PLANT NUTRITION INVESTIGATIONS

COLORIMETRIC ESTIMATION OF ZINC IN PLANT MATERIAL

The colorimetric method (devised by Cholak, Hubbard, and Burkey) has been tested for the estimation of zinc in plant material. This method is based on the intensity of red coloration obtained with di-beta naphthylthiocarbazone and zinc. Experience showed the prime importance of purification of all reagents and the thorough cleansing of all apparatus used in the determination.

The greatest care was found necessary at every stage in the determination to avoid contamination from casual sources of zinc and to secure complete extraction of zinc.

Determinations made by the colorimetric method compare very favourably with corresponding determinations made by the polarograph method. Seven determinations of zinc in apple-leaf samples made by the Dominion Laboratory, Wellington, agreed satisfactorily with colorimetric determinations made on the same samples at the Cawthron Institute.

ZINC CONTENT OF APPLE-LEAVES AND FRUIT SPURS

With a view to securing information concerning the distribution of zinc in different types of apple material and at the same time obtaining suitable standards for comparison, samples of leaves, fruit buds, spur bark, spur wood, leader bark, and leader wood, obtained from several varieties of apple-trees, have been analysed for zinc contents.

The varieties of trees examined in this way included Gravenstein, Sturmer, Jonathan, and Cox's Orange. The samples of apple material were obtained from typical orchards at Mahana, Tasman, Braeburn, Redwood's Valley, Waimea West, Riwaka, and Stoke.

The leaf samples were collected at a different period and from different trees to those from which the fruit buds and other samples were obtained. On this account the zinc contents of apple-leaves are not strictly comparable to the zinc contents of the fruit buds, spur bark, &c.

In the leaf samples a variation in zinc content from 16·25 p.p.m. to 27·6 p.p.m. was obtained for eight samples of Gravenstein leaves collected from different orchards in the Nelson district, the average being 22·3 p.p.m. In the Sturmer variety, four leaf samples gave an average zinc content of 34·8 p.p.m. on the dry matter, the variation being from 28·2 p.p.m. to 40·4 p.p.m. In three Jonathan leaf samples, the variation in zinc content was from 34·4 p.p.m. to 44·7 p.p.m.

Fifteen samples of fruit buds, spur bark, spur wood, leader bark, and leader wood obtained from Gravenstein, Sturmer, Jonathan, and Cox's Orange trees were analysed separately for zinc content. As the samples of different types of apple material were obtained from the same trees, the zinc contents provide information concerning the distribution of zinc in different parts of the fruit spurs.

The determinations showed very marked differences in the zinc content of the different types of apple material. The average zinc contents for the fifteen samples were as follows: fruit buds, 83 p.p.m.; spur bark, 271 p.p.m.; spur wood, 84 p.p.m.; leader bark, 69 p.p.m.; and leader wood, 34 p.p.m., on the dry basis. Leader wood had the lowest zinc content, resembling fairly closely the zinc content of apple-leaves. The highest zinc content was found in spur bark—but very great variations in different samples occurred, the lowest zinc figure for this type of material being 81 p.p.m. and the highest 501 p.p.m.

No clear indication was obtained from the samples analysed of any association of higher zinc content with any one of the four varieties of apples or of great variation in zinc content due to location of the orchards.