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## Leaf nutritional status of declined Nagpur Mandarin in Morshi Tehsil of Amravati District

Indranil S Pathare, MM Raut, DD Dahule and RA Tembhurkar

### Abstract

The present investigation in relation to "Soil Characteristics and Leaf Nutritional Status in Declined Nagpur Mandarin Orchards in Morshi Tehsil of Amravati District", was undertaken during 2017- 18. Twelve orchards from declined condition were selected on the basis of their yield performance and visual observations from five locations of Morshi tahsil viz., Nimbhi, Shirkhed, Ladki, Dapori and Chikhalsawangi were selected to evaluate the soil characteristics and leaf nutritional status and fruit quality of Nagpur mandarin. Twelve soil profile samples were taken from 0-30, 30-60 and 60-90 cm depth randomly selected over the field of Nagpur mandarin and collected leaf and fruit samples were analyzed for quality parameters. The leaf nutrient status of study area was found to be low in total nitrogen, phosphorus and potassium and in micronutrients. Fruits of declined Nagpur mandarin were found to be of average quality.

**Keywords:** Nagpur mandarin, declining orchards, fruit quality, leaf nutrient.

### Introduction

Citrus is the most important fruit crop in the world and is produced in over 100 countries in all six continents, and it is often regarded as golden fruit or queen of all fruits. Citrus is the World's leading fruit crop. It occupies about 9% of total land under various fruits in India. It is believed that most of the species under the genus citrus are native to tropical and sub-tropical regions of south-east Asia. India ranks 3rd in world production of citrus with an area of 10.78 million hectares (14.9% of total fruit area) and production of 11.14 million tones (12.5% of total fruit production) with a productivity of 10.30 tones ha<sup>-1</sup>. The total production of oranges in India is 3431.4 thousand MT (3.9% of total fruit production) from an area of 330.0 thousand hectares (4.6% of total fruit area) with a productivity of 10.4 MT ha<sup>-1</sup>. Plant nutrients are classified as macronutrient (N, P, K, Ca, Mg and S) and micronutrient (Cu, Zn, Fe, Mn, Mo and B). Each of these nutrients plays important role in the growth and quality production of citrus. The emphasis is by and large, given to micronutrients nutrition, which in the long run widens the necessary ratio between micro and macronutrient, and thus encourages the occurrence of various imbalances.

### Material and Methods

The present investigation in relation to "Soil characteristics and leaf nutritional status of declined Nagpur mandarin orchards in Morshi tehsil of Amravati district" was undertaken during the year 2017-2018 to assess the nutrient content and quality of Nagpur mandarin considering the different nutrient management practices. The 12 declined Nagpur mandarin orchards were selected from Morshi tehsil of Amravati district and depth wise soil sampling were done along with the leaf and fruit samples of Nagpur mandarin.

The present investigation on soil characteristics and leaf nutritional status of declined Nagpur mandarin orchards as influenced by various nutrient content was carried out at farmer's fields in Morshi tehsil of Amravati district. The five locations were selected viz., Nimbhi, Chikhalsawangi, Dapori, Ladaki, Shirkhed. The leaf samples collected from the orchard trees were also analyzed. The leaf samples were collected following the procedure as suggested by Srivastava *et al.* (1994) and analyzed for nitrogen, phosphorus, potassium, calcium,

magnesium and sulphur by standard methods as described by Jackson (1967) [3]. Total iron, manganese, copper and zinc were determined by Atomic Absorption Spectrophotometer. The fruit juice extracted by hand operated extractor. The juice per cent was calculated from juice content and total weight of fruit as per Garwell *et al.* (2000) [2]. The TSS (Total soluble solids contents) was determined by the Refractometer as given by Lacey, (2009) [4]. Ascorbic acid was determined by the Spectrometric method as given by Lacey, (2009) [4].

## Results and Discussion

### a) Leaf nutrient composition of declining orchards

The data regarding nitrogen content in leaves of declined mandarin orchards varied a progressive increase on N content in leaves with increasing nutrient quantities from 1.68 to 2.07 %, such type of large variation of nitrogen content in Nagpur mandarin was also observed by Shrivastava and Singh (2001). Wassel (2007) [6] also observed applied through drip N levels from 400 to 1000 g tree<sup>-1</sup> 19.4 g. It was observed that phosphorus content in the leaves of declined trees. Low concentration in phosphorus might be due to low available phosphorus status in soils of declined orange orchards and inadequate use of phosphatic fertilizers phosphorus content in the leaves of declined trees ranged from 0.07 to 0.11%. Similar findings were reported by Kuchanwar *et al.* (2017) [7] who reported that phosphorus content in leaves of declined Nagpur mandarin orchards in Warud tahsil of Amravati

district were ranged from 0.08 to 0.1 % with a mean value of 0.09 %, the potassium content in the leaves of declined Nagpur mandarin orchards varied from 0.82 to 1.72%. Similar findings were reported by Kuchanwar *et al.* (2017) [7] who reported that potassium content in leaves of declined Nagpur mandarin orchards in Warud tahsil of Amravati district were ranged from 0.83 to 1.73 % with a mean value of 1.06 %. It is seen from the result that, the calcium concentration in leaves of declined Nagpur mandarin was ranged from 1.02 to 1.80 per cent, the average magnesium concentration was 0.40 per cent which ranged from 0.22 to 0.39 per cent in leaves of declined Nagpur mandarin orchards. Similar findings were reported by Kuchanwar *et al.* (2017) [7] who reported that magnesium content in leaves of declined Nagpur mandarin orchards in Warud tahsil of Amravati district were ranged from 0.31 to 0.70 %. It was evident from the result that, the concentration of iron in the leaves of declined trees of Nagpur mandarin ranged between 84.55 to 102.00 ppm. The manganese concentration ranged from 38.66 to 43.10 ppm in declined Nagpur mandarin orchards. Concentration of copper varied from 20.75 to 25.25 ppm in declined trees of Nagpur mandarin. Zinc is required in very minute quantities by citrus trees. Zinc ranks next to Nitrogen in citrus nutrition. Analytical data regarding zinc content in leaves of declined trees of Nagpur mandarin in the zinc concentration ranged from 23.15 to 30.65 ppm.

**Table 1:** Leaf nutrient status of declined Nagpur mandarin orchards

Location	N	P	K	Ca	Mg	Fe	Mn	Cu	Zn
	%					ppm			
Nimbhi	1.80	0.08	1.22	1.22	0.25	95.33	41.90	21.23	28.00
Nimbhi	2.05	0.09	1.72	1.25	0.37	84.55	43.10	22.23	23.15
Nimbhi	1.72	0.08	0.90	1.08	0.28	93.95	38.66	20.75	23.70
Ladki	1.82	0.09	0.87	1.02	0.34	94.00	41.88	25.00	24.25
Ladki	1.75	0.10	0.82	1.37	0.32	102.00	39.10	21.65	29.78
Shirkhed	1.92	0.08	1.05	1.05	0.22	85.25	41.10	24.65	30.65
Shirkhed	2.04	0.07	0.90	1.55	0.32	94.00	39.16	23.25	26.25
Dapori	1.68	0.09	1.06	1.80	0.27	96.22	38.66	21.72	23.18
Dapori	1.70	0.10	0.98	1.10	0.39	85.32	41.20	25.25	30.25
Chikhasawangi	2.07	0.12	0.85	1.25	0.32	100.00	39.30	22.78	27.15
Chikhalsawangi	1.86	0.09	0.93	1.75	0.33	88.25	40.66	20.65	23.18
Chikhalsawangi	1.79	0.11	1.05	1.10	0.23	96.33	41.16	25.00	30.65

### b) Fruit quality of declined Nagpur mandarin orchards

The fruit weight of Nagpur mandarin orchards of study area ranged between 88.2 g to 145.9 g with an average weight of 115.7 g. Similar observations were observed by Reddy *et al.*, (2013) [8]. The juice content in Nagpur mandarin orchards varied from 38.26 to 44.87 per cent with an average of 41.9 per cent. Similar observations were recorded by Survase *et al.*, (2016). Total soluble solids content in fruit juice of

Nagpur mandarin orchards ranged between 7.8 to 10.6 with an average of 9.1 per cent. Similar observations were recorded by Shirgure and Srivastava (2013) [9]. The ascorbic acid content in fruit juice ranged from 30.4 to 39.1 mg 100 ml<sup>-1</sup>. The higher value of vitamin C was observed in juice of orchards of Nagpur mandarin of Nimbhi. Similar observations were observed by Reddy *et al.*, (2013) [8].

**Table 2:** Fruit quality of declined Nagpur mandarin orchards

Sample	Weight of fruit(g)	Juice (%)	TSS (%)	Ascorbic acid (mg 100 ml <sup>-1</sup> )
Nimbhi	95.2	38.26	10.6	36.9
Nimbhi	111.1	44.47	8.6	39.1
Nimbhi	145.9	41.43	8.8	30.4
Ladki	110.5	41.60	8.6	38.5
Ladki	138.7	44.87	9.3	36.8
Shirkhed	120.3	41.00	8.9	37.3
Shirkhed	128.5	43.25	8.6	37.6
Dapori	110.5	40.32	7.4	35.7
Dapori	104.0	43.50	8.2	37.5
Chikhasawangi	124.0	42.30	8.7	36.8
Chikhalsawangi	133.0	44.07	7.8	38.1
Chikhalsawangi	88.2	40.25	8.0	34.3

## Conclusion

The pH and EC of the study area are within the acceptable limit. Organic carbon was found low in declined orchard soils. Available nitrogen, phosphorous and zinc levels in soil were low as per critical limit. Some orchard soils were well supplied with available K, S, and micro-nutrient like iron, manganese and copper. Leaf analysis study showed that in general, leaf N, P, Ca, Mg, Zn, Cu, Fe and Mn concentration were significantly lower in declined Nagpur mandarin orchard. Low organic carbon, nitrogen, phosphorus, zinc status in soil and high CaCO<sub>3</sub> in subsurface may be the cause of citrus declined in studied area. The low content of these nutrients in soil of declined mandarin orchards may be reason for low yield.

There is a need to increase in the content of organic carbon, available nitrogen, available phosphorus, DTPA extractable Fe, Cu and Zn, it increases the content of nutrients in leaves which turns into yield of mandarin orchards. Similarly increased in content of CaCO<sub>3</sub> and lowered in the availability of the nutrients. In declined mandarin orchards content of CaCO<sub>3</sub> increases with increasing depth of soil, this might be interfere with root system of mandarin plant and which results into lowering the yield if mandarin orchards is declined one.

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