

The total time required for taking all the readings necessary to find out the coefficient of absorption of energy of a leaf, is never more than three minutes, and it may be presumed that the reflecting and transmitting power of the leaf with its petiole dipped in water, does not alter materially during this period.

Having found out the incident energy (I), the reflected energy (R) and the transmitted energy (T) the coefficient of absorption (C) can be found out by the equation

$$C = \frac{I - (R + T)}{I}$$

A detailed study of the leaves of several species has been made with the help of the above apparatus and some interesting results have been noted. Further details of the apparatus and the results obtained with it will be published in due course.

U. K. KANITKAR.

12, Ganesh Wadi,
Poona 4.

¹ Brown, H. T., and Escombe, F., *Proc. Roy. Soc.*, (Lond.), (B), 1905, 76, 69-111.

² Jorgensen, I., and Stiles, W., *Carbon Assimilation*, p. 141.

³ Coblenz, W. W., *Bull. Bur. Stand.*, 1912, 9, 283-325.

⁴ Shull, C. A., *Bot. Gaz.*, 1929, 87, 583-635.

Soil Fertility and the Role of Trace Elements.

IN recent years, a great number of papers have been published on soil fertility studies and in some of these, the factors that influence the plant growth are discussed. These experiments tend to show that some of the elements needed only in small quantities, e.g., Mn, Ti, B, Zn, exercise marked influence on plant growth. Among the various workers who have contributed to this line of research mention may be made of Bertrand, Warrington, Sommer, Subrahmanyam, Dhar and Horner. The great importance of traces of Manganese for the plant has been demonstrated by McHargue, McLean, Kelley and Gerrestsen.

Kelley, while studying the soils under cane cultivation in Hawaii, observed the presence of large quantities of Mn and Ti, while Gerrestsen believes that Manganese intensifies photosynthesis by accelerating the oxidation processes connected with the photochemical reactions in the leaf, shortage of Manganese resulting in retarded carbon dioxide assimilation. In carrying out a study of the physical and chemical properties of some typical soils from cane-growing areas, which were kindly supplied to the author by the Superintendent of the Government Agricultural Farm, Anakapalli, it was felt that valuable information might be obtained by the spectrographic examination of these soils, as it would enable one to detect and identify all the metallic elements contained in them without allowing even the rare ones to escape detection. The arc spectra of many representative soil samples have been photographed. Besides the elements Na, K, Cu, Mg, Ca, Al and Si which can be detected by chemical analysis as well, the trace elements Zn, Ti, Mn and B could be indubitably detected and identified, while Be is suspected. By comparing the spectra of these soil samples with those of a series of suitable ratio powders of known composition, attempts have been made to determine the proportion of the minor constituents. The Manganese content of the majority of the fertile soils was found to range from 0.04 to 0.15 per cent., while the value of Zinc ranged from 0.03 to 0.06 per cent. Though no very definite statement can be made as to the relative importance of the trace elements, the preliminary experiments tend to show that while these elements are needed only in small quantities, they may not be present in sufficient amounts in available form. An outstanding feature of this spectrographic examination is the predominating proportion of Manganese and Zinc in some fertile soils, while all the soils of the tract seem to be comparatively rich in Silicon. Further experiments are in progress.

A. L. SUNDARA RAO.

Kodaikanal,
June 1937.