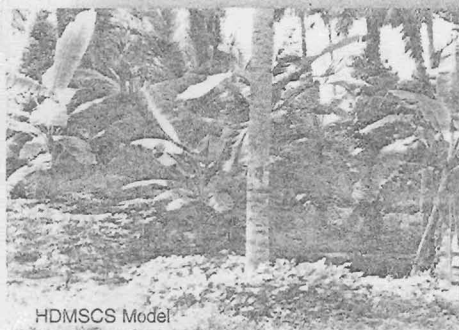
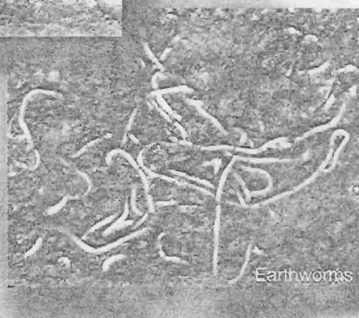


INTEGRATED APPROACH FOR MANAGING ROOT (WILT) AFFECTED COCONUT GARDENS



HMSCS Model



Earthworms



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INTEGRATED APPROACH FOR MANAGING ROOT (WILT) AFFECTED COCONUT GARDENS

Coconut root (wilt) disease is a non-lethal, debilitating malady that affects the production potential of palm. The disease is caused by phytoplasma. It is prevalent in all the eight southern districts of Kerala in varying severity and also has been reported in isolated pockets in northern districts of Kerala, in districts of Tamil Nadu bordering Kerala state and in Goa. Research efforts have resulted in evolving viable management technologies to increase the productivity of the diseased palms. The package of technologies evolved over a period of time are briefed below. Disease advanced, uneconomical palms yielding less than 10 nuts per palm per year and diseased palms in the pre-bearing stage should be removed. In homestead gardens, restructuring of other perennial crop species should be carried out to avoid the competition for natural resources.

L INTEGRATED NUTRIENT MANAGEMENT

- ♦ **Apply organic manures:** Application of organic manures improves soil physico-chemical and biological properties which results in proper supply of nutrients to coconut, and ultimately enhances yield. Apply any of the following organic manures depending upon the availability during post-rainy season (September-October) by opening a basin to a depth of 30 cm in a radius of 1.8 m from the bole along with chemical fertilizers. Farm Yard Manure -25 kg or Green leaves-25 kg or Composted coir pith-25 kg or Vermicompost-25 kg.
- ♦ **Apply balanced dose of chemical fertilizers:** In order to supply 500 g Nitrogen, 300 g Phosphorus, 1000 g Potassium, 500 g MgO to each palm every year, apply 1.1 kg of urea, 1.5 kg mussoorie rock phosphate, 1.7 kg muriate of potash and 1 kg of $MgSO_4$ (3 kg of $MgSO_4$ for Onattukara region). The above fertilizer should be applied in two splits, one-third during April-May and two-third during September-October under rainfed condition and in four splits during January, April, July and October under irrigated condition.

- ◆ **Apply Borax:** Application of borax is necessary wherever boron deficiency symptom is seen. Apply 300 g borax per palm for seedlings and 500 g borax per palm for adult palms in two equal splits.
- ◆ **Grow green manure crops:** Sowing of any of the following green manure crops during April-May (after applying first dose of fertilizer) in coconut basins (1.8 m radius) and incorporating during September – October (at the time of second dose of fertilizer application) should be followed. Green manure crops act as a cover crop, which suppresses weed growth and under sloppy land, conserves soil due to heavy rainfall.

Green manure crops: Cowpea, Sannhemp (*Crotalaria juncea*), Mimosa (*Mimosa invisa*), Calapo (*Calopogonium mucunoides*), Kudzu (*Pueraria phaseoloides*).



Fig. 1. Cowpea as green manure crop

- ◆ **Mulching with coconut leaves:** Mulching the basin with coconut leaves provides beneficial effects during summer months by reducing direct heating of soil surface and reducing evaporation of soil moisture. Coconut leaves can be mulched during October-November and retained till April-May. The epigeic earthworms (*Eudrilus* spp.) can be released in the basins which will effectively convert the wastes into rich vermicompost.

II. ADOPTION OF APPROPRIATE CROPPING/FARMING SYSTEM

Grow suitable crops as intercrops/mixed crops in coconut garden as per the soil type and agroclimatic condition. Following crops can be grown in coconut garden without affecting the yield of coconut.

1. **Tubers and Rhizomatous species:** Cassava, Elephant foot yam, Greater yam, Lesser yam, Colocasia, Ginger and Turmeric.

2. **Fruit crops:** **Banana** (varieties like poovan, njalipoovan, palayankodan, robusta, nendran, karpooravalli), **Pineapple** (Kew variety).
3. **Fodder crops:** Pusa giant napier, Hybrid napier-NB-21 and BH-18, Guinea grass, Stylosanthes, Fodder cowpea.
4. **Spices/Tree spices:** Black pepper, Nutmeg, Clove.
5. **Beverages:** Cocoa



Fig. 2. Intercropping with Banana, *Dioscorea* & Elephant foot yam

- **Multistoreyed Cropping/High Density Multi Species Cropping System:** Growing different stature crops in the same field, which ensures utilization of natural resources to the maximum extent and higher yield per unit area. In cropping system, care should be taken to add recommended organic and inorganic fertilizers for component crops separately.

Example: Coconut, pepper, nutmeg, banana, tubercrops, pineapple

- **Mixed Farming System:** Integrating with dairy enterprise in coconut garden along with growing fodder crops ensures additional employment and income for a coconut farmer coupled with organic waste for recycling and increase in coconut yield.

III. WATER MANAGEMENT AND DRAINAGE

♦ Basin irrigation:

- Irrigate 1 to 2 years old seedlings with 25-30 litre of water once in 2 days.
- Irrigate 3 to 4 years old seedlings with 75-80 litre of water once in 4 days.
- Adult palms should be irrigated with 200-250 litre of water once in 4 days.

◆ Drip irrigation:

- For 1 to 2 years old seedlings place 2 emitters 50 cm away from the base of the seedling and apply 10 litre of water per seedling per day.
- For 3 to 4 years old seedlings place 3 emitters 75 cm away from the base of the seedling and apply 20 litre of water per palm per day.
- For adult palms, 4 emitters should be placed one metre away from the bole at equidistance by opening a small pit measuring 25 cm³ in laterite and red sandy loam soil whereas, for littoral sandy soil use 6 emitters per palm placed at equidistance and apply 30-35 litre of water per palm per day.



Fig. 3. Drip irrigation layout for Coconut

- It is also possible to supply chemical fertilizer through water, which ensures high fertilizer use efficiency under drip irrigation system.
- ◆ **Perfo irrigation or Sprinkler irrigation:** This system should be adopted under high density multi species cropping system model to ensure uniform distribution of water to all the crops. Irrigate the field to a depth of 20 mm once in 4 days.
- ◆ **Drainage:** Drainage should be provided in water logged area for increasing aeration in the soil and more of soil should be applied in manuring basin to facilitate production of new roots.

IV. INTEGRATED CONTROL OF LEAF ROT DISEASE

Leaf rot disease gets superimposed on 65 per cent of root (wilt) affected palms. It reduces photosynthetic area of leaves and results in disfiguration of the palms and reduction in yield. The leaf rot disease is caused by fungi like *Colletotrichum gloeosporioides* and *Exserohilum rostratum*.

Following is the integrated schedule for the control of leaf rot disease:

- Cut and remove rotten portions of the spindle only and the adjacent two innermost fully opened leaves.
- Pour 300 ml of fungicidal solution containing 2 ml of Contaf 5% EC or 3 g Dithane-M-45 around the spindle leaf.
- Apply 20 g phorate 10G mixed with 200 g fine sand around the base of the spindle leaf.
- Treat all the palms in the garden twice a year in April-May and October-November.

In disease endemic areas collect seednuts from high yielding disease free palms of WCT, CGD and raise seedlings for future planting. Hybrid CGD X WCT can be planted in diseased area. Planting should be carried out with the quality seedlings only.

For effective control of major pests like eriophyid mite, red weevil & rhinoceros beetle adopt recommended integrated pest management practices at appropriate time.

Integrated agrotechniques improve soil physico-chemical and biological properties which inturn improves the health of the palm and results in increase in nut yield along with income year after year. Through integrated control of leaf rot disease in root (wilt) disease affected garden, farmers can improve the health of the palms by regaining the leaf area of the palm and increasing the photosynthetic area. By adopting integrated approach one can expect the increase in the yield by 25 to 83 % on an average depending upon severity of infection.

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