Nutrient Distribution in the Crown of Healthy and Root (Wilt) Affected Coconut Palms

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ABSTRACT

The pattern of distribution of nutrients in the crown of coconut palm as influenced by root (wilt) disease was studied to examine whether 14th leaf is suitable for comparison of nutrient status between healthy and diseased palms. The results indicated that the nutrient levels in the leaves of diseased palms are generally higher than in healthy ones. The differences in foliar levels of nutrients are more conspicuous for leaf ranks 4 and 6 than when the nutrient levels of 14th leaf were compared. It is concluded that 14th leaf which is generally considered as the index leaf for nutrient deficiency diagnosis in coconut is not suitable for comparison of the nutritional status of healthy and root (wilt) affected palms.

INTRODUCTION

The nutritional status of coconut is studied by foliar analysis for which 14th leaf starting from the first fully opened one is generally used (Wahid, 1984). It is probable that 14th leaf which is considered for nutrient deficiency diagnosis in coconut may not truly reflect the nutrient status of the palm under diseased condition. This study reports the distribution pattern of nutrients in coconut crown as influenced by root wilt disease in an attempt to examine this aspect.

MATERIALS AND METHODS

Three root (wilt) disease affected palms growing on sandy soil in Kayamkulam area and showing flaccidity, foliar yellowing and necrosis which are typical symptoms of root wilt disease were selected for the study. Healthy palms one from each location growing adjacent to the deseased palm were also chosen for comparison. All the palms were receiving uniform cultural and manurial management (0.5kg N, 0.32kg P_2O_5 and 1.2kg K_2O per palm) for over 30 years and the palms were about 45 years old. The three diseased palms supported 22, 26 and 27 leaves while the three healthy palms had 26, 27 and 34 leaves. Each leaf starting from the first fully opened one to the last undried leaf was seperately sampled from each palm. Six leaflets from either side of the rachis of each leaf were collected and dried in an oven at 75°C after removing the midrib and discarding the extreme portions on either end of the leaflets. After grinding, the samples were analysed for Kjeldahl N, P (vanadomolybdate method), K (flame photometry), Ca, Mg, Fe and Mn (atomic absorption spectrophotometry and S turbidimetry). The data are furnished for 27 leaves for healthy plants and 26 leaves for diseased plants.

RESULTS AND DISCUSSION

The soil of this area was characterised by low organic matter content (0.1%), high content of available P (115 ppm), 150 ppm K, 3.0 me/100g of Ca and 2.0 me/100g Mg.

The distribution patterns of N, P and K; Ca, Mg and S; and Fe and Mn in various leaf ranks are presented in Figs 1, 2 and 3 respectively. The concentration of N increased from first to the fourth leaf and then maintained a steady level up to 15th leaf beyond which there was a gradual decrease in the diseased palm. Almost similar pattern was seen in healthy palms also. Nevertheless the N content of healthy leaves was comparatively much lower than that of diseased palms especially in the upper 16 fronds.

In the case of phosphorus, the concentration increased initially up to 4th frond in the diseased palms which decreased gradually thereafter. Healthy palms showed a gradual decrease in P content from first to the last frond. In younger leaves up to 10th frond, the concentration of P was higher in diseased palms than in healthy palms. Beyond 14th leaf the concentration of P in the diseased palms was less than that of the healthy palm.

In both healthy and diseased palms there was a gradual decrease in foliar K level with increasing age of the leaves. As in the case of N, K levels of healthy fronds were relatively less than in diseased ones.

A gradual increase in the concentration of foliar Ca was observed with increasing age of the frond in both healthy and diseased palms. Calcium levels were higher in diseased palms up to the first twelve ranks compared to healthy palms. However, it was less than in healthy palms beyond 14th leaf.

Magnesium levels in the foliage decreased steadily with increasing rank of the leaf. The diseased palms registered a higher Mg content in all the leaves than healthy palms.

In the case of S, the concentration increased up to 8th frond beyond which there was not much difference in healthy palms. Even though a similar trend was seen in the diseased palm also, a decrease in levels occurred in leaves beyond 20th rank. Up to this rank, the concentration of S was higher in diseased palms than in healthy palms.

Iron levels did not change much with the age of the leaves. The concentration of Fe was more in the leaves of the diseased palms.

Manganese concentration remained same up to tenth leaf and increased thereafter up to 16th leaf in healthy palms. Beyond 16th leaf, Mn levels remained almost constant. In the diseased palms, Mn levels were higher than in healthy palms. However the pattern of distribution of Mn was almost same upto 20th frond. Thereafter there was an increase in the older leaves.

Generally speaking the diseased palms registered a higher level of nutrients in their foliage than the helathy palms except for phosphorus and calcium. In these two cases the foliar levels were less than that of healthy palms in older leaves beyond 12th frond. Another observation is that for most of the nutrients, the differences in levels were much more conspicuous in the younger leaves than in the older leaves. In fact the differences in nutrient levels between healthy and diseased palms were almost nil for phosphorus, sulphur, and calcium if 14th leaf rank were considered for comparison. The differences in nutrient levels are pronounced if leaf ranks between 4 and 6 were considered for comparison. This indicates that the generally accepted procedure of sampling 14th leaf for nutrient analysis in coconut may not hold good if comparison is to be made between healthy and root (wilt) affected palms. For this purpose younger leaves between 4th and 6th ranks will be much more suitable.

The distribution patterns of several nutrients studied in the coconut crop indicate that N, P, K and Mg are relatively more mobile in the palm than Ca, S and Mn. Perhaps, this may be the reason for the decrease of levels of the former nutrients with the age of the leaves,

REFERENCES

Wahid, P. A. 1984. Diagnosis and correction of nutrient deficiencies in coconut palm. *J. Plant. Crops.* 12 (2) : 98-111.

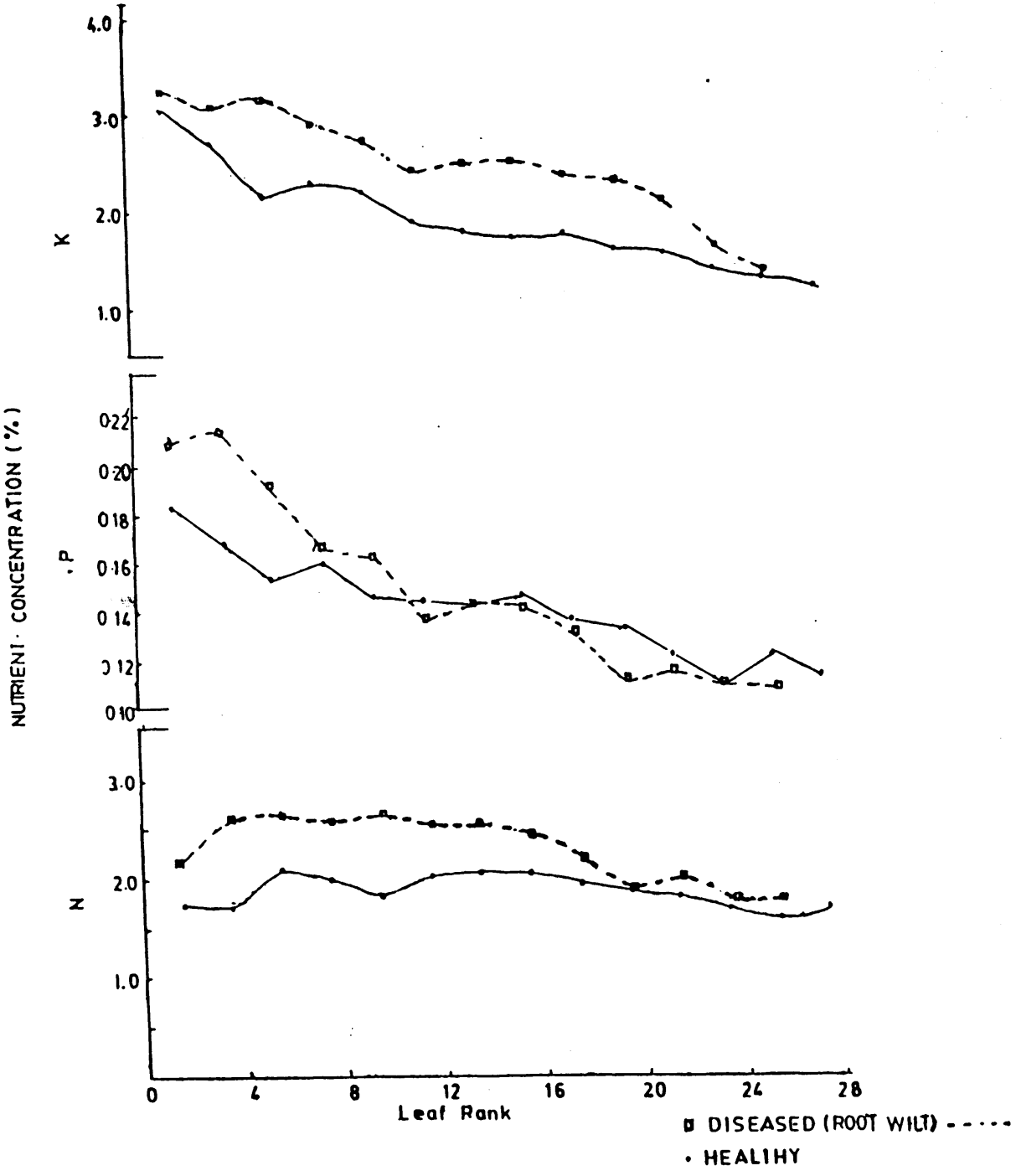

FIG 1. DISTRIBUTION OF N PK IN COCONUT GROWN

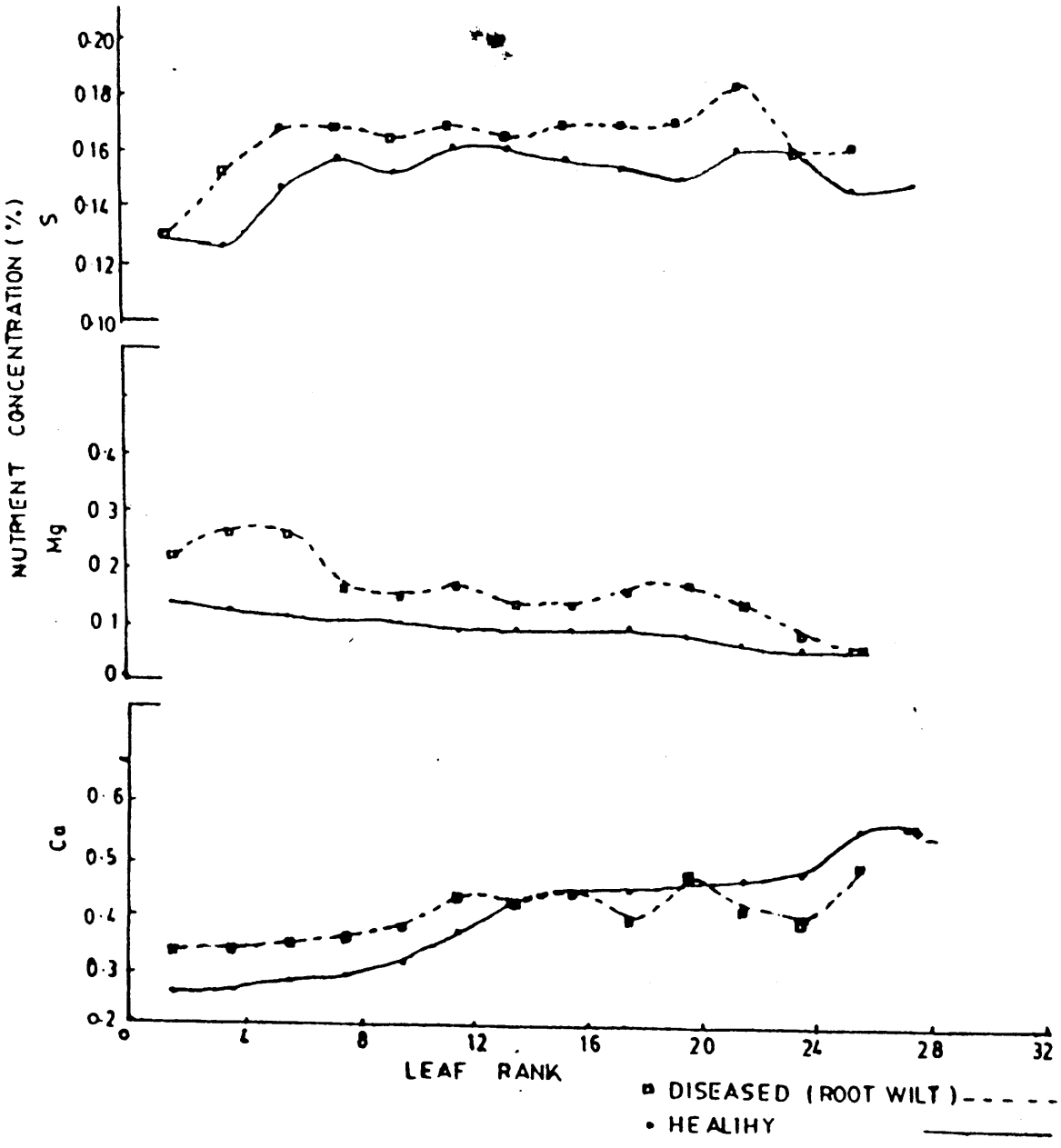

FIG. 2 DISTRIBUTION OF Ca, Mg, and S in COCONUT CROWN

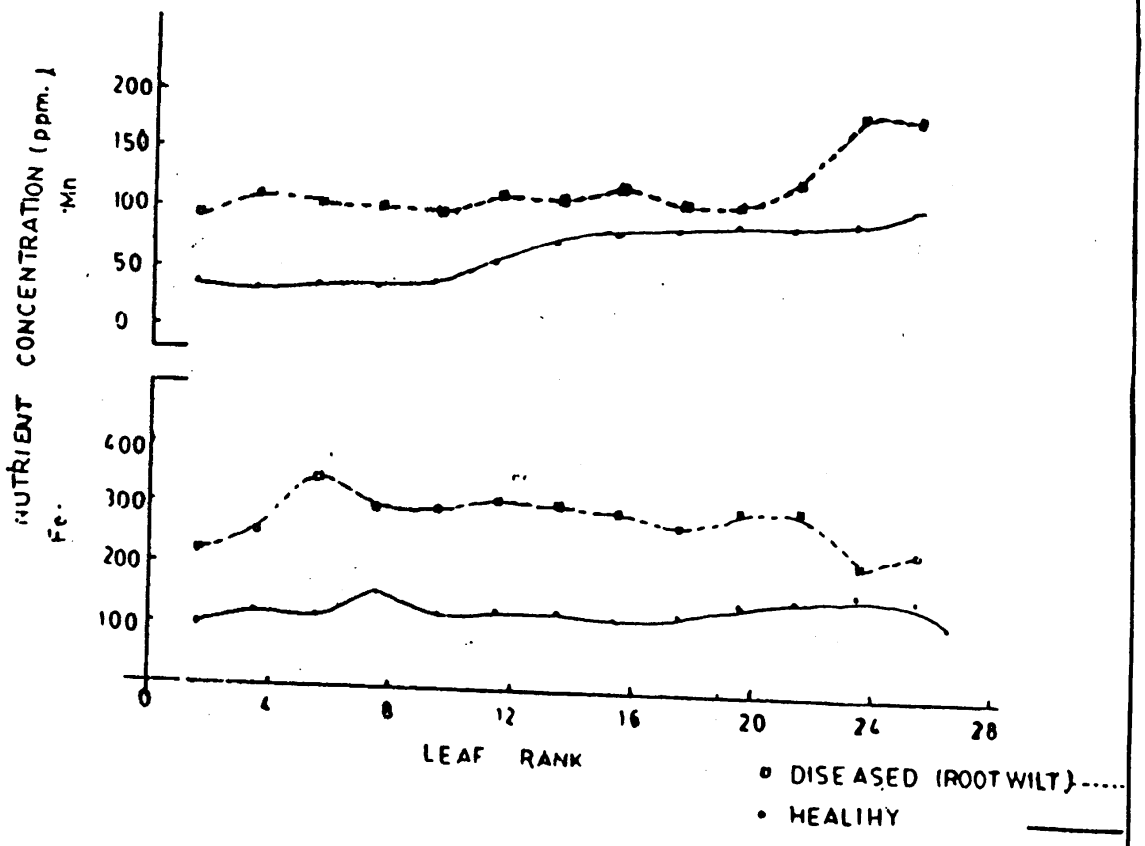

FIG 3. DISTRIBUTION OF Fe and Mn in COCONUT CROWN