

Research Paper :

New soil fertility norms for Nagpur mandarin from summer flush using DRIS

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ABSTRACT

The survey was undertaken and 10 to 13 years old 75 bearing orchards of Nagpur mandarin from summer flush from Western Vidarbha region of Maharashtra state were selected to establish soil fertility norms using diagnosis and recommendation integrated system (DRIS). DRIS norms as new ratings for 14 soil fertility parameters were derived from mean and standard deviation and divided into five classes, viz., very low, low, optimum, high and excess for diagnosis purpose. As per norms with an optimum range of nutrients, the optimum yield level of Nagpur mandarin ranging from 802 to 1433 fruits per tree was possible. The evaluation of orchard soils showed that the soil characteristics viz., pH, EC and organic carbon; major nutrients viz., K₂O, Mg and S as well as micronutrients viz., Fe, Mn, and Zn do not affect yield as they were in acceptable or adequate limit in soil. Low available N, P₂O₅, Ca and Cu; and higher CaCO₃ in low yielding orchard soils were found to be yield limiting. The new DRIS norms for yield showed that the yield level should be considered as 'low' when it is less than 801 fruits per tree in summer flush.

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In India mandarin orange (*Citrus reticulata* Blanco) is most important among commercial citrus fruits. Maharashtra state of India is popular for mandarin orange production. In Maharashtra, Vidarbha grows mandarin orange on more than 95 per cent mandarin area of the state (Anonymous, 2002). Mandarin growers of Vidarbha region prefers to produce mandarin from summer flush as it can give higher and assured returns. Mandarin orange plants require judicious supply of plant nutrients for proper growth and yield of high quality fruits. Most of the common mandarin growers do not have the importance of plant nutrition in determining the quality and production of mandarin fruits. Due to the lack of information regarding soil fertility status they cannot maintain the yield potential of orange. Most of the fertilizer recommendations emanating in India are based on soil test ratings of Muhr *et al.* (1965). Unfortunately, these rating limits are irrespective of crops or soils. Diagnosis and recommendation integrated system (DRIS) described by Beaufils (1973) and others offer a means of handling collection, storage and calibration of data and make a diagnosis of condition of particular crop. Using DRIS, new norms as new ratings for soil fertility status are developed as a new five-tier system of fertilizer recommendation. No systematic work on soils of extensively mandarin growing belt of Western Vidarbha region particularly in case of summer flush has been attempted using DRIS in India. Hence, an investigation was carried out with the objective of (1) to develop new norms for soil characteristics of Nagpur mandarin growing

soils of Western Vidarbha region using DRIS and (2) to evaluate and classify the orchards on the basis of nutrient status in relation to yield.

MATERIALS AND METHODS

The research was conducted under Department of Agricultural Chemistry and Soil Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth (Agricultural University), Akola (Maharashtra State), India during October, 2000 to January, 2003. A survey was conducted for soil sampling as recommended by Srivastava (1997) for summer flush. Seventy five bearing Nagpur mandarin orchards from summer flush of 10 to 13 years old were selected from Akola, Amravati, Buldana, Washim and Yavatmal districts of Western Vidarbha region of Maharashtra state which extends from 19°26' to 21°46' N Latitudes and 75° 57' to 79°98' E Longitudes. The sets of these soil samples were processed and analyzed in the laboratory for 14 soil characteristics. The soil pH and electrical conductivity were determined in 1:2.5 soil: water suspension (Jackson, 1973) and supernatant liquid (Richards, 1954), respectively. Free calcium carbonate was determined by rapid titration method whereas soil organic carbon was determined by Walkley and Black method (Piper, 1966). The available nitrogen was estimated by alkaline permanganate method of Subbiah and Asija (1956). The Olsen's method (Olsen *et al.*, 1954) was used to determining available phosphorus. The available potassium was determined in neutral normal ammonium acetate (N NH₄OAc) extract of soil (Jackson,