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A COMPARISON OF UV SPECTROSCOPY AND ION SELECTIVE ELECTRODE IN THE DETERMINATION OF NITRATE IN *HEVEA* FOLIAGE

Nitrate (NO_3^-) is the predominant ionic form by which most plants take up nitrogen from the soil. For a better understanding of the dynamics of nitrate in soil-plant systems, monitoring nitrate concentration within the plant is essential. Foliage nutrient content is taken as an index of plant nutrient status in *Hevea*. Hence determination of nitrate becomes frequently necessary. There are several methods for determination of nitrate (Milham *et al.*, 1970) of which the most important are reduction to ammonia followed by titration or colorimetry, selective chemical or bio-chemical reduction and its diazotisation with a variety of reagents and nitration of active organic molecules and quantitative determination of nitrate product. Most of the methods are too cumbersome for routine analysis, but the ion selective method is comparatively easy (Keeney *et al.*, 1970; Milham *et al.*, 1970). An improved method employing UV spectrophotometer has been detailed by Heanes (1982). The present attempt is a comparison of ion selective and UV spectroscopic methods in nitrate determination with a view to find out whether the latter can be used for routine analysis.

Foliage samples of *Hevea brasiliensis*, the Para rubber tree, were collected as per the method followed by the Rubber Research Institute of India (Karthikakutty Amma, 1976). Based on earlier analytical values 16 foliage samples were selected with varying total nitrogen content. The samples were dried at 65°C, ground and sieved through 25 mesh. 0.4 g of the oven dried sample was extracted with 0.025 M $Al_2(SO_4)_3$ containing 0.1 per cent sulphamic acid and oxidized activated charcoal. The absorbance of the extractant after being made up was read at 225 nm in a Hitachi UV visible spectrophotometer (Model No. 200 – 20). For the determination of nitrate using ion selective electrode, the method outlined by Keeney *et al.*, (1970) was followed. The interferences due to other anions was controlled by buffering the solutions. Buffer concentration was adjusted to suit the requirements of precipitation, decomposition or removal of interfering anions and to provide uniform physical conditions for measurement of nitrate concentration. The buffer solution used for the study was 0.010 M aluminium sulphate, 0.010 M silver sulphate and 0.020 M sulphamic acid, adjusted to pH 3.0 with 0.10 M sulphuric acid. Ionic strength adjustor (ISA) was added to all nitrate standards and samples so that the background ionic strength is high and constant relative to variable concentrations of nitrate ions. For the nitrate electrode ammonium sulphate, the recommended ISA, was used. Nitrate was determined using specific ion selective electrode model 93–07 with double junction reference electrode in an Orion 901 microprocessor ion-analyser. Ion selective electrode senses the activity which is derived from the Nernst equation:

$$E = E^\circ \pm \frac{RT}{ZF} \text{ in } a_x$$

where, E° = standard potential of cell
a_x = activity of ion x, and
Z = number of charges on x.