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Micronutrient Distribution in the Crowns of Healthy and Root (Wilt) Diseased Palms*

Investigations on soil nutrient contents in relation to root (wilt) disease (Sankarasubramoney, Pandalai and Menon, 1954; 1955; 1956; Pandalai, Sankarasubramoney and Menon, 1958) and on the comparative contents of major and secondary nutrients in the diseased and healthy palms (Varghese, Sankarasubramoney and Menon, 1959) have been documented. Nutrient abnormalities have been associated with the expression of symptoms in many crops. Root (wilt) affected coconut palms show characteristic symptoms like yellowing, necrosis and flaccidity. George and Radha (1973) formulated a disease index to characterise the palms into different degrees of disease intensity based on external symptoms so that the disease complex is reduced to a single numerical expression that is open to statistical analysis.

An attempt has been made in this study to find out the relationship between micronutrient contents in the crown and disease index to know how far this integrated expression is related to micronutrient contents. No attempt has been made in this direction so far though studies by Pillai et al. (1975) and Mathew and Thomas Varkey (1976) eliminated the involvement of major and secondary nutrients respectively by quantitative evaluation. For this study, leaf samples were collected from 15 each of diseased and healthy palms sampled from the 1st, 4th, 9th, 14th and last functional leaf from an experimental field at Central Plantation Crops Research Institute, Regional Station, Kayangulam following standard procedures. The diseased palms were indexed for the intensity of the disease (George and Radha, 1973). The oven dried and powdered samples were digested in nitric : perchloric acid mixture (2:1) and analysed for Fe, Mn, Zn and Cu using atomic absorption spectrophotometer-Model Varian AA6.

The distribution of Cu, Mn, Fe and Zn in the crown of the diseased and healthy palms (Fig. 1) revealed that the contents in general except Zn were higher in the diseased palms indicating accumulation of these nutrients with the contract of disease. However, the 't' test revealed significant differences only in the case of Mn content of the 1st leaf. The comparatively higher contents of the micronutrients in the diseased palms could have resulted due to physiological derangement in the diseased palms and/or due to reduction in growth. Varghese, Sankaranarayanan and Menon (1959) observed such accumulations of major nutrients under diseased conditions. The trend of distribution of Mn, Fe and Cu in the crown was also found to be altered by disease incidence. It can be observed that Mn contents increase with increase in the age of the leaf, the contents being

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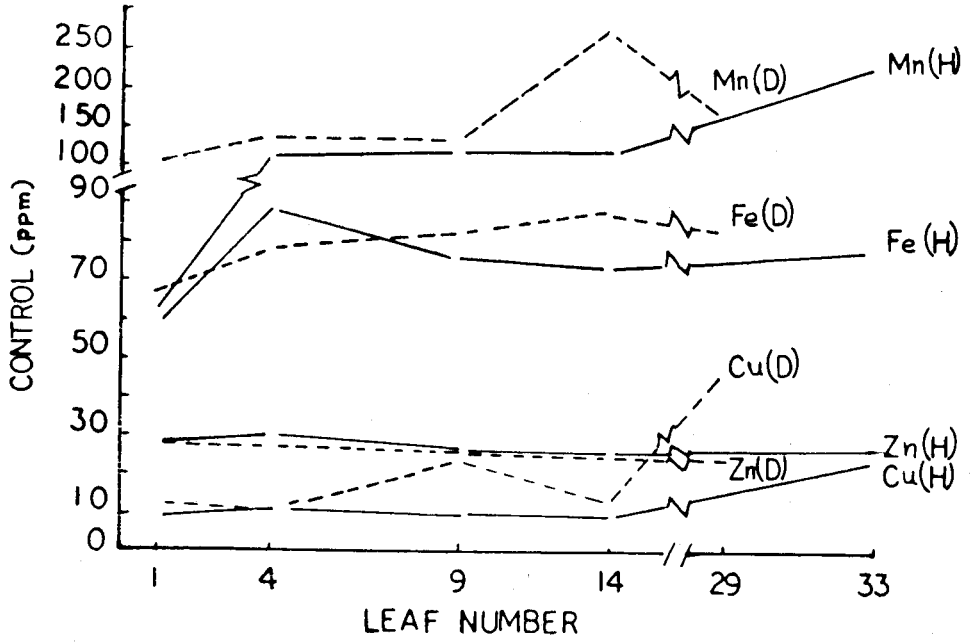

Fig. 1. Distribution of Cu, Zn, Mn and Fe in healthy and root (wilt) diseased coconut crown

higher in the diseased crown. While iron contents gradually increase with age of the leaf in diseased palm, a reduction from the fourth leaf and an uniform trend thereafter was observed in the healthy crown. Zinc contents were marginally lower in the diseased condition but maintaining an uniform trend, the values ranging from 27 to 30 ppm in the healthy palms and 25 to 27 ppm in the diseased palms. Copper contents were higher in the diseased palms with irregular increase with leaf age in the diseased conditions. It was also interesting to note that under diseased and healthy conditions the palms are maintained in the sufficiency levels of these micro nutrients under normal N, P, K fertilization itself. Kamala Devi et al. (1975) also observed increased micronutrient uptake by the palms with fertilizer application.

The correlations between elemental concentrations in question in different leaves in the crown and the disease index revealed no relationship. The failure of response to foliar application of Zn and Mo (Anonymous, 1982) in the redemption of the disease and the absence of a relationship between the nutrient contents and the disease index further indicate that even micronutrients are not directly involved in the incidence/cure of the disease. Probably detailed studies of the roots of the diseased and healthy palms may give some indications on the nature of involvement of these nutrients. Biddappa and Robert Cecil (1984) were able to

give some indications on higher concentration of certain elements in roots of diseased palms based on electron-x-ray microprobe analysis. The contract of root (wilt) disease in the young palms under a micronutrient experiment (Anonymous, 1984) also indicates the non-involvement of these nutrients in the disease. The irregular trend in the distribution of Fe, Mn and Cu in the crown of the diseased palms also indicate the loss of selectivity in the palm with the onset of disease.

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