

DISTRIBUTION PATTERN OF HEAVY METALS IN COCONUT CROWN UNDER ROOT (WILT) DISEASED AND HEALTHY CONDITIONS*

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ABSTRACT

The heavy metal contents in the coconut crown was evaluated both in root (wilt) diseased and healthy coconut palms. The studies indicated that the concentration of Cr, Pb, Ba, Bi, Ga, Sr and Li were significantly higher in the diseased palms. The localisation and translocation of heavy metals in different leaf positions are primarily dependent on nature of the metal ion itself.

INTRODUCTION

The root (wilt) disease of coconut has been attributed to the involvements of various biotic factors such as fungi (Thomas Joseph, 1978), bacteria (Srivastava, Shekhawat and Rao 1969), virus (Summanwar et al, 1969) and nematode (Khan et al, 1971) and the nutritional disorder (Cecil, 1975) However, in recent past, the direct or indirect participation of these factors in the disease syndrome has been ruled out through systematic experimentations. Of late, the presence of mycoplasma like organisms (MLOs) has been implicated in the root (wilt) disease of coconut palm, though its role in the expression of the disease has yet to be established.

Varghese, Sankaranarayanan and Menon (1957) ruled out the involvement of Sr in the incidence of root (wilt) disease. However, Biddappa

(1984) has demonstrated high concentration of certain heavy metals in the cabbage and root tissue of diseased coconut palm by employing scanning electron x-ray microprobe technique. It has been hypothesized that either the high concentration of certain heavy metals or deficiencies of certain others in the diseased coconut palms might induce derrangement of physiological processes besides rendering imbalances in the plant nutrients. Thus the metal toxicity could be related to the disease syndrome to a large extent. The distribution pattern of heavy metals in the coconut crown under diseased and healthy condition is of great significance in understanding the nature of the disease.

The present paper primarily deals with the distribution pattern of certain heavy metals in different leaf position

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The results pertaining to Ga (Table II) have indicated that first leaf does not show significant difference between diseased and healthy palms. However, a marked variation has been exhibited among soils as well as diseased status with the maturity of leaf. The diseased palm leaves invariably contained higher Ga content than healthy leaves. The Ni content (Table III) in the 14th leaf showed significantly higher concentrations in the diseased leaf. The influence of soils and their interaction was significant only for the 14th leaf.

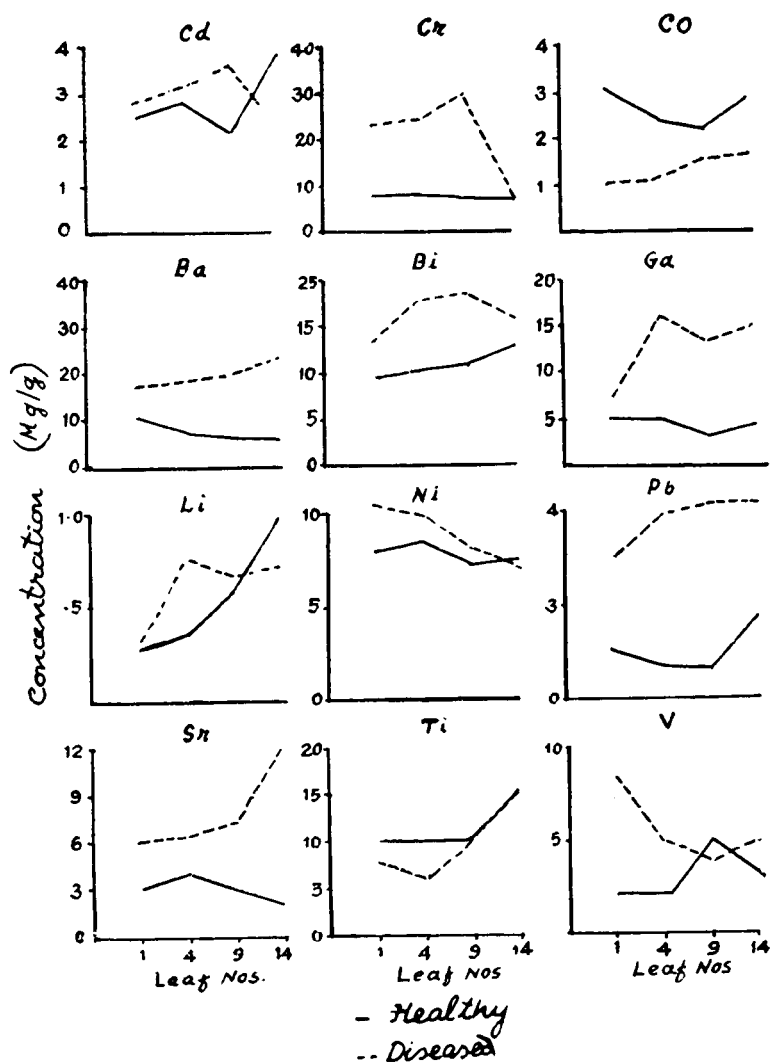
Although the Li content (Table III) in the diseased palm was relatively more than the healthy, the difference was not significant. It is also evident from the results that the laterite soil supported least uptake of Ni compared to sandy and alluvial soils. The results of Pb content (Table III) in the crown revealed that the leaves of the diseased palms irrespective of leaf maturity contained higher amount of pb than the healthy leaves. However, the influence of soil was reflected significant only in the Pb content of first leaf. The interaction between soils and diseased status was significant for the first leaf concentration. In general, laterite soil supported lower uptake of Pb by the coconut compared to remaining soils.

The Sr content in the first and the 4th leaf was not significantly different between diseased and healthy palms and among soils (Table IV) while markedly high concentration of Sr in 9th and 14th

Table III. The contents of Li, Ni and Pb in different leaf positions of diseased and healthy palms sampled from different soils ($\mu\text{g/g}$)

Soils	D/H	Heavy Metals											
		Li				Ni				Pb			
		First leaf	4th leaf	9th leaf	14th leaf	First leaf	4th leaf	9th leaf	14th leaf	First leaf	4th leaf	9th leaf	14th leaf
Sandy	Diseased	0.29	0.62	0.78	0.70	11.25	12.62	9.00	7.12	1.00	3.62	5.00	5.50
	Healthy	0.34	0.52	1.29	2.38	8.38	9.25	12.25	10.38	4.00	0.75	1.25	2.38
Laterite	Diseased	0.22	0.36	0.65	0.84	6.62	5.50	8.25	7.50	0.12	3.12	6.88	3.12
	Healthy	0.34	0.38	0.31	0.46	9.00	6.00	4.25	6.09	2.88	0.62	0.88	0.75
Alluvial	Diseased	0.52	0.50	0.62	0.68	14.50	10.50	6.88	6.25	2.00	5.25	2.88	4.88
	Healthy	0.22	0.24	0.31	0.66	6.38	10.75	5.62	6.62	2.38	0.95	0.00	2.75
CD for soils		NS	NS	0.45*	0.43**	NS	NS	3.73**	NS	1.15**	NS	NS	NS
CD for D/H		NS	NS	NS	0.35*	NS	NS	NS	NS	0.45*	1.81**	2.11**	1.87*
CD for soils \times D/H		NS	NS	NS	0.61**	NS	NS	NS	NS	1.64**	NS	NS	NS

FIG. 1. DYNAMICS OF HEAVY METAL CONCENTRATION IN COCONUT CROWN



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