ORGANIC MANURES : A POTENTIAL MICRONUTRIENT SOURCE FOR COCONUT

N A Tennakoon
L L W Somasiri
Coconut Research Institute of Sri Lanka

The elements which are required in very small amounts but essential for plant growth are known as micronutrients or trace elements. Eight such elements viz manganese (Mn), iron (Fe), boron (B), zinc (Zn), copper (Cu), molybdenum (Mo), cobolt (Co) and chlorine (Cl) have been recognized as micronutrients for plant growth.

The coconut palm takes up nitrogen (N), phosphorus (P) and potassium (K) in large quantities as primary nutrients and the magnesium (Mg) and sulphur (S) in moderate quantities as secondary nutrients. Chlorine (Cl) is also removed by the coconut palm in a large quantity which is comparable to potassium. The soil may get rapidly depleted of these nutrients due to prolonged coconut cultivation. Therefore potassium and magnesium deficiency symptoms are often visible in coconut plantations. Such deficiencies can be corrected by application of common NPK and Mg fertilizers.

Micronutrient deficiency symptoms in coconut plantations have not been observed so far except boron (B) in very few sites. In 1980's, the boron deficiency symptom first appeared in coconut palms on a heavily leached soil at Pujapitiya, in Kandy district. Later the boron deficiency symptoms appeared in Kegalle and Peradeniya areas in 1993, where coconut has been planted in uprooted rubber lands.

Visible symptoms occur in the leaf only when the deficiency is severe. When the deficiency is mild, symptoms are not visible but yield limiting conditions would occur. In such circumstances, deficiencies should be diagnosed by special techniques. Nutrient deficiencies of the coconut palm can be diagnosed easily by analysing the leaf nutrient concentration of the 14th frond. Sufficiency ranges of concentrations of primary and secondary nutrients are well established. Sufficiency ranges for few micronutrients have been determined by some workers and those for other micronutrients are under investigation.

The sufficiency ranges of micronutrients for the coconut palm are as follows.

Mn	-	60 mg/kg
B	-	8-10 mg/kg
Fe	-	40 mg/kg
Cu	-	5-7 mg/kg
Zn	-	15-24 mg/kg
Cl	-	3000-6000 mg/kg

(Manciot et al., 1979; Eschbach and Manciot, 1981; ANON,1989).

The leaf analysis of coconut palms grown on some predominent soil types in the major coconut growing areas, such as Madampe series, Sudu series, Andigama series, Kuliyapitiya series, and Kurunegala series indicated that Fe and Mn concentrations were above the respective sufficiency ranges in all five soil series. The study further showed that leaf Cu concentration of coconut in all

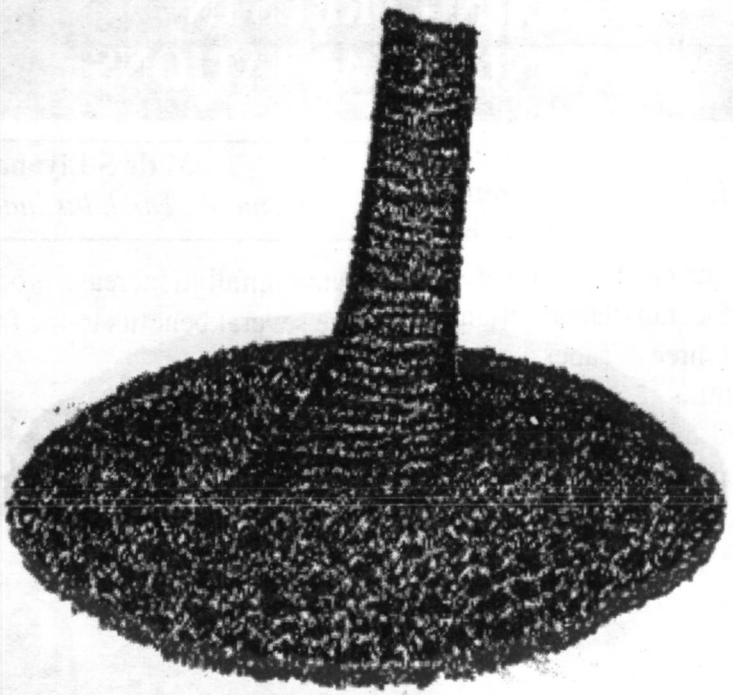
five soil types was marginal. The leaf zinc concentration was also marginal in Kuliyapitiya and Kurunegala soil series. Low concentrations of leaf boron were randomly observed in all soils irrespective of the soil type (Somasiri, 1994). Therefore, the situation is not alarming to the extent that micronutrient fertilizers to be applied to coconut. But the current situation suggests that application of organic manures to coconut could be a successful preventive measure against occurrence of micronutrient deficiencies of coconut plantations in the future.

Organic manures are rich in micronutrients as shown in Table 1. Trace elements in organic manures occur in complex forms. They are released to the soil at a slow rate depending on the rate of decomposition of organic matrix (Tennakoon, 1994). Most organic sources are applied to the coconut palm at the rate of 30 kg per palm per year, except goat dung which is applied at the rate of 15 kg per palm per year (Anon, 1987).

Obviously, organic manures can be successfully used for replenishing the soil micronutrient pool. Although the current recommendations on organic manures for coconut (eg.

Table 1 Micronutrient concentrations in different types of organic sources (Tennakoon, 1994)

Organic source	Micronutrients ppm (mg/kg)				
	Fe	Mn	Cu	Zn	B
Goat dung	1449-2174	246-505	20-38	112-184	29-66
Cow dung	690-1518	167-389	24-40	128-183	13-30
Poultry manure					
Broiler Litter	723-1565	213-421	27-40	166-271	15-27
Layer Litter	1144-2215	287-450	22-38	182-329	12-23
Pig dung	1020-1990	180-207	45-48	186-575	4-13
Farm yard manure (FYM)	1135-3515	229-668	17-29	83-128	12-27
Compost	2090-4064	201-505	11-25	75-169	12-20
Biogas residues	1097-1644	402-616	37-53	300-412	22-46
Sewage sludge	2275-3322	100-287	7-11	69-177	3-5
Gliricidia	212-450	85-156	4-5	57-70	41-69
Acacia	870-994	78-92	7-9	54-61	46-49
Pueraria	117-280	82-120	4-6	64-70	20-24



Application of organic mannure

35 kg of cattle manure, or 30 kg of poultry manure or 15 kg of goat dung) are aimed at meeting the N demand of the palm. The same amount would be sufficient to enrich the soil micronutrient pool. It is important to note that accumulation of micronutrients in the soil would become toxic to plants. Such an accumulation could result from liberal application of micronutrients. Therefore, much care is needed in using micronutrient chemical fertilizers. Whereas addition of micronutrient through organic would not cause such an accumulation due to their slow decomposition. Therefore organic manure application would be safer and more beneficial than chemical fertilizer application to the coconut palm because it supplies the required amount of primary and secondary nutrients along with micro nutrients. Improvement of soil quality around the coconut palm is another important benefit of organic manuring.

Register with CRI

Coconut cultivation is very profitable if you do it correctly with new technology. The Coconut Research Institute has different programmes to assist coconut growers to improve their knowledge on cultivation and processing. Coconut growers are requested to register with the institute to obtain these services. Please send your information to the **Director, Coconut Research Institute, Lunuwila.**