

AIDS TO DIAGNOSE NUTRIENT DEFICIENCY SYMPTOMS IN COCONUT

Chacko Mathew, Scientist, S-I, Central Plantation Crops Research Institute, Regional Station, Kayamkulam.

The coconut palm is unique in that once it starts flowering the production phase lasts almost throughout the year and all through its life. Therefore, there is bound to be a steady utilisation of nutrients by the tree and consequent depletion of the same in the soil. The average annual loss of the important nutrient elements has been estimated to be 56.2 kg. nitrogen, 13.0 kg. phosphorus 70.9 kg. potassium, 34.3 kg. calcium and 12.6 kg. magnesium from a hectare of land carrying 175 coconut palms. This data clearly indicate that there is large depletion of potassium and nitrogen and lesser depletion of calcium, magnesium and phosphorus from coconut gardens. When soil is depleted of the essential nutrient elements, naturally, coconut palms growing on such soils tend to show signs of hunger, which are manifested in different ways.

Soil and plant analysis for diagnosis of nutrient deficiency.

Soil and tissue analysis are the two important tools usually employed for detecting nutrient deficiencies in plants. Analysis of soils from coconut gardens may provide indications of major deficiencies but very often it is misleading. Many nutrients may often be present in the soil and still be not available

to the palms. So also, the soil may appear from results of chemical analysis to be deficient in a particular essential element, but still the palm may thrive well and also often yield well. Soil analysis is therefore of very limited value in forecasting nutrient deficiencies in coconut. On the other hand, leaf analysis has been recognised as a more reliable method for detecting nutrient deficiencies. This

method assumes special significance in perennial crops, for they cannot be subjected as such to plant analysis as in the case of seasonal crops. Largely as a result of the pioneering work of scientists of IRHO in West Africa foliar analysis has now been widely adopted as an important guide for diagnosing nutrient deficiencies in coconut. A large amount of information

has been accumulated and provisional critical levels (levels below which the palm shows response to respective fertilisers) of major nutrients for coconut

have been suggested. Fremond and his co-workers of IRHO have suggested the following critical levels of nutrients in the 14th leaf of the adult coconut

palms. (The fourteenth leaf is regarded as the standard or reference leaf because it has reached the physiological maturity but not yet entered the phase of senescence).

N —	1.8 — 2.0	(% dry material)
P —	0.120	(“ “ “)
K —	0.8 — 1.0	(“ “ “)
Ca —	0.50	(“ “ “)
Mg —	0.30	(“ “ “)

Research workers throughout the world have generally adopted Fremond's levels as an initial guide for nutrient deficiency diagnosis, until their own results necessitated modifications. Foliar nutrient level has now been considered as one of the very effective tools to determine the fertilizer requirement of the coconut palm. It is possible to measure the degree of nutrient deficiency by leaf analysis and to assess the level at which fertilizers should be added to the soil, or supplied directly to the plant by foliar-sprays.

Visual and other symptoms of nutrient deficiency.

Visual symptoms of malnutrition appear generally in leaves and are manifested by changes in their colour and growth. These changes often serve as a guide to detect the deficiency of a particular element in the plant system. A knowledge of the various deficiency symptoms caused by the lack of different nutrient elements is helpful to detect nutrient deficiencies in coconut gardens and to correct such deficiencies by replenishing the soil with adequate fertilizers.

Nitrogen deficiency in coconut is shown by the yellowing (chlorosis) of leaves, especially of the older leaves. The younger leaves may be green but dull in appearance. Nitrogen deficiency symptoms appear last in the younger leaves because of the high mobility of this element in the plant system. The younger leaves retain their nitrogen and in addition obtain nitrogen translocated from older leaves. Under nitrogen deficient conditions, palms also show poor production of female flowers. In severe situations of nitrogen deficiency the lower most leaves may become dry and in many cases abscise.

Potassium deficiency is the most common nutrient deficiency in coconut and leads to characteristic symptoms. The palm remains small with thin trunks. The canopy is underdeveloped with fronds and leaflets smaller and fewer than normal. Yellowing of foliage is not uniform. The youngest leaves may remain green, but middle leaves turn yellow and become senescent more rapidly than usual, the dead ones hanging down giving a wretched appearance to the palm. Yellowing of the leaf-let is greater at the tip than at the petiole end.

The tip may show necrosis or drying. Much brown spotting may also occur on the leaves.

Phosphorus deficiency by itself is not very common in coconut. It does not lead to chlorosis as do most other nutrient deficiencies, but leaves may develop a dull purple tinting.

Since magnesium is the only metallic element that goes into the constitution of chlorophyll, the green colouring pigment of leaf; its deficiency naturally leads to yellowing of the foliage. Yellowing appears first in the basal leaves and eventually reaches the younger leaves. The base to tip order of appearance of deficiency symptoms indicate that magnesium, like nitrogen, is mobile in the plant system. In the individual leaflet yellowing always starts from the tip and gradually advances towards its basal end. The mid-rib remains green. As yellowing progresses there is a tendency for the leaf-lets to wither prematurely.

Calcium deficiency is not common in coconut and reports of deficiency symptoms are scanty. The optimum percentage of calcium in dry matter of leaflets of

the 14th leaf of coconut is given as 0.50 (I R H O standard), but figures higher than this is quite usual. It is reported that even at lower levels no severe symptoms occur in adult palms.

Sulphur deficiency in coconut has been reported recently from different coconut growing countries. The main symptoms of deficiency are severe yellowing of leaves, poor yields and poor quality copra. Unlike nitrogen deficient palms, sulphur deficient palms first show yellowing of younger leaves. In individual leaflet chlorosis starts from the tip but rapidly extends until the

whole leaf-let including the midrib becomes chlorotic. The occurrence of defective coconuts with a soft kernel which does not dry properly, and a soft flexible and leathery copra (which is also known as rubbery copra) are other symptoms of sulphur deficiency.

Of the several micro elements required for the proper growth and productivity of the coconut palms, only boron has been reported to produce characteristic deficiency symptoms. The 'crown-rot' disease of coconut observed in some coconut tracts, is known to be due to boron deficiency.

The symptoms of the disease are the emergence of shorter leaves with deformed, crinkled and rudimentary leaflets associated with severe tip necrosis, giving a 'choked' appearance of the fronds. Laminal expansion of the leaflets of the distal ends of innermost leaves is inhibited in the earlier stages and the leaflets become corrugated by transverse constrictions and they become thicker than normal. Studies conducted at C. P. C. R. I., Regional Station, Kayamkulam have shown that the application of borax was effective in correcting such type of deficiency symptoms in coconut.

Checking

**IF YOU ARE A COCONUT FARMER....
READ PUBLICATIONS ON COCONUT**

	Annual Subscription (Including Postage)		Cost per copy	
	Rs.	Ps.	Rs.	Ps.
1. Indian Coconut Journal (English Monthly)	—	12—00 (Inland)	1—	20
	—	47—00 (Foreign)	4—	25
2. Indian Nalikerla Journal (Malayalam Monthly)	—	5—00	0—	50
3. Sastriya Thengu Krishi (Malayalam)	—		8—	75
4. Handbook on Coconut Palm (English)	—		39—	00

Read these publications and get to know the techniques of scientific methods of coconut cultivation, control of pests and diseases. etc. for increased coconut production.

Send your subscription or cost in advance by m. o.

TO
The Chairman
COCONUT DEVELOPMENT BOARD
ERNAKULAM, COCHIN - 11
KERALA STATE, INDIA

25% commission will be allowed to agents for enlisting subscribers. For agency terms please write to the above address