Indian J. agric. Sci. 43(6): 611–612, June 1973

Note on the mineral losses from coconut leaves by foliar leaching*

S. ROBERT CECIL[1] and N. G. PILLAI[2]

Regional Station, Central Plantation Crops Research Institute, Kayangulam

Received: 27 June 1972

Large quantities of various organic and inorganic metabolites are leached down from the above-ground parts of plants by the action of rain and dew. The influence of foliar leaching on plant nutrition, particularly the cycling of nutrients, has been well recognized, but information on this phenomenon in coconut palm is practically lacking, although Ziller and Prevot (personal communication, 1961) reported, that in Dahomey the rain water collected under the coconut palm was richer in potassium than the water falling directly from the sky.

The present study was conducted at the farm of the Central Plantation Crops Research Institute's at Regional Station Kayangulam, to study the extent of mineral losses from coconut leaves by the action of rain.

Leaf drips were collected during rains directly from the leaves in hanging glass-jars from the rachis of an upper leaf. The distal ends of about 10 adjacent leaflets were directed towards the mouth of the jar, in a slanting position, with the help of a twine, without causing any mechanical injury to the tissues. To eliminate the possibility of collecting the washing down of any dust trapped on the foliage, the leaf drips were collected after the downpour of a few heavy rains during the major rainy season (June–August). The leaf-drips collected in the jar were gathered daily till a 5-litre sample was obtained. The samples were filtered and the possible microbial activity during storage was prevented with the addition of toluene. From a palm 3 samples were collected from different leaves. A total 15 samples of leaf drips from 5 young palms (age 15–20 year) growing in the same plot were collected, along with 5 samples of rain water from the top of a 15·2-m observation tower. The rain-water samples are representative of the rainfall in June-August, which accounts for more than 75 per cent of the total precipitation in the area. The samples were analysed for N, P, K, Ca, Mg, and Na. Total N was estimated by the micro-Kjeldahl method. Phosphorus was determined colorimetrically by the Fiske and Subbarow's method. Sodium was determined gravimetrically as sodium magnesium uranyl acetate, and K by the gravimetric cobaltinitrite method. Ca and Mg were determined volumetrically as calcium oxalate and magnesium ammonium phosphate respectively.

The differences between the concentrations of nutrients from leaf drips and rain water were taken as a measure of the nutrients washed down from the foliage by rain. Considering the horizontal area covered by an average tree crown to be about 50 m^2 and the annual rainfall to be 2,500 mm, the probable loss by leaching of N, P, K, Ca, Mg, and Na annually from a single tree was computed. The values were 0·435, 0·017, 0·500, 0·147, 0·051 and 0·189 kg respectively. Nye (1961) reported an annual loss of 219·5 kg K, 29·1 kg Ca, 17·9 kg Mg, 3·7 kg P, 9·0 kg NO_3N, and 3·4 kg NH_4N/ha from forest vegetation with an annual rainfall of 1,562 mm, whereas Ingham (1950) reported an annual loss of 320 kg K/ha with an annual precipitation of 1,245 mm. Stenlid

*Part of the M.Sc. Thesis submitted by the first author to the University of Kerala, Trivandrum, in 1969.

[1]Senior Research Assistant.

[2]Present address: Soil Chemist, Central Plantation Crops Research Institute, Kasaragod 670124.

(1958) reported that K is leached more readily than other ions from individual detached leaves. Because K is extremely mobile, it was probably washed out easily from the tissues during leaching.

The annual losses of nutrient elements by leaching from a hectare of 170 coconut trees with an annual rainfall of 2,500 mm computed from the present study were 85·0 kg K, 74·0 kg N, 32·1 kg Na, 25·0 kg Ca, 8·7 kg Mg and 2·9 kg P.

REFERENCES

INGHAM, G. 1950. The mineral content of air and rain and its importance to agriculture. *J. agric. Sci., Camb.* **40:** 55–61.

NYE, P. H. 1961. Organic matter and nutrient cycles under moist tropical forest. *Pl. Soil* **13:** 333–46.

STENLID, G. 1958. Salt losses and redistribution of salts in higher plants. (*in*) *Encyclopaedia of Plant Physiology.* IV. *Mineral Nutrition of Plants*, 1st edn, pp. 615–47. RUHLAND, W. (Ed.). Springer-verlag, Berlin.

ZILLER, R. and PREVOT, P. 1961. The diagnosis of leaf. Method of study of mineral nutrition: its application to the coconut palm. Institute de Recherches pour les Huiles et Oleagineux, Paris. Personal communication to the Director, Central Coconut Research Station, Kayangulam.

Indian J. agric. Sci. **43**(6): 612–614, June 1973

Note on the effect of salts on the growth, mineral nutrition and quality of tomato (*Lycopersicon esculentum* Mill.)

G. C. NANAWATI[1] and G. L. MALIWAL[2]

Agricultural Experiment Station, University of Udaipur, Udaipur

Received: 2 November 1972

Excessive salinity limits crop growth, but very little is known about the actual mechanism responsible for the reduction. As information on the salt tolerance of vegetable crops is meagre, the present study was conducted to select varieties suitable for salt-affected areas.

The study was conducted in a greenhouse on the growth, mineral nutrition and quality of tomato grown at different levels of salinity (3, 6, 9, 12 and 18 mmhos/cm) in quartz sand. The solutions were prepared in half Hoagland nutrient solution. Sodium and calcium chlorides were used in the ratio of 4 : 1. A control was maintained in half Hoagland nutrient solution.

The dry matter and root yield decreased with an increase in the salt concentration of the medium (Table 1). Statistical analysis showed that 'Pusa Ruby' could tolerate salts up to an EC value of 6 mmhos/cm. A similar tolerance limit for tomato was observed by McNaught and Houston (1956) and Ravikovitch and Porath (1967).

To examine the extent to which the relative uptake of nutrients is influenced by excess of salts, the chemical composition of plant and root was determined (Table 1). The uptake of N, P, K, Ca and Mg decreased with an increase in the salt concentration, but Na increased both in the stem and the root. The decrease in N and P was more beyond an EC value of 6 mmhos/cm, which is the tolerance limit for this crop. The absorption of nutrients is a selective process and varies with the part of the plant. However, N, P, K, Ca and Mg decreased, and Na increased, with an increase in the salinity,

[1]Research Assistant, [2]Assistant Physical Chemist.