

# Mid whorl yellowing of coconut: a serious concern of coconut farmers

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Coconut, one of the main agricultural crops in Kerala, directly and indirectly forms the major source of livelihood for lakhs of farming families. Many pests and diseases affecting coconut palms cause widespread crop damage leading to huge economic losses. Rhinoceros beetle, red palm weevil, eriophyid mite, whitefly, black headed caterpillar, bud rot, root (wilt), stem bleeding, ganoderma wilt, inflorescence blight nut fall and leaf rot are the major pests and diseases of coconut resulting in considerable monetary losses.

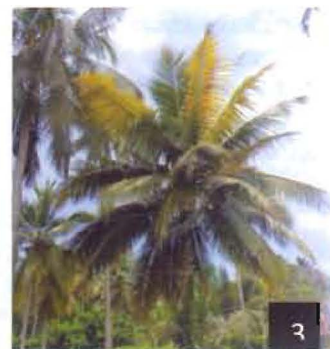
In the recent years, coconut farmers of the state are facing another threat, the mid whorl yellowing / lethal yellowing disease of coconut. The disease was first seen in the districts of Thiruvananthapuram, Kollam and Pathanamthitta in southern region of Kerala in 2010. The disease spread to Thrissur, Wayanad, Kannur and Kasargod districts over a period of last 10 years. Coconut palms infected with mid whorl / lethal yellowing die within 2 years. In a purposive survey conducted across Kerala, it has been found that the disease is equally prevalent in all types of soils even in coconut gardens with good management practices.

## Symptoms

The disease affects coconut palms of all ages. However, disease symptoms are mainly seen in palms that are 10 to 25 years old. It affects all tall and yellow dwarf varieties of coconut. The first visual symptom on infected bearing coconut palms is the premature nut fall/fruit drop. Most of the fallen nuts have brown to black water-soaked regions under the calyx (Figure 1). Sometimes the farmers may believe that these sudden

nut falls from apparently healthy palms is due to the deficiency of certain micronutrient in the soil. This nut fall is followed by blackening/necrosis of newly emerging inflorescences. Most of the male flowers will be dead, and there will not be any fruit set in the affected inflorescences (Figure 2). In short, the vitality of the reproductive system is adversely affected in the diseased coconut palms. Inflorescence necrosis, shedding of female flowers and pollen sterility render the palm unproductive.

As the inflorescence necrosis phase progresses, yellowing of the leaves starts from the leaves in the middle whorls, advancing upwards, affecting the younger and finally the upper leaves. In the initial stages of yellowing, the infected palms can be differentiated from symptomless palms from a far distance through the presence of the characteristic middlewhorl yellowing (Figure 3). Leaf yellowing, the most conspicuous symptom starts in a peculiar manner (Figure 4). Initially the yellowing occurs only in tip leaflets of the middle whorl and it progresses towards the basal leaflets. The either side of the leaf let midrib remains green and the rest of the leaf lamina turns in to golden yellow colour (Figure 5). The yellow leaves turn brown and dry. The dried leaves remain hanging on the crown for few days before fall down (Figure 6). Eventually, the whole crown perishes, leaving a bare trunk or 'telephone pole'. Mid whorl yellowing is quite different from root (wilt), which cause widespread crop damage in southern Kerala, and has the symptoms like inflorescences necrosis, shedding of immature nuts and flaccidity, ribbing, marginal yellowing and necrosis



of leaflets, rotting of root tips and leaf rot. Root (wilt) is a debilitating disease and takes many years to kill the palms. On the contrary, the mid whorl yellowing disease leads to the complete fall of immature nuts from affected palms and make them sterile. The infected palms do not produce symptoms like flaccidity / ribbing of leaves, leaf rot and rotting of root tips.

## Etiology

Symptoms of mid whorl yellowing disease are similar to the phytoplasma disease called lethal yellowing, which is found in coconut palms in African and American continents. Recently, phytoplasmal lethal yellowing of coconut has been reported in Tamil Nadu. The College of Agriculture, Vellayani and Coconut Research Station, Balaramapuram under Kerala Agricultural University have launched comprehensive research projects to identify the causal organism of mid whorl yellowing disease in Kerala.

## Control measures

- Remove and destroy the diseased coconut palms along with roots.
- Plant resistant cultivars like Chowghat Green Dwarf, Malayan Green Dwarf and other hybrid seedlings having these cultivars as one of the parent.
- Ensure the good health of coconut palms by adopting integrated and balanced fertilizer management using both organic and chemical fertilizers.
- Apply 1 Kg lime/dolomite, after receiving the summer rain.
- Add 50 kg of organic manure (dung, green manure, compost) annually.
- Apply fertilizers for coconut palms in average management at the rate of 340 g N (urea 740 m), 170 g P<sub>2</sub>O<sub>5</sub> (rajphos 1060) and 680 g K<sub>2</sub>O (Murate of Potash 1330 gm) per palm per year.
- Apply fertilizers and manures in 10 cm deep circular basins at a radius of 1.8 to 2.0 m from the bole of the coconut palm
- Under rainfed conditions apply fertilizers in 2 splits, 1/3 in June - July and 2/3rd during the month of September - October. Under irrigated conditions apply fertilizers in four equal splits during March-April, June-July, September-October, December-January
- Along with the second fertilizer dose application, 1 kg magnesium sulphate should be applied. Apart from that, 250 g of micro nutrient mixture should also be applied
- Adopt inter cropping, mixed cropping, mulching with coconut husk, husk burial and cultivation of leguminous pulse crop.
- Adopt timely plant protection measures for the management of pests and diseases.

