Confirmation of Occurrence of Root (wilt) Disease of Coconut in Dakshina Kannada District of Karnataka State

M. Sasikala, R. Chandra Mohanan, V. R. Prakash, R. Ajith Kumar, V. P. Sapna and G. Rajeev

The occurrence of root (wilt) disease of coconut was first noticed in 1882 in Erattupetta area of Meenachil taluk in Kottayam district of Kerala (Butler, 1908; Pillai, 1911; Menon and Pandalai, 1958; Koshy, 1999). Around 1907 the disease was reported from Kaviyoor and Kallooppara areas of Thiruvalla taluk in Pathanamthitta district and later from Kayangulam area of Karthikapally taluk in Alappuzha district.

The disease has since then, spread in all directions and now occurs in 0.41 million hectares, area under coconut in Kerala State. The disease is prevalent in a contiguous manner in eight out of fourteen districts in Kerala and occurs sporadically in the remaining six northern districts of the state and bordering areas of Tamil Nadu such as Shenkottai, Coimbatore, Cumbam, Pollachi and Kulasekharam (Solomon, 1994; Srinivasan *et al.*, 2000; Srinivasan and Sasikala, 2001).

The etiology of the disease has conclusively been established as phytoplasma (Solomon, 1994; Solomon and Govindankutty, 1991). Lace bug, *Stephanitis typica* and plant hopper *Proutista moesta* are the proven vectors of the disease (Mathen *et al.*, 1990; Anon, 1997).

During the investigations on yellow leaf disease (YLD) of arecanut, a phytoplasmal disease, typical symptoms of root (wilt) disease (RWD) were observed in some coconut palms in Sullia taluk of Dakshina Kannada district of Karnataka. Such palms were found in and around YLD affected arecanut gardens. Palms in the early, middle and advanced stage of RWD were observed. The earliest consistent visual symptom, popularly known as flaccidity - the characteristic bending or ribbing of leaflets on either side of leaf in the lower and middle whorl - was observed in all affected palms in different locations in Sullia taluk such as Aranthode and Goonadka. All the palms in the middle and advanced stages exhibited other important characteristic symptoms such as yellowing and marginal necrosis. Flaccidity was the only symptom observed in an affected seedling. The symptoms observed were identical to that of RWD in Kerala. Immature nut fall was observed in certain palms.

Leaf rot caused by fungal infection of spindle, the youngest unopened leaf usually appears on RWD affected palms in Kerala. But rotting of spindle leaf was not seen in the few RWD affected palms observed during this study. A more intensive garden-to-garden survey may reveal the exact picture of association of leaf rot with RWD in Karnataka. However, flaccidity, yellowing and necrosis were very conspicuous in RWD affected palms in Dakshina Kannada district of Karnataka.

A garden having both RWD affected coconut and YLD affected arecanut palms

Usually RWD is identified based on visual symptoms in

Central Plantation Crops Research Institute, Regional Station, Krishnapuram, Kayangulam, Kerala, 690 533.

A WCT coconut palm at Goodnadaka, D.K. district showing severe incidence of RWD

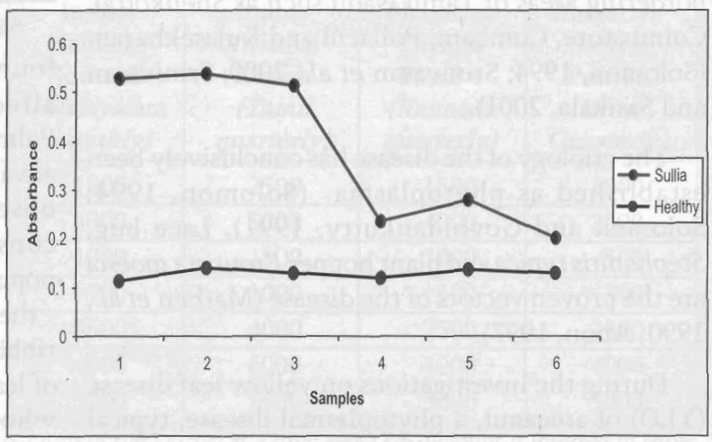
Typical foliar symptoms of RWD - flaccidity, yellowing and marginal necrosis

areas where the disease is already prevalent. But in the areas where the disease has been newly noticed, correct detection of the disease by sensitive diagnostic techniques is necessary to establish the etiology. Serological techniques have been found to be effective tools for diagnosis of RWD even before symptom expression. Sensitivity, rapidity and versatility are the major criteria for the wide acceptability of these tests to plant pathologists.

Enzyme Linked Immunosorbent Assay (ELISA) is a rapid and sensitive diagnostic technique standardized at CPCRI for detection of RWD (Sasikala *et al.*, 2001). ELISA has been carried out to confirm the occurrence of RWD in Karnataka State. For this, creamy white tender leaflets were collected from the middle portion of the spindle leaf of six palms, three of them resembling RWD early and three resembling disease middle stage, from Goonadka area of Sullia taluk. The samples were separately labelled and packed in polythene bags and brought in icebox to the laboratory. For ELISA, 0.5 g of leaf tissue from each sample was separately cut in to small pieces, soaked in 5 ml, 0.05M carbonate-bicarbonate buffer (pH 9.6) containing additives (gelatin 1% and ovalbumin 0.2%) and then homogenized with the help of a tissue homogenizer. The extract was centrifuged at 5000 rpm for 10 min and the clarified extract was used as test antigen.

Polyclonal antiserum (phytoplasma specific), prepared by immunizing white rabbits (New Zealand variety) with purified RWD phytoplasma, was used as primary antibody in ELISA. Horseradish - peroxidase conjugate and Tetramethyl benzidine were used as enzyme conjugate and substrate respectively. Wells of a polystyrene microtitre plate was first coated with 100µl test antigen followed by 100 µl each of unfractionated phytoplasma specific antiserum and enzyme conjugate. In between each addition plate was incubated at 37°C and washed 3-5 times with wash buffer (PBS Tween pH 7.4). When enzyme substrate was added to this, all the

Root (wilt) disease affected (WCT) seedling at Aranthode, D. K. District showing characteristic symptoms - leaf bending and flaccidity



Absorbance of symptomatic palms from Sullia and negative controls

samples from palms with RWD symptoms and positive control exhibited a colour development. This was recorded by visual examination, as well as by the measurement of absorbance with ELISA reader using 450 nm filter. Samples from symptomatic palms had high absorbance value over the cut off value of negative controls (*See Fig*).

Thus, the symptoms, confirmed by ELISA, the sensitive diagnostic test, confirms the occurrence of RWD of coconut in Sullia taluk of Dakshina Kannada district of Karnataka.

A garden-to-garden survey is necessary to assess the severity of the problem and extent of spread in Dakshina Kannada district. **Being a mildly affected area, eradication of all the affected palms is the only and immediate step to be undertaken to check the spread of the disease.** Eradication of disease-affected palms to prevent the spread of the disease within the garden, as well as from garden-to-garden or locality-to-locality can be successful when continuous monitoring for occurrence of RWD and uprooting of diseased palms are taken up simultaneously. But, if the programme is not monitored uninterruptedly the desired goal will not be achieved.

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Programmes of CDB in Integrated farming for productivity improvement

The objective of the programme is to improve production and productivity of the coconut holdings through an integrated approach and thereby increasing the net income from unit holdings with the following component programmes.

(a) Management of disease affected palms

An amount of Rs.250/- per palm is provided as an incentive for removal of root wilt / thanjavur wilt / ganoderma and tatipaka disease advanced palms.

b) Laying out of demonstration plots

Financial assistance of Rs.35,000 per ha in two annual installments is provided for adoption of integrated management practices in disease affected gardens. The objective of the programme is to encourage the farmers to adopt the technology developed for the management of disease affected coconut gardens. Demonstration plots will also help in motivate farmers in adoption of result oriented production technologies.

(c) Assistance for organic manure units

To promote the use of organic manure like vermicompost, coir pith compost, ordinary compost and FYM in coconut holdings. Financial assistance of Rs.20000 per unit or 50% of cost of production is provided for setting up of a unit.

(d) Integrated pest management

To assist in control of sporadic incidence of pests through integrated approach.

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