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PESTS AND DISEASES OF GARDEN LAND CROPS

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Coconut palm affected by root-wilt disease

DISEASES and pests pose a major threat to the garden land crops. The important diseases are the root (wilt) of coconut, yellow leaf and 'mahali' diseases of arecanut, bud rot affecting both coconut and arecanut and the wilt diseases of pepper. Numerous insect pests also infest these crops; predominant among them are rhinoceros beetle, leaf-eating caterpillar, red palm weevil and white grubs affecting coconut, spindle bugs, mites, inflorescence caterpillar and root grubs attacking arecanut and pollu beetle of pepper. The exact extent of loss due to various pests and diseases is yet to be worked out in many cases though they account for considerable crop loss. Meteorological factors like high humidity, low temperature and heavy rainfall are conducive to the incidence of diseases like bud rot and 'mahali' of coconut and arecanut, quick wilt of pepper and black pod of cacao. The population of rhinoceros beetle on the crowns of

coconut palms will be more during the south-west monsoon (July-September). The infestation of the leaf-eating caterpillar of coconut and foliage mites of arecanut is more severe during summer months especially in the coastal and backwater tracts, with the population declining with the onset of monsoon showers.

The root (wilt) disease of coconut, spreads over an area of 2.5 lakh hectares south and central Kerala, causes an estimated annual loss of Rs 300 million. About 5 per cent of the coconut palms are affected by the bud rot disease.

Flaccidity and abnormal bending of leaves, reduction in their number and size, yellowing and necrosis of leaflets, shedding of immature nuts and buttons and rotting of roots are the main symptoms associated with root (wilt). The cause of the disease is not yet fully understood. The disease is not amenable to control by conventional plant protection practices. However, judicious appli-

cation of fertilizers coupled with proper agronomic and plant protection practices checks the decline in production. West Coast Tall variety which has been grown extensively is highly susceptible to root (wilt) while hybrids, namely, Tall x Dwarf and Dwarf x Tall show better tolerance and give higher yield (Table 1).

Replacing the badly affected 'West Coast Tall' palms with hybrids will go a long way in reducing the incidence of the disease and consequent loss due to it. Raising fodder grass and legumes as mixed crops in coconut gardens under irrigation and maintaining of milch cows besides giving additional returns, reduce the yellowing in affected coconuts and increase their yield by 26 per cent.

Leaf rot, a fungal disease, caused by *Bipolaris halodes* affects the palms already weakened by root (wilt) disease. The disease can be kept under check by spraying the palms with one per cent Bordeaux mixture or 0.5 per cent copper oxychlorides.

or 0.3 per cent Dithane M-45 twice a year—in April/May and September.

Bud rot is caused by the fungus, *Phytophthora palmivora*. The fungus affects the growing bud of young palm and kills it during monsoon months. Removal of the affected and decayed tissues and application of Bordeaux paste will save the palm if the disease is detected and treated in the early stage of infection. Prophylactic spraying of all young palms below 25 years with one per cent Bordeaux mixture before the onset of south-west monsoon will prevent the disease.

Stem bleeding is a disease of complex nature characterised by the exudation of a reddish-brown liquid through the growth cracks on the stem. Removal of the affected bark and application of Bordeaux paste, providing good drainage facilities in the garden and regular cultivation practices are helpful in checking the spread of the disease.

The pests rhinoceros beetle (*Oryctes rhinoceros*), red palm weevil (*Rhynchophorus ferrugineus*), leaf eating caterpillar (*Nephantis serinopa*) and rats are causing considerable loss to the crop.

The adult rhinoceros beetle attacks the unopened leaf and spathes. The pest breeds in compost pits, decaying organic debris, farm yard manure, etc. Hooking out adult beetle from the crown, treating the breeding sites with 0.01 per cent BHC or carbaryl (350 g of 50 per cent BHC or Sevin in 3 M³ breeding material) and filling the innermost leaf axils with BHC 5 per cent dust + sand mixture are effective methods in controlling the pest.

The grubs of red palm weevil bore into the crown and chew up the tender growing tissues and consequently the palm dies. The attacked palm can be saved by injecting Pyrethrins-piperonyl butoxide (Pyrocon-E 10 ml in 1 litre water) or carbaryl one per cent (Sevin 50 per cent wp, 20 g in 1 litre water) into the infested portion.

The leaf eating caterpillar lives on

the undersurface of the leaflets inside galleries made of silken threads and eats away the functional leaf tissue. Spraying the infested palms with 0.2 per cent BHC (4 g of 50 per cent BHC in 1 litre water) or 0.05 per cent malathion (1 ml of 50 per cent Malathion in 1 litre water) on the undersurface of leaves is an effective control measure. Biological control using indigenous parasites which attack the pest at various stages of its development is also effective.

Rats which damage tender nuts can be controlled by providing mechanical barriers on the stem and by baiting them using poisons like zinc phosphide or anti-blood coagulant warfarin.

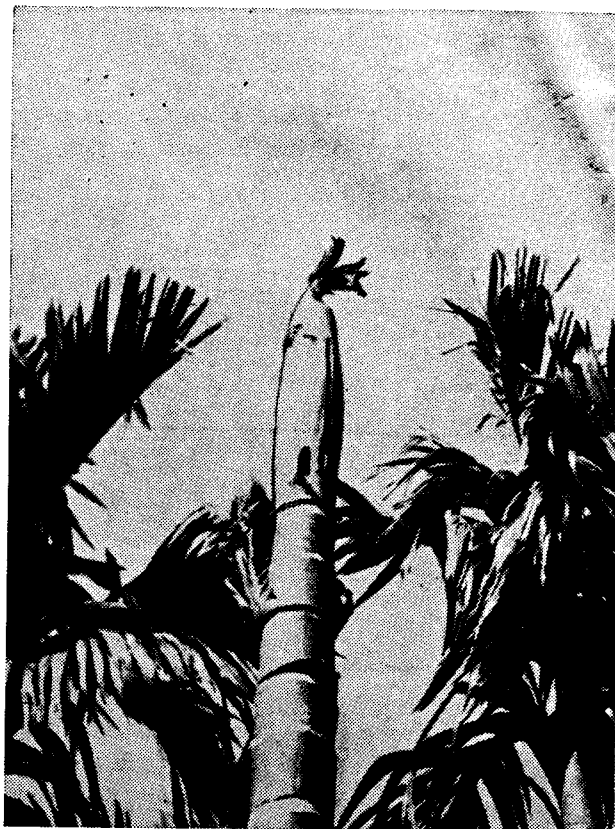
Arecanut

'Yellow leaf', 'Koleroga' (Mahali) and bud rot are the important diseases of arecanut while pests such as spindle bug, mites and inflorescence caterpillar cause considerable damage to the crop.

In the 'yellow leaf' affected arecanut palms the leaves turn yellow and the kernel of the nuts is blackened. Though the exact cause of the disease is not known, proper manuring, cultural practices and judicious irrigation help in maintaining economic yield from affected gardens.

'Koleroga' (Mahali) and bud rot are caused by the fungus *Phytophthora arecae*. 'Koleroga' attacks the bunches during the south-west monsoon period resulting in nut shedding while bud rot kills the palm outright. Prophylactic spray of palms with 1% Bordeaux mixture twice a year, first before the onset of south west monsoon and second 40 days later, protects the palms from infection. The fallen nuts and affected crown tissue should be collected and burnt lest they act as foci of infection.

The spindle bug lives inside the topmost leaf axils and sucks up sap from the unopened leaf resulting in the production of distorted and stunted leaves. This pest can be controlled by filling the innermost leaf axils with 5 g phorate 10 g at bimonthly intervals using specially



Bud rot in arecanut



Quick wilt of pepper

designed applicator.

The red mite (*Raoiella indica*) and the white mite (*Paratetranychus indicus*) colonise on the undersurface of leaves and suck the sap as a result of which the affected leaves turn yellow. The pest is effectively controlled by spraying the lower surface of leaves with 0.02 per cent chlorobenzilate or dicofol (25 per cent Akar-338 100 ml or 18.5 per cent Kelthane, 186 ml in 100 litre water) at intervals of 2 to 3 weeks till the infestation is controlled.

The inflorescence caterpillar feeds on the female flowers and causes direct damage to the crop. The affected spadices should be force-opened and sprayed with 0.125 per cent malathion (2.5 ml of 50 per cent malathion in 1 litre water).

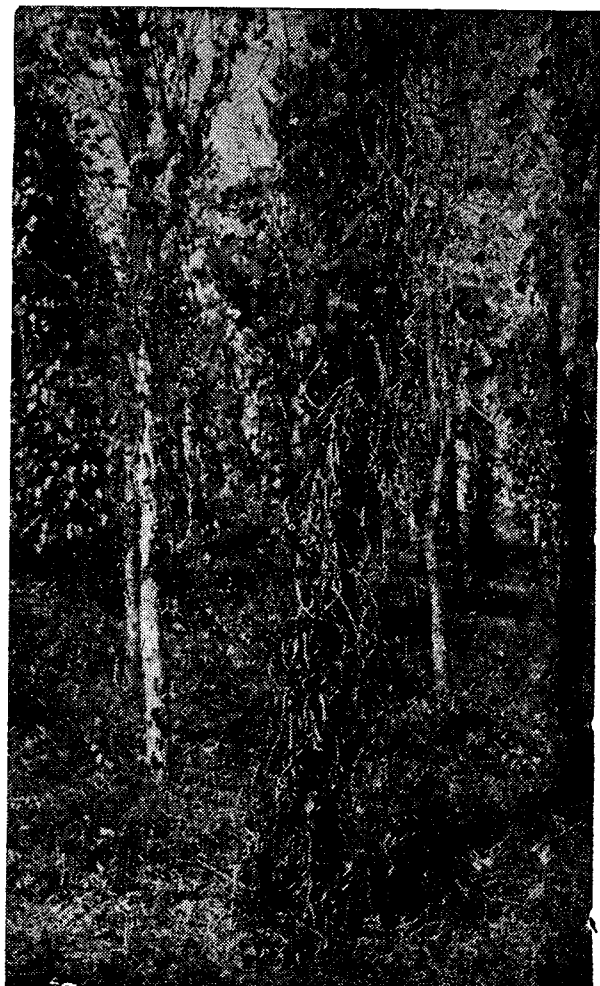
Pepper

'Slow' and 'Quick' wilt diseases and 'Pollu' beetle are the important limiting factors in pepper production. The fungus *Phytophthora palmivora* causes quick wilt. Two sprayings with one per cent Bordeaux mixture once before and after the south-west monsoon and drenching the root zone with 0.1 per cent ceresan wet solution and adoption of

phyto-sanitary measures will keep the wilt under check. Slow wilt is considered to be a complex of fungal and nematode infection coupled with nutrient deficiency in soil. Dasanit 5 g may be applied in the basins of vines at the rate of 25 to 30 g per vine and the soil drenched with 0.1% wet ceresan solution against slow wilt. The grubs of pollu beetle render the berry hollow. The infested vines should be sprayed with quinalphos or dimethoate 0.1 per cent (4 ml of 25 per cent Ekalux or 3.3 ml of 30 per cent Rogor in 1 litre water) in late July and early October.

Cacao

Leaf eating caterpillar (*Euproctis subnotata*), aphids and mealy bugs attack the cacao crop. The important diseases are the black pod caused by *Phytophthora palmivora* and Charcoal rot caused by *Botryodiplodia theobromae* and *Macrophoma* sp. The leaf eating caterpillar which feeds on tender leaves can be controlled by spraying carbaryl 0.1 per cent while mealy bugs attacking the tender shoots can be kept under check by spraying 0.05 per cent malathion (10 ml of 50 per cent malathion in 10 litre water).



Slow wilt of pepper