International Journal of Advanced Biochemistry Research

ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; 9(7): 1236-1241
www.biochemjournal.com
Received: 01-04-2025
Accepted: 04-05-2025

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Assessment of spatial variability of micronutrients in soils of eastern central demonstration farm Dr. PDKV, Akola

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DOI: https://www.doi.org/10.33545/26174693.2025.v9.i7p.4915

Abstract
Georeferenced surface soil samples from eight (8) blocks of eastern Central Demonstration Farm, Dr. PDKV, Akola were delineated using stratified random soil sampling method. An investigation was carried out at All India Co-ordinated Research Project on Micro and Secondary Nutrients and Pollutant Elements in Soils and Plant under Department of Soil Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra to assess the chemical properties and micronutrients status in soils of eastern Central Demonstration Farm in the year 2024-2025. Total two hundred and sixty-eight (268) soil samples at the depth of (0-20 cm) were collected across the eight blocks of eastern CDF and analysed in the laboratory. The results revealed that pH, EC, $CaCO_3$ and OC of soils collected across different blocks of eastern CDF varied from 7.45 to 8.48, 0.10 to 0.80 dS m^{-1}, 2.12 to 21.87% and 1.40 to 9.7 g kg^{-1}. The DTPA-Zn, Fe, Cu and Mn ranged from 0.20 to 1.71 mg Kg^{-1}, 1.91 to 12.73 mg Kg^{-1}, 0.25 to 4.45 mg Kg^{-1} and 2.02 to 21.56 mg Kg^{-1} respectively. The CaCl2-B in soils ranged from 0.70 to 1.73 mg Kg^{-1}. The results obtained clearly showed a large variability in physio-chemical properties of soil across the eastern Central Demonstration Farm in the jurisdiction of Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The soils were latent deficient in zinc and iron; adequate in manganese and boron; high in copper with nutrient index values as very low for zinc; moderate for iron; moderately high for manganese, high for boron and very high for copper.

Keywords: Micronutrients, grid sampling, nutrient indices, deficiency

1. Introduction
An important non-renewable resource that gives ecosystems vital support is soil. The limited land resources have been exhausted due to overexploitation to meet basic necessities, which has resulted in land degradation. However, careless resource usage combined with poor management has resulted in degradation, which worries planners, academician, and farmers alike. To satisfy future demand, soil productivity must be increased. Soil scientists, particularly pedologists, have been creating techniques for soil survey and categorization in order to comprehend and rationalize the use and management of soil. As a nutrient reservoir, soil is essential for the development of crops and other vegetation and helps to keep the environment clean on the earth. According to Sharma and Dogra (2011) [19], soil both serves as a source and a sink for atmospheric gases. The available nutrients in heavily farmed soils are being exhausted. Modern agriculture is becoming increasingly reliant on a consistent supply of synthetic inputs, mostly fertilizers, which are made from fossil fuels, as a result of the advent of green revolution technologies. A loss in organic carbon, a decrease in the soil's microbial flora, an increase in acidity and alkalinity, and soil hardening are all consequences of the overuse and unbalanced application of chemical fertilizers (V.K. Jain, 2009) [22].
Micronutrient deficiencies in soils can result from a variety of factors, including chemical or biological fixing, spatiotemporal fluctuations, or unavailability, in addition to their naturally low levels. Even when fertilizers are given less frequently and at lower rates, micronutrient-efficient crop cultivars may have a larger yield advantage over inefficient ones under such circumstances (Rengel and Marschner, 2005) [17]. At the field level, the diversity of soil micronutrients has been described using geographic information systems (Ramzan and Wani, 2018) [15].

2. Materials and Methods

In order to evaluate the chemical characteristics and micronutrient status in the soils of eastern Central Demonstration Farm Dr. PDKV, Akola in the years 2024-2025, the current investigation was conducted at the All India Co-ordinated Research Project on Micro and Secondary Nutrients and Pollutant Elements in Soils and Plant under the Department of Soil Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra. GPS-based soil samples (0-20 cm) were taken by grid sampling method from eight blocks of the eastern Central Demonstration Farm in the jurisdiction of Dr. PDKV, Akola. The samples were then analyzed in a laboratory.

2.1 Description of the Study Area

Central Demonstration Farm at Dr. Panjabrao Deshmukh Krishi Vidyapeeth is located at Wani Rambhapur, approximately 20 km from Akola. It is located at 20.7149° N, 77.1952° E and has an average elevation of 287 metres (927 feet). Its area is about 2,031.83 hectares**.** The geology of this region is characterized by a combination of Deccan basalt formations and alluvial deposits, contributing to the area's agricultural fertility. The area experiences a tropical climate characterized by distinct seasons: summer, monsoon, and winter. The farm is part of the Western Vidharbha agro-climatic zone, characterized by erratic rainfall ranging from 740 to 860 mm annually temperatures. The mean minimum temperature is 12.6 °C and means maximum temperature is 42.4 °C. Established in 1969, the CDF serves as the largest farm under PDKV and plays a pivotal role in agricultural research, seed production, and the demonstration of innovative farming techniques. It serves as an exclusive area for the production of Breeder's and Foundation seeds. There are total 17 blocks present in Central Demonstration Farm which is further divided into eastern side of CDF and western side of CDF. Work area includes 8 blocks in eastern side of CDF i.e Rajapur, Tankhed, Mirzapur, Pailpada, Kurankhed, Katepurna, Tamshi and Dhaga.

2.2 Soil Sampling and Analysis

GPS information, including latitude, longitude, and altitude, was captured at each sampling location dispersed throughout the eastern CDF blocks. Total 268 soil samples were collected by grid sampling method. For selecting the samplings, randomization with stratification was employed. The georeferenced soil samples were treated and allowed to dry in the shade after being collected. The processed soil samples were measured for pH, EC, $CaCO_3$, organic carbon and micronutrients (Zn, Fe, Cu, Mn, and B).

Soil pH and EC were determined in soil: water suspensions (1:2.5 w/v) as described by Jackson (1973) [7]. Organic carbon was determined by the dichromate wet oxidation method of Walkley and Black (Nelson and Sommers, 1982) [12]. Free $CaCO_3$ was determined by rapid titration method (Piper, 1966) [13]. The available zinc, iron, copper and manganese were extracted with 0.005M diethylene triamine penta acetic acid (DTPA) and the concentrations of nutrients were determined on Atomic Absorption Spectrophotometer (Lindsay and Norvell, 1978) [9]. The Azo-Methine method was used to determine the accessible boron utilizing a 0.01 M CaCl2 extraction (Berger and Truog, 1939) [1]. Soil nutrient index was calculated as per six tier system and six tier nutrient index rating system (Ramamoorthy and Bajaj,1969) [14]. The nutrient index is rated into various categories viz., very low, low, moderate, moderately high, high, and very high as rating given by Stalin *et al*. (2010) [21]. Formula for Nutrient Index:

$$\text{Nutrient Index} = [\text{NVL} \times 0.5 + \text{NL} \times 1 + \text{NM} \times 1.5 + \text{NMH} \times 2 + \text{NH} \times 2.5 + \text{NVH} \times 3] \div \text{Total no. of samples}$$

Where,

NVL, NL, NM, NMH, NH and NVH are the number of samples in very low, low, medium, moderately high, high and very high classes of nutrients as per six tier system.

3. Results and Discussion

3.1 Soil properties

The soil pH values for eight blocks of eastern Central Demonstration Farm, ranged from 7.45 to 8.48, indicated a pH range from neutral to moderately alkaline. The highest pH of 8.48 was observed in soils of Tamshi block, while the lowest pH of 7.45 was recorded in Pailpada block. Similar results reported by Mathurkar *et al*. (2020) [11] revealed that, the pH of the soil of different land use system in Nagpur were ranged from 7.02 to 8.23. Neutral to alkaline pH may be attributed to the reaction of applied fertilizer material with soil colloids, which resulted in the retention of basic cations on the exchangeable complex of the soil (Hadole *et.al* 2020) [6]. The soil electrical conductivity (EC) values ranged from 0.10 to 0.80 dSm^{-1} and with mean value of 0.21 dSm^{-1}. It showed that the soils of eight blocks are non-saline, making them suitable for healthy plant growth. EC exceeding 1.0 dSm^{-1} indicates the presence of soluble salts, posing a risk to plant cultivation. Jackson (1967) [8]. The EC value <1.0 indicate that these soils are free from hazard of soluble salts as prescribed by Richards (1954). The majority of samples were in normal EC range (<1.0 dS m^{-1}). Hadole *et al*. (2024) [5] also reported that, the electrical conductivity (EC) gives an indication about salt concentration of the soil in Satara district varied from (0.10-0.98 dS m^{-1}) and appropriate for optimal plant growth. The organic carbon content varied from 1.4 to 9.7 g kg^{-1} with the mean of 5.53 g kg^{-1}. The organic carbon variation could be noticed in every block with highest content observed in Katepurna block with mean of 6.4 g kg^{-1} followed by Dhaga block with mean of 6.4 g kg^{-1} and lowest in case of Tamshi and Rajapur with mean of 4.8 g kg^{-1}. Organic materials produce binding agents around which soil particles coalesce to form aggregates**.** An increase in SOC may reduce maximum compactibility by increasing soil aggregate stability, lowering the soil bulk density, inducing some elastic properties, and enhancing strong physico-chemical bonds among soil particles (Blanco-Canqui and Benjamin 2013) [2]. The calcium carbonate content of soils ranged from 2.12 to 21.87 percent with mean of 11.65 percent (%) which indicates that soil are non-calcareous to strongly calcareous in nature. The highest content of calcium carbonate was recorded in Rajapur block with mean of 13.81 percent (%) followed by Kurankhed, Tamshi, Tankhed and Katepurna i.e.13.29(%), 13.00(%), 12.73 (%) and 12.47(%) respectively while, lowest percentage (%) of calcium carbonate observed in Dhaga with mean of 5.12 percent (%). High calcium carbonate is harmful; it reduces the concentration of micronutrient cations in soils to such a level that the sensitive plant suffers from deficiency of micronutrients (Deb *et al*. 2012) [3].

3.2 Status of micronutrients

The result showed that blocks had latent deficient available zinc content in soils of eastern CDF with the mean of 0.75 mg kg^{-1}. The available zinc content observed maximum in Kurankhed block with mean of 0.94 mg kg^{-1} and minimum in Dhaga and Mirzapur block with mean of 0.63 mg kg^{-1}. The available zinc in all over eastern side of CDF ranged from 0.20 to 1.71 mg kg^{-1}. In all blocks major soil sample were found in latent deficient (54.48%) category of available zinc followed by deficient (22.76%), marginal sufficient (14.92%), high (5.98%). While acute deficiency was observed in only five samples (1.86%). The Nutrient index value in all over the blocks was found in very low range that is (1.22). Highest nutrient index was found in Kurankhed block (1.81) followed by Pailpada (1.61) and Tankhed block (1.55) while lowest nutrient index was observed in Dhaga (1.31) and Mirzapur block (1.31). The availability of micronutrient cations is generally low in alkaline soils and crops grown on these soils suffer from hidden hunger (Malewar, 2005) [10]. The blocks have latent deficient in available iron content in soils with the mean of 6.01 mg kg^{-1}. The available iron content observed maximum in Kurankhed block with mean of 7.49 mg kg^{-1} and minimum in Mirzapur block with mean of 5.10 mg kg^{-1}. The available iron in all over the eastern side blocks of CDF ranged from 1.39 to 12.73 mg kg^{-1}. Low Fe status might be due to precipitation of Fe^{+2} by calcium carbonate concentration in calcareous soils and higher pH of the soil, which may decreased the availability of Fe (Vijaykumar *et al*., 2013) [23]. In all eight blocks of CDF, most of the soil sample were found in marginal sufficient category (45.89%) of available iron followed by latent deficient (37.32%), deficient (12.68%), adequate (2.61%) category. While in the acute deficient and high categories some samples were found (1.12%) and (0.38%) respectively. The Nutrient index value in all over the blocks was found in moderate range that is (1.68). Highest nutrient index was found in Kurankhed block (1.98) followed by Tamshi and Katepurna block (1.81) and (1.71) respectively, while lowest nutrient index was observed in Mirzapur block (1.46). The results showed that eastern parts of blocks had high available copper content in soils with the mean of 1.63 mg kg^{-1}. The available copper content observed maximum in Dhaga block with mean of 2.19 mg kg^{-1} and minimum in Mirzapur block with mean of 1.41 mg kg^{-1}. The available copper in all over eastern side of CDF ranged from 0.25 to 4.45 mg $kg^{-1.}$ In all the eight blocks of eastern side of CDF, 214 soil samples were found in high category (79.85%) of available copper followed by 30 samples found in adequate category (11.20%) and 21 samples in marginal sufficient category (7.83%). In case of acute deficiency not any sample is observed while, two samples (0.74%) was observed in deficient and one sample (0.38%) was observed in latent category. The Nutrient index value in all over the blocks was found in very high range that is (2.84). Highest nutrient index was found in Tamshi, Dhaga and Pailpada block (3.00) while, the lowest value was observed in Tankhed block (2.48). The higher biological activity and chelating effect of organic compounds released during the decomposition of organic matter left after harvesting of crop might be cause for sufficient copper in soils (Reddy and Naidu, 2016) [16]. The results for available manganese showed that blocks had high available manganese content in soils with the mean of 8.53 mg kg^{-1}. The available manganese content observed maximum in Pailpada block with mean of 12.15 mg kg^{-1} followed by Kurankhed block with mean of 11.79 mg kg^{-1} and minimum in Tankhed block with mean of 4.90 mg kg^{-1} from all over the blocks. The available manganese in all over eastern side of CDF ranged from 2.02 to 21.56 mg kg^{-1}. In all the eight blocks of CDF most of the soil samples were found in marginal sufficient category (35.44%) category of available manganese followed by high, adequate and latent (31.72%), (17.92%) and (12.68%) categories respectively. Acute deficiency was not observed in any block. However, six samples were found to be in deficient category (2.24%). The Nutrient index value in all over the blocks were found in high range that is (2.32). Highest nutrient index was found in Pailpada (2.85), Dhaga (2.78), Kurankhed block (2.65) followed by Rajapur (2.41) and Katepurna (2.21). The lowest NIV was observed in Tankhed block (0.73). The blocks had adequate available boron content in soils. The available boron content observed maximum in Rajapur block with mean of 1.12 mg kg^{-1} and minimum in Tamshi block with mean of 0.89 mg kg^{-1} from all over the blocks. The available boron in all over blocks ranged from 0.70 to 1.73 mg kg^{-1} with mean of 1.03 mg kg^{-1}. Sufficiency of boron may be due to increase the soil organic matter with the addition of crop residues, animal waste etc. In all eight blocks soils most of the sample were found in adequate category (50.0%) for available boron followed high category (29.85%) and marginal sufficient category (20.15%). The Nutrient index value in all over the blocks were found in high range that is (2.54). Highest nutrient index was found in Rajapur (2.71) followed by Katepurna (2.71) and Kurankhed block (2.71) while lowest nutrient index was observed from Tamshi (2.18) block.

Table 1: Categorisation of micronutrients

Categories of microutrients	Acute deficient	Deficient	Latent deficient	Marginal sufficient	Adequate	High
Zn (mg kg^{-1})	<0.30	0.31-0.60	0.61-0.90	0.91-1.2	1.21-1.80	>1.80
Fe (mg kg^{-1})	<2.50	2.50-4.50	4.51-6.50	6.51-8.50	8.51-10.50	>10.50
Cu (mg kg^{-1})	<0.20	0.20-0.40	0.41-0.60	0.61-0.80	0.81-1.0	>1.00
Mn (mg kg^{-1})	<1.0	1.10-3.0	3.10-5.0	5.0-7.0	7.10-9.0	>9.00
B (mg kg^{-1})	<0.20	0.20-0.50	0.50-0.70	0.70-0.90	0.90-1.10	>1.10

Table 2: Categorisation of nutrient index value

NIV Index	Very Low	Low	Moderate	Moderate	High	Very High
	<1.33	1.33-1.66	1.66-2.00	2.00-2.33	2.33-2.66	>2.66

Categories for available micronutrient in six tier system acute deficient, deficient, latent deficient, marginal sufficient, adequate and high is taken from (Shukla and Behera 2019) [20] and Dhaliwal *et al*. (2020) [4].

Table 3: Chemical properties of soils in eastern CDF, Dr. PDKV, Akola

Blocks	pH (1:2.5)		EC (dS m^{-1})		$CaCO_3$ (%)		Org. carbon (g kg^{-1})	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean
Tamshi	8.24-8.48	8.37	0.15-0.29	0.17	9.25-16.25	13.00	3.6-7.7	4.8
Dhaga	7.75-8.11	7.94	0.11-0.20	0.14	3.25-7.75	5.12	4.7-9.1	6.4
Katepurna	8.04-8.37	8.25	0.12-0.33	0.20	9.62-16.25	12.47	4.2-9.7	6.4
Mirzapur	7.74-8.45	8.27	0.10-0.80	0.29	4.37-16.12	12.00	1.4-8.8	5.0
Tankhed	8.12-8.40	8.30	0.15-0.24	0.18	4.25-19.50	12.73	1.9-7.3	5.1
Pailpada	7.45-8.37	7.90	0.10-0.76	0.23	2.12-15.75	7.66	3.4-8.1	4.9
Kurankhed	7.91-8.34	8.14	0.15-0.33	0.20	9.37-16.75	13.29	3.5-8.4	5.8
Rajapur	8.15-8.41	8.27	0.14-0.68	0.20	3.37-21.87	13.81	3.1-9.0	4.8
Overall average	7.45-8.48	8.19	0.10-0.80	0.21	2.12-21.87	11.65	1.4-9.7	5.53

Table 4: Block wise status and nutrient indices of available zinc in soils of eastern CDF, Dr. PDKV, Akola

Blocks	Range (mg kg^{-1})	Mean	No. of samples						
			Acute def.	Deficient	Latent def.	Marginal sufficient	Adequate	High	NIV
Tamshi	0.45-1.12	0.73	0	3 (18.75)	10 (62.5)	3 (18.75)	0	0	1.5
Dhaga	0.20-0.81	0.63	1 (6.25)	4 (25.0)	11 (68.75)	0	0	0	1.31
Katepurna	0.26-1.52	0.70	1 (2.70)	3 (8.10)	31 (83.78)	1 (2.70)	1 (2.70)	0	1.47
Mirzapur	0.21-1.02	0.63	2 (5.0)	14 (35.0)	21 (52.5)	3 (7.5)	0	0	1.31
Tankhed	0.42-1.71	0.81	0	15 (37.5)	14 (35.0)	3 (7.5)	8 (20.0)	0	1.55
Pailpada	0.42-1.65	0.84	0	2 (5.0)	29 (72.5)	7 (17.5)	2 (5.0)	0	1.61
Kurankhed	0.62-1.48	0.94	0	0	15 (46.87)	14 (43.75)	3 (9.37)	0	1.81
Rajapur	0.27-1.63	0.68	1 (2.12)	20 (42.55)	15 (31.91)	9 (19.1)	2 (4.25)	0	1.40
Overall average	0.20-1.71	0.75	5 (1.86)	61 (22.76)	146 (54.48)	40 (14.92)	16 (5.98)	0	1.22

(Figures in parenthesis are percentage)

Table 5: Block wise status and nutrient indices of available iron in soils of eastern CDF, Dr. PDKV, Akola

Blocks	Range (mg kg^{-1})	Mean	No. of samples						
			Acute def.	Deficient	Latent def.	Marginal sufficient	Adequate	High	NIV
Tamshi	2.74-7.98	6.31	0	1 (6.25)	4 (25)	11(68.75)	0	0	
Dhaga	4.19-7.68	6.00	0	3(18.75)	4(25)	9(56.25)	0	0	1.68
Katepurna	2.21-12.73	6.04	1 (2.70)	5 (13.51)	10(27.02)	20(54.05)	0	1(2.70)	1.71
Mirzapur	2.98-9.39	5.10	0	13(32.5)	18(45.0)	8(20.0)	1(2.5)	0	1.46
Tankhed	1.39-8.46	5.83	1 (2.5)	5(12.5)	13(32.5)	21(52.5)	0	0	1.67
Pailpada	3.30-9.08	6.05	0	5(12.5)	18(45.0)	16(40.0)	1(2.5)	0	1.66
Kurankhed	5.32-8.94	7.49	0	0	6(18.75)	21(65.62)	5(15.62)	0	1.98
Rajapur	1.91-6.98	5.73	1 (2.12)	2(4.25)	27(57.44)	17(36.17)	0	0	1.63
Overall average	1.91-12.73	6.01	3(1.12)	34(12.68)	100(37.32)	123(45.89)	7(2.61)	1(0.38)	1.68

(Figures in parenthesis are percentage)

Table 6: Block wise status and nutrient indices of available copper in soils of eastern CDF, Dr. PDKV, Akola

Blocks	Range (mg kg^{-1})	Mean	No. of samples						NIV
			Acute def.	Deficient	Latent def.	Marginal sufficient	Adequate	High	
Tamshi	1.22-1.90	1.52	0	0	0	0	0	16 (100)	3
Dhaga	1.04-3.35	2.19	0	0	0	0	0	16 (100)	3
Katepurna	0.61-4.34	1.82	0	0	0	2 (5.40)	1 (2.70)	34 (91.89)	2.93
Mirzapur	0.82-2.41	1.41	0	0	0	0	3 (7.5)	37 (92.5)	2.96
Tankhed	0.58-3.78	1.15	0	0	1 (2.5)	9 (22.5)	20 (50.0)	10 (25.0)	2.48
Pailpada	1.11-3.96	2.14	0	0	0	0	0	40 (100)	3
Kurankhed	0.70-1.93	1.56	0	0	0	1 (3.12)	1 (3.12)	30 (93.75)	2.95
Rajapur	0.25-4.45	1.53	0	2 (4.25)	0	9 (19.14)	5 (10.63)	31 (65.95)	2.66
Overall average	0.25-4.45	1.63	0.00	2 (0.74)	1(0.38)	21 (7.83)	30 (11.20)	214 (79.85)	2.84

(Figures in parenthesis are percentage)

Table 7: Block wise status and nutrient indices of available manganese in soils of eastern CDF, Dr. PDKV, Akola

Blocks	Range (mg kg^{-1})	Mean	No. of samples						NIV
			Acute def.	Deficient	Latent def.	Marginal sufficient	Adequate	High	
Tamshi	5.56-7.88	6.51	0	0	0	14 (87.5)	2 (12.5)	0	2.06
Dhaga	6.25-17.27	11.37	0	0	0	3 (18.75)	1 (6.25)	12 (75.0)	2.78
Katepurna	4.75-20.4	7.43	0	0	2 (5.40)	22 (59.45)	8 (21.62)	5 (13.51)	2.21
Mirzapur	2.20-11.00	6.36	0	2 (5.0)	1 (2.5)	28 (70.0)	5 (12.5)	4 (10.0)	2.10
Tankhed	2.02-20.20	4.90	0	4 (10.0)	27 (67.5)	4 (10.0)	3 (7.5)	2 (5.0)	0.73
Pailpada	5.33-19.80	12.15	0	0	0	2 (5.0)	8 (20.0)	30 (75.0)	2.85
Kurankhed	4.81-21.56	11.79	0	0	2 (6.25)	4 (12.5)	8 (25.0)	18 (56.25)	2.65
Rajapur	4.20-18.02	8.77	0	0	2 (4.25)	18 (39.29)	13 (27.65)	14 (29.78)	2.41
Overall average	2.02-21.56	8.53	0	6 (2.24)	34 (12.68)	95 (35.44)	48 (17.92)	85 (31.72)	2.32

(Figures in parenthesis are percentage)

Table 8: Block wise status and nutrient indices of available boron in soils of eastern CDF, Dr. PDKV, Akola

Blocks	Range (mg kg^{-1})	Mean	No. of samples						
			Acute def.	Deficient	Latent def.	Marginal sufficient	Adequate	High	NIV
Tamshi	0.70-1.45	0.89	0	0	0	11(68.75)	4(25.0)	1(6.25)	2.18
Dhaga	0.75-1.30	0.94	0	0	0	6(37.5)	8(50.0)	2(12.5)	2.37
Katepurna	0.87-1.35	1.07	0	0	0	2(5.40)	20(54.05)	15(40.54)	2.67
Mirzapur	0.71-1.25	0.94	0	0	0	18(45.0)	18(45.0)	4(10.0)	2.32
Tankhed	0.79-2.00	1.09	0	0	0	6(15.0)	17(42.5)	17(42.5)	2.63
Pailpada	0.78-1.28	0.99	0	0	0	10(25.0)	21(52.5)	9(22.5)	2.48
Kurankhed	0.94-1.24	1.06	0	0	0	0	21(65.62)	11(34.37)	2.67
Rajapur	0.71-1.73	1.12	0	0	0	1(2.12)	25(53.19)	39(44.68)	2.71
Overall average	0.70-1.73	1.03	0	0	0	54(20.15)	134(50.00)	80(29.85)	2.54

(Figures in parenthesis are percentage)

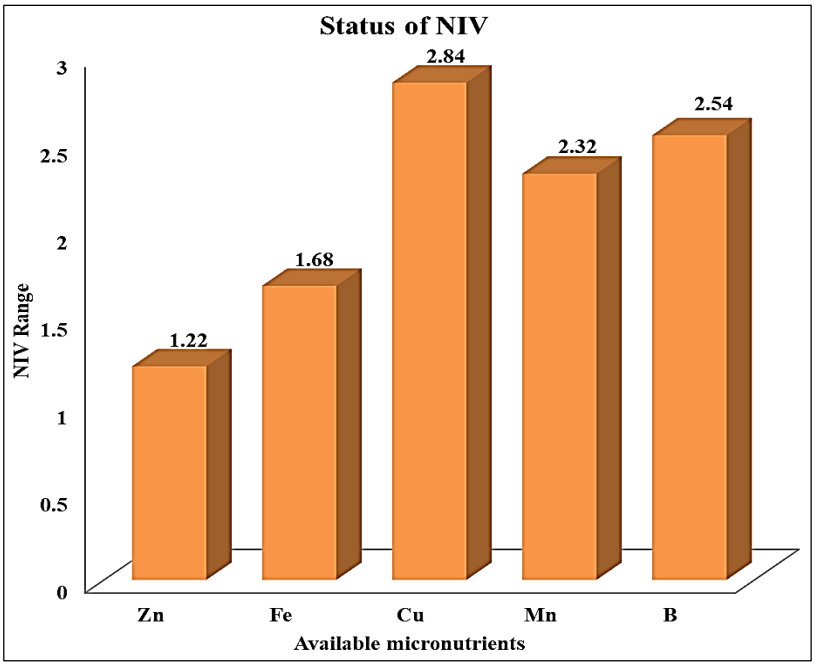

Fig 1: Nutrient Index Values (NIV) of available micronutrients showing highest level of Cu (2.84) and lowest of Zn (1.22)

4. Conclusion

From the present investigation it can be concluded that the soil of eastern Central Demonstration Farm in the jurisdiction of Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola were latent deficient in zinc and iron, adequate in manganese and boron; high in copper with nutrient index values as very low range for zinc; moderate for iron; high for manganese and boron and very high for copper.; moderately high for manganese, high for boron and very high for copper

5. Acknowledgement

The authors are highly grateful to the Project Coordinator, AICRP on Micro and Secondary Nutrients and Pollutant Elements in Soils and Plants, IISS, Bhopal and Head, Department of Soil Science, Dr. PDKV., Akola for providing necessary facilities and funds to carry out this work.

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