms in the state is 165.6 lakhs. These disease early palms and the apparently healthy palms could yield better by adopting appropriate scientific strategy and thus the disease intensity which has reduced from 32.37 percent in 1985 to 24.05 percent in 1996 can be further reduced

Root (Wilt) Management

The root (wilt) disease is only debilitating but not lethal. As on today there is no therapeutic control for the disease. The health and yield of the affected palms can be maintained at economical level through the adoption of integrated management practices. This comprises application of organics, palm waste recycling, scientific and balanced fertilizer application, cultivation of compatible crops in the interspaces of coconut, mixed farming, eradication of disease advanced and uneconomic palms, reducing the palm population to 150 per hectare, plant protection measures to control other associated diseases and pests of coconut, prevention of drought and water logging and restructuring of other perennial crop species in the garden. Though the root (wilt) affected palms respond to the above management practices, the same strategy will not suit to disease advanced palms and disease early and apparently healthy palms.

A. Strategy for Disease Advanced Palms

There are 79.88 lakh disease advanced palms in Kerala (Anon. 1996). These palms will not respond economically to any scientific care and management practices. Therefore it is uneconomic to maintain such palms in the garden. Investigations show that juvenile young palms affected by the disease before flowering may not flower at all or flower much later, yielding very few nuts. Under the circumstances, all such juvenile

palms as well as the disease advanced palms should be removed from the garden. Thus the operational strategy for root(wilt) management in the highly diseased and contiguous eight districts should be the eradication of all disease advanced and disease affected juvenile palms. Further planting in these areas is advisable only if the plant density is less than 150 per hectare and if the distance from the neighbouring palm is more than 8 m. In areas where such gap filling is adopted plant a Chowghat Green Dwarf (CGD), which is reported to be slightly tolerant. Similarly in the remaining six districts of Kerala and in the neighbouring districts of Tamil Nadu/Karnataka sporadic occurrence of the disease is noticed. All such palms should be removed as and when detected irrespective of its disease intensity.

B. Management of Apparently Healthy / Disease Early Palms

Apparently healthy palms in the disease affected areas and the disease early palms respond well to scientific management practices. There are about 165.5 lakh disease early palms in the diseased eight districts of Kerala (Anon.1996). The strategies to combat root(wilt) disease to these palms should consist of the following.

Application of Organic Manure

Apply 50 kg. farm yard manure/compost/pith manure/ other organics to all disease early palms every year along with other recommended dose of fertilizers. In a coconut garden the chances of organic recycling of coconut palm parts is much less and as such the importance of organics in a long standing perennial crop like coconut is very high. Coconut requires about 16 elements as essential for

its proper growth and performance and we supply only three to five nutrients (N,P,K,Ca& Mg) through chemical fertilizers/lime etc. Therefore for a balanced nutrient supply the application of organics is inevitable. It is also desirable to apply green leaf/green manure. For this cultivate green manure crops in the coconut basins, which could be later incorporated into the soil. After the pre-monsoon showers seeds of peuraria/cowpea/calapagonium can be sown in each basin. This can produce 20 to 25kg. green manure in three to four months. At flowering stage this can be incorporated in the basin itself.

Palm Waste Recycling

The coconut palm being a perennial tree continues to remove large quantities of nutrients from the soil. Unlike other plantation crops like rubber, coffee, etc. almost all parts of the palm are removed from the garden for domestic purposes and practically there is no self sustaining organic recycling process. The palms remove the same types of nutrients including micro nutrients and trace elements continuously for 70 to 80 years or more. Under such condition the application of inorganic fertilizers alone creates a nutrient imbalance in the plant system. This imbalance can be reduced by the application of adequate quantities of organic manures as well as by the recycling of palm waste.

Recycling of palm waste itself is very much beneficial especially for a better balance of nutrients and trace elements. For this one can apply palm wastes like leaves, crown waste, bunch parts, dried spathe, husk, husk pith etc .etc. in a small trench of convenient length, 0.5m to 0.75 m wide 0.3 to 0.5 m deep taken at a distance of two meter away from the base of the trunk. The trench may be

taken on one side of the palm (say north) in one year, opposite side (south) in the next year, on the eastern side in the third year and so on. Fill up the trench with the above palm wastes and cover with soil. This practice of palm-waste recycling has been found to improve the growth and productivity of disease affected palms.

Apply Balanced Dose of Fertilizer

Apart from the above organic manures application of recommended dose of fertilizers is essential to maintain the productivity of palms. Apply 340 g. nitrogen, 170g. phosphorous, 680 g potassium and 500 g. magnesium sulphate [Anon.1996(b)] to each palm in two splits in a year when sufficient moisture is available in the soil. For the purpose, it is sufficient to apply 740 g urea, 940 g mussoriephos, 1130 g muriate of potash and 500 g magnesium sulphate to each palm. Under rainfed condition, one third of these fertilizers should be applied in May-June and the remaining two third in September-October. In the case of irrigated palms the fertilizers can be applied in four equal splits during the month of January, April, August and October.

Inter/Mixed with Compatible Crops

Inter/mixed cropping with compatible crops in properly spaced gardens will improve the soil organic build up, increase soil microbial activity in the soil, improve aeration, moisture holding capacity and improve the soil and microclimate of the coconut garden. This will ensure better land utilization, solar energy harvesting, efficient water use, utilization of soil nutrient resources, weed control, more labour and returns and an insurance against crop failure. This should be adopted on a more scientific basis taking into consideration the soil condition, water

availability, age of the palm, marketability of the produce etc. A wide range of crops can be grown as inter/mixed crops in coconut garden. This includes cereals like upland rice, maize and millets; legumes and pulses like cowpea, groundnut, horsegram, red gram etc; tubers like tapioca, sweet potato, yams and colocasia; spices and condiments like ginger, turmeric, chillies, pepper, nutmeg, cinnamon and clove; fruit plants like banana, pineapple and papaya; beverage crops like cocoa and coffee and fodder grasses like hybrid napier and guinea grass. Whenever inter/mixed crops are cultivated both coconut and intercrops need be provided separately with the recommended doses of fertilizers and all other package of practices.

Mixed Farming

Cultivation of fodder crops and maintenance of milch cows in heavily diseased gardens facilitate organic recycling of cattle manure and other organic wastes in the garden. This helps improve the health and productivity of apparently healthy and disease early palms. In one hectare garden three to four milch cows can be economically maintained.

Control Leaf Rot

Leaf rot is another disease normally found super imposed on the coconut root (wilt) affected palms which can drastically reduce the growth and yield of the palms. This disease can be controlled by spraying any copper fungicides like bordeaux mixture 1 per cent or phytolan 0.5 per cent. For the apparently healthy and disease early palms systematic spraying helps to reduce leaf rot and increase productivity.

Protect from Pests

The apparently healthy palms and disease early palms are more susceptible to pest attack than the

disease advanced palm. So need based plant protection measures must be adopted to control the palms from such attack. The disease early palms being already weak needs protection from the attack of any pathogen/ insect pests. So the farmers should visit the garden frequently and adopt suitable plant protection measures against any pest/disease outbreak to combat the already ill healthy disease early palms.

Irrigation/Moisture Conservation

The disease early and apparently healthy palms respond well to irrigation. Adopt suitable irrigation measures wherever possible. Coconut responds well to drip irrigation and the various assistance available for the same may be suitably exploited. In areas where there is absolutely no scope for irrigation adopt suitable moisture conservation measures including husk/pith burial, mulching, etc

Drainage

Provide adequate drainage in low lying areas for increasing the soil aeration and regeneration of new roots. Disease early palms with inadequate drainage succumb to the disease at a faster rate. Therefore, adopt suitable drainage measures and apply fresh soil/silt in such low lying areas.

Restructure the Garden by Reducing Palm Population and Other Perennial Trees

One of the major inadequacy observed in many of the disease affected gardens is the non-availability of sufficient sunlight. Though the recommended palm population per hectare is only 150 to 175, the present stand is much more. A recent study conducted by the Coconut Development Board has shown the average palm population as 264 per hectare (Anon 1997). This should be reduced to the recommended level by remov-

ing all uneconomic/low yielding palms (less than 15 nuts/year). Similarly all other perennial trees in the garden should be properly restructured by cutting the branches etc. to ensure better availability of sunlight.

Conclusion

The century old root(wilt) disease is one of the major threats to the coconut farmers of Kerala. The disease intensity ranges from 2.09 per cent in Thiruvananthapuram district to 48.03 per cent in Alappuzha district with a mean incidence of 24.05 per cent. There are 79.88 lakh disease advanced palms and 165.5 lakh disease early palms in the eight southern districts of Kerala. The disease is non lethal but debilitating. By providing adequate institutional support and adopting suitable management strategy, the coconut farmers can combat this century old disease and increase the productivity from a unit area.

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