†A NOTE ON THE MANGANESE CONTENT OF SOME TEA SOILS IN CEYLON

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Introduction

Eden (1933) found the average manganese content of 12 soil samples from the tea-growing areas of Ceylon to be 1470 ppm, while Koch (1946) reported an average of 800 ppm with 1200 ppm as the highest for 18 surface soils from different parts of Ceylon. Tolhurst (1954) reported a chlorosis in young and old tea leaves which he believed was the first recorded instance of manganese deficiency for tea under any circumstances. Manganese deficiency symptoms were also reported by Tolhurst (1963) on tea in bonfire sites where the pH was high. A chlorosis in tea both in the low country and in Uva where the manganese content in the dry matter of tea leaves ranged from 3500 to 4100 ppm (Tolhurst 1959) was suggestive of manganese toxicity although iron deficiency could not be ruled out.

Total and available manganese (as extracted by Morgan's reagent) were determined on eight different estates in the course of an investigation on the uptake of manganese by tea under *Grevillea* shade (Kalpagé 1967). Manganese contents of these soils are reported in this paper.

Experimental

Total manganese was determined by digesting the soil with nitric and perchloric acids, centrifuging and developing the colour with potassium periodate and phosphoric acid (Page *et al* 1962). Available manganese was estimated in Morgan's extractant using 10 g soil and 50 ml extractant.

Results and discussion

The general characteristics of the soils used are described in Table 1. Table 2 shows the values obtained for the total manganese contents and the available manganese contents of the eight types of soils.

Total manganese contents varied widely from 15 ppm for the Deeside Estate soils to 662 ppm for the Hantane Estate soils. These are lower than the values reported hitherto (Eden 1933 ; Koch 1946). Swaine (1955) states that the total manganese content in most soils is in the range 200-3000 ppm while Vinogradov (1938) suggested an average value of about 600 ppm. With the exception of Hantane Estate soils, therefore, the manganese contents of the soils studied are generally low. In the case of the Hapugastenne (Maskeliya District) (50-100 ppm) and Deeside (< 15 ppm) soils the values are particularly low.

The total manganese content of a soil will depend on the mineralogical composition of the inorganic soil material and on the nature of the organic fraction. The mineralogical composition will be governed by the nature of the parent material from which the soils have been derived and, for residual soils, this in turn will depend on the nature of the parent rock.

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†*Advance Information on Research Projets*

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TABLE 1—*General characteristics of the soils used*

Location	Elevation (ft)	Colour Munsell notation	Colour name	pH	% Organic matter
1—Bohapugoda Estate	2500	7.5 YR 4/4	dark brown	4.50	1.52
2—Hantane Estate	2500	5 YR 4/6	yellowish red	4.28	2.25
3—Galaha Estate	3000	5 YR	yellowish red	4.60	3.66
4—Alma Estate	3300	5 YR	yellowish red	4.40	5.18
5—Hapugastenne Estate	3800	7.5 YR 6/8	reddish yellow	4.38	1.68
6—Deeside Estate	4000	10 YR 5/6	yellowish brown	4.58	1.88
7—Deeside Estate	4900	10 YR 6/4	light yellowish	4.98	2.88
8—Deeside Estate	5000	10 YR 5/4	yellowish brown	5.20	3.12

TABLE 2—*Total and available manganese in soils*

Location	Total Mn (ppm)	Available Mn (ppm)	$\frac{\text{Average Mn}}{\text{Total Mn}} \times 100$
1—Bohapugoda Estate	492	32.7	6.65
2—Hantane Estate	662	35.9	5.42
3—Galaha Estate	101	7.05	6.98
4—Alma Estate	247	19.59	7.93
5—Hapugastenne Estate	50-100	15	—
6—Deeside Estate	15	10	—
7—Deeside Estate	15	10	—
8—Deeside Estate	15	10	—

Gneissic and igneous rocks in the Archaean complex of Central Ceylon will contain manganese-bearing minerals such as manganese garnet. Quartzites and limestone rocks on the other hand are likely to be poor in total manganese. The extremely low manganese contents of Hapugastenne and Deeside soils, both from the Maskeliya District, indicates that rocks in this area are extremely low in total manganese. As manganese is an essential plant nutrient, this fact is of significance.

Between five and eight per cent of the total manganese was extractable with Morgan's reagent for the four soils for which accurate determinations were possible. No estimation was possible in the case of Hapugastenne and Deeside soils. Available manganese is perhaps a better index of manganese uptake by plants than total manganese and will depend on such factors as soil pH and organic matter.

Conclusion

The total manganese contents of soils from eight locations in the tea growing areas of Ceylon showed values ranging from 15 ppm to 662 ppm. These values are generally lower than those previously reported and are lower than average.

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