

Standardization of micronutrients ranges in mango (*Mangifera indica* L.) by orchard surveys

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ABSTRACT

The present investigation was carried out in mango orchards located in Himachal during 2004 and 2005. The studies were undertaken with the objectives to find out the micronutrient element status of mango orchards to establish nutrient norms based on orchard surveys. The survey was carried out on Dashehari cultivar of mango of 15 years age group. Four districts of Himachal Pradesh viz., Kangra, Una, Hamirpur and Bilaspur were selected for the studies. Twenty representative orchards were selected throughout the state. Optimum sample size of 20 trees from each orchard of high productive category (>90 kg / tree)) were selected randomly on the basis of apparent performance and the past history of the trees. Leaf samples were analyzed for micronutrient contents (Fe, Cu, Zn and Mn). Soil chemical characteristics were also assessed. Leaf micronutrient content varied from 176.5- 192.0 ppm Iron (Fe), 13.5- 26.2 ppm Copper (Cu), 27.5- 38.8 ppm Zinc (Zn) and 68.3- 79.7 ppm Manganese (Mn). For balanced fertilization and sustainable production of Dashehari orchards under agro- climatic conditions of Himachal Pradesh, the micro- nutrient standards viz., 177.1- 191.2 ppm Fe, 13.8-26.0 ppm Cu, 28.0- 38.5 ppm Zn and 68.9- 79.1 ppm Mn, were developed.

Key words: Survey, Orchard, Soil Characteristics, Micronutrient, Mango.

Nutrients are essential for the productivity and quality of fruit crops. The determination of nutritional need of crops is an important aspect of nutrient management for the orchardist, and leaf analysis has been widely used as an analytical tool in understanding the nutritional requirements (Montanes *et al.*, 1993). Mineral nutrient requirements of fruit crops assessed on the basis of soil analysis alone have not been useful in making fertilizer recommendation as the plants have deep and ramified root system. Therefore, leaf analysis is recommended for fruit crops. However, leaf analysis is required, together with soil analysis, in the design of adequate fertilization programmes and in the evaluation of soil nutrient use efficiency by crops. Once leaf sampling and analytical methods have standardized, the interpretation of results is carried out by 'classical' concepts such as concentration on dry matter basis, sufficiency ranges, standard and critical values, nutrient balance and nutrient ratios. Further, the relationship between leaf composition and the tree performance may be expressed as standard nutrient ranges or classes, which hold well in location where they are developed. Standardization of varying nutrient ranges can be established by the use of any of the methods i.e. (i) survey of commercial orchards, (ii) long term field experiments and/or (iii) nutrient solution studies.

Kenworthy (1979) has suggested that nutrient standards of one region cannot be applied in other because of differences in the nutrient supply, sampling and other analytical techniques. The present investigations, therefore, were carried out for the standardization of nutrient ranges in 'Dashehari' mango, which is a main variety being grown in mid to low hill elevations of Himachal Pradesh.

MATERIALS AND METHODS

The survey was carried out on full bearing trees of 'Dashehari' cultivar of mango of uniform age group i.e. 15 years during 2004 and 2005. Four districts of Himachal Pradesh were selected purposely viz., Bilaspur, Hamirpur, Una and Kangra, being major mango growing districts. Representative sample of 5 orchards from each district were selected using probability proportional to size sampling scheme, taking number of trees per orchard as an auxiliary variable. Optimum sample size of 20 trees from each orchard, high productive (>90 kg/ tree) were selected randomly on the basis of apparent performance and the past history of the trees. Each foliage sample was made up of 50 leaves taken during April from middle of the shoot (non-fruiting and non-flushing twigs) from December flush (Kumar and Nauriyal 1978) in both the years. The sampling of leaves and their preparation for analysis was in accordance with the procedure recommended by Chapman (1964). The leaves were