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**Komal Laxman Wagh**
PG Scholar, Department of Soil Science, Post Graduate Institute, Akola, Dr. PDKV, Akola, Maharashtra, India

**PA Sarap**
Assistant Professor, Department of Soil Science, AICRP on MSPE, Dr. PDKV, Akola, Maharashtra, India

**SS Hadole**
Associate Professor, Department of Soil Science, AICRP on MSPE, Dr. PDKV, Akola, Maharashtra, India

**SM Bhoyar**
Professor, Post Graduate Institute and Associate dean, College of Agriculture, Dr. PDKV Akola, Maharashtra, India

**RV Zanzad**
Associate Professor, Department of Agricultural Botany and Qualiaty Seed Production Unit, AICRP on Seed, CDF, Wani-Rambhapur, Dr. PDKV, Akola, Maharashtra, India

**YA Reddy**
Research Associate AICRP on MSPE, Department of Soil Science, Dr. PDKV, Akola, Maharashtra, India

**Devika**
PG Scholar, Department of Soil Science, Post Graduate Institute, Dr. PDKV, Akola, Maharashtra, India

**Corresponding Author:**
**Komal Laxman Wagh**
PG Scholar, Department of Soil Science, Post Graduate Institute, Akola, Dr. PDKV, Akola, Maharashtra, India

# Spatial distribution of micronutrients in soils of western part of central demonstration farm Dr. PDKV, Akola

**Komal Laxman Wagh, PA Sarap, SS Hadole, SM Bhoyar, RV Zanzad, YA Reddy and Devika**

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**Abstract**
Georeferenced surface soil samples from eight (8) blocks of western part of 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 western part of Central Demonstration Farm in the year 2024-2025. Total two hundred and eighty (280) soil samples at the depth of (0-20 cm) were collected across the eight blocks of western CDF and analysed in the laboratory. The results revealed that pH, EC, CaCO3 and OC of soils collected across different blocks of western part of CDF varied from 7.56 to 8.55, 0.10 to 0.39 dS $m^{-1}$, 2.87 to 13.5% and 1.90 to 10.3 g $kg^{-1}$. The DTPA -Zn, Fe, Cu and Mn ranged from 0.33 to 1.30 mg $Kg^{-1}$, 2.97 to 10.67 mg $Kg^{-1}$, 0.27 to 2.99 mg $Kg^{-1}$ and 2.28 to 19.92 mg $Kg^{-1}$ respectively. The CaCl2-B in soils ranged from 0.70 to 1.51 mg $Kg^{-1}$. The results obtained clearly showed a large variability in physio-chemical properties of soil across the soil of western part of 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 moderate for zinc and iron; high for manganese & boron and very high for copper.

**Keywords:** Micronutrients, grid sampling, nutrient index, CDF

## Introduction
Soil fertility is one of the important factors controlling yields of the crops. Soil characterization in relation to evaluation of fertility status of the soils of an area or region is an important aspect in context of sustainable agriculture production. Because of imbalanced and inadequate fertilizer use coupled with low efficiency of other inputs, the response (production) efficiency of chemical fertilizer nutrients has declined tremendously under intensive agriculture in recent years. Introduction of high yielding varieties (HYV) in Indian Agriculture in mid- sixties compelled the farmers to use high doses of NPK fertilizers along with micronutrient fertilizers. Present agricultural systems are exploitive of nutrients through intensive tillage, monocropping year after year, use of high yielding varieties, imbalanced use of nutrients coupled with limited use of organic manures, less recycling and burning of crop residues, soil erosion, undulated topography and indiscriminate use of irrigation water. Balanced use of organics, fertilizers and biofertilizers plays an important role to maintain soil fertility in long run. The availability of macro and micronutrients to plants is influenced by several soil characteristics. Land use pattern also plays a vital role in governing the nutrient dynamics and fertility of soils (Venkatesh *et al*. 2003) [24]. Similarly, different cropping systems are suitable for different soil groups as regards to production and productivity.
Soil quality plays a crucial role in sustaining agricultural productivity, as it directly influences crop yield and long-term soil fertility (Wankhede *et al.* 2021) [24]. Assessing the physico-chemical properties and nutrient composition of soil is essential for determining its fertility and optimizing land use for sustainable farming (Shanmugasundaram *et al*. 2019) [21]. Effective soil management, including balanced fertilization and organic matter conservation,

enhances carbon sequestration and improves productivity across diverse agro-climatic conditions (Bhattacharyya *et al*. 2009) [2].

## 2.Materials and Methods

In order to evaluate the chemical characteristics and micronutrient status in the soils of western part of 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 western part of 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 part of CDF and western part of CDF. Work area includes 8 blocks in western part of CDF i.e Sukali, Wani, Rambhapur, Kothari, Nipana, Anvi, Pahadpur, Office Area.

### 2.2 Soil Sampling and Analysis

GPS information, including latitude, longitude, and altitude, was captured at each sampling location dispersed throughout the western part of CDF blocks. Total 280 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, CaCO3, 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) [8]. Organic carbon was determined by the dichromate wet oxidation method of Walkley and Black (Nelson and Sommers, 1982) [26]. Free CaCO3 was determined by rapid titration method (Piper, 1966) [17]. 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) [13]. 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) [18]. 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) [23]. Formula for Nutrient Index:

$$NI = \frac{(NVL\times0.5)+(NL\times1)+(NM\times1.5)+(NMH\times2)+(NH\times2.5)+(NVH\times3)}{\text{Total number of samples}}$$

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

Soil pH values for eight blocks of Central Demonstration Farm, ranged from 7.56 to 8.55, indicated a pH range from neutral to moderately alkaline. The highest mean 8.42 was observed in soils of Rambhapur block, while the lowest mean of 8.21 was recorded in Pahadpur block. Similar results reported by Dhotare *et al.* (2019) [5] indicate that pH of Soil under study at Department of Soil Science PDKV Akola were ranges from 7.5 to 8.6. The alkaline nature of the soil is likely attributed to the presence of adequate free lime content in the soil (Jibhakate *et al*. 2009) [10]. Soil electrical conductivity (EC) values ranged from 0.10 to 0.39 $dSm^{-1}$ and 0.15 $dSm^{-1}$ with their mean. The highest EC observed in Pahadpur block while lowest EC observed in Kothari block. 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) [9]. Organic carbon content varied from 1.9 to 10.3 g $kg^{-1}$ with the mean of 5.2 g $kg^{-1}$. The organic carbon variation could be noticed in every block with highest content observed in Anvi block with mean of 6.8 g $kg^{-1}$ followed by Nipana block with mean of 6.0 g $kg^{-1}$ and lowest in case of Wani and Rambhapur block with mean of 4.5 g $kg^{-1}$. Results are in accordance with the results reported by Hadole *et al.* (2020) [20] of Solapur district of Maharashtra, the organic carbon ranged from 2.67 to 13.37 g $kg^{-1}$, indicating that the soils were low to very high in organic carbon content. The calcium carbonate content of soils ranged from 2.87 to 13.5 percent with mean of 9.43 percent (%) which indicates that soils are non-calcareous to calcareous in nature. The highest content of calcium carbonate was recorded in Sukali block with mean of 10.47 percent followed by Pahadpur block i.e. (10.15 %) while, lowest percentage of calcium carbonate observed in Office Area with mean of 7.83 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]. Similar result was also found by Sarap *et al*. (2020) [20].

### 3.2 Status of micronutrients

The result showed that western blocks of CDF had latent deficient available zinc content in soils with the mean of 0.86 mg $kg^{-1}$. The available zinc content observed

maximum in Office Area with mean of 1.05 mg $kg^{-1}$ and minimum in Wani block with mean of 0.73 mg $kg^{-1}$. The available zinc in all over western part of CDF ranged from 0.33 to 1.30 mg $kg^{-1}$. In all blocks major soil samples were found in the marginal suficient (49.65%) category of available zinc followed by latent deficient (31.07%), deficient (16.78%), and adequate (2.5%) categories. The Nutrient index value in all over the blocks was found in moderate range that is (1.68). Highest nutrient index was found in Kothari block (2.28) followed by Office Area and Pahadpur block (1.99) and (1.82) while lowest nutrient index was observed in Wani (1.49) block. Similar result was also found by Magare *et al.* (2022) [14] and Katkar *et al.* (2019) [12]. Blocks had latent deficient Iron content in soils with the mean of 6.09 mg $kg^{-1}$. The available iron content observed maximum in Office Area block with mean of 6.76 mg $kg^{-1}$ followed by Pahadpur block with mean of 6.36 mg $kg^{-1}$ and minimum in Nipana block with mean of 5.97 mg $kg^{-1}$. The available Iron in all over the western part blocks of CDF ranged from 2.97 to 10.67 mg $kg^{-1}$. Similar result was found by Hadole *et al.* (2020) [20]. In black soils, low Fe content may be due to precipitation of $Fe^{2+}$ by $CaCO_3$ and decrease the availability (Mamaledesai *et al.* 2012) [15]. Similar results were also observed by Ravikumar *et al.* (2007) [19]. In all eight blocks of CDF, most of the soil samples were found in marginal sufficient category (40%) of available iron followed by latent deficient (39.29%), deficient (14.29%), category. While in the adequate and high categories some samples were found (6.07%) and (0.35%) respectively. The Nutrient index value in all over the blocks was found in moderate range that is (1.69). Highest nutrient index was found in Office Area block (1.83) followed by Sukali block (1.75) while lowest nutrient index was observed in Nipana block (1.63). The result showed that western parts of blocks had high available copper content in soils with the mean of 1.47 mg $kg^{-1}$. The available copper content observed maximum in Anvi block with mean of 2.43 mg $kg^{-1}$ and minimum in Nipana block with mean of 0.87 mg $kg^{-1}$. The available copper in all over western part of CDF ranged from 0.27 to 2.99 mg $kg^{-1}$. In all the eight blocks of western part of CDF, 197 soil samples were found in high category (70.36%) of available copper followed by 35 samples found in adequate category (12.5%) and 31 samples in marginal sufficient category (11.07%). In case of acute deficiency not any sample is observed while, five samples (1.78%) observed in deficient and twelve sample (4.2%) was observed in latent category. The Nutrient index value in all over the blocks was found in very high range that is (2.72). Highest nutrient index was found in Kothari, Anvi, Pahadpur and Office Area block (3.00) while, the lowset value was observed in Nipana block (2.28). Similar result was also found by Hadole *et al.* (2020) [20]. The results for available manganese showed that blocks had high available manganese content in soils with the mean of 8.59 mg $kg^{-1}$. The available manganese content observed maximum in Anvi block with mean of 15.05 mg $kg^{-1}$ and minimum in Wani block with mean of 4.72 mg $kg^{-1}$ from all over the blocks. The available manganese in all over western part of CDF ranged from 2.28 to 19.92 mg $kg^{-1}$. In all the eight blocks of CDF most of the soil samples were found in high (38.92%) category of available manganese followed by adequate, latent and marginal sufficient (25.71%), (15.72%) and (15%) categories respectively. Acute deficiency was not observed in any block. However, 13 samples were found to be in deficient category (4.64%). The Nutrient index value in all over the blocks were found in high range that is (2.39). Highest nutrient index was found in Anvi (3), followed by Office Area (2.83) and Kothari (2.65). The lowest NIV was observed in Wani block (1.59) followed by Sukali (1.74). Similar result was also found by Kashiawar *et al.* (2019) [11] and Mandavgade *et al.* (2015) [16]. Result showed that blocks had adequately available boron content in soils. The available boron content observed maximum in Pahadpur block with mean of 1.10 mg $kg^{-1}$ and minimum in Kothari block with mean of 1.0 mg $kg^{-1}$ from all over the blocks. The available boron in all over blocks ranged from 0.70 to 1.51 mg $kg^{-1}$ with mean of 1.05 mg $kg^{-1}$. In all eight blocks soils most of the samples were found in adequate (43.21%) of available boron followed by high category (37.86%) and marginal sufficient category (18.32%). Deficiency of available boron was not observed in any of the blocks. The Nutrient index value in all over the blocks were found in high range that is (2.58). Highest nutrient index was found in Pahadpur (2.72) followed by Office Area and Nipana block (2.66) and (2.65) while lowest nutrient index was observed from Kothari (2.46) 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 | Moderately High | 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) [22] and Dhaliwal *et al.* (2020) [4].

**Table 3:** Chemical properties of soils in western part of 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 |
| Sukali | 8.03-8.49 | 8.36 | 0.12-0.28 | 0.18 | 8.85-13.5 | 10.47 | 1.9-6.5 | 4.6 |
| Wani | 7.91-8.41 | 8.23 | 0.10-0.25 | 0.14 | 4.84-11.5 | 8.56 | 3.8-5.8 | 4.5 |
| Rambhapur | 8.15-8.55 | 8.42 | 0.10-0.18 | 0.13 | 5.12-11.75 | 9.86 | 2.2-5.3 | 4.5 |
| Kothari | 7.8-8.49 | 8.35 | 0.10-0.20 | 0.12 | 5.75-11.50 | 9.41 | 3.8-5.1 | 4.6 |
| Nipana | 7.91-8.53 | 8.37 | 0.11-0.32 | 0.16 | 2.87-12.25 | 8.14 | 3.4-10.0 | 6.0 |
| Anvi | 8-8.44 | 8.32 | 0.11-0.21 | 0.13 | 6.75-13.0 | 9.56 | 2.4-10.3 | 6.8 |
| Pahadpur | 7.56-8.43 | 8.21 | 0.11-0.39 | 0.20 | 7.75-12.7 | 10.15 | 3.1-7.7 | 5.3 |
| Office Area | 8.38-8.42 | 8.40 | 0.14-0.22 | 0.18 | 5.37-10.25 | 7.83 | 4.6-6.4 | 5.5 |
| Overall average | 7.56-8.55 | 8.32 | 0.10-0.39 | 0.15 | 2.87-13.5 | 9.43 | 1.9-10.3 | 5.2 |

**Table 4:** Block wise status and nutrient indices of available Zinc in soils of western part of CDF, Dr. PDKV, Akola

| Blocks | Range (mg $kg^{-1}$) | Mean | No. of samples | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Acute def. | Deficient | Latent def. | Marginal sufficient | Adequate | High | NIV |
| Sukali | 0.45-1.00 | 0.75 | 0 | 9 (30) | 10 (33.33) | 11(36.66) | 0 | 0 | 1.53 |
| Wani | 0.35-1.18 | 0.73 | 0 | 14(38.88) | 8 (22.22) | 14 (38.88) | 0 | 0 | 1.49 |
| Rambhapur | 0.39-1.08 | 0.86 | 0 | 6(13.33) | 16 (35.55) | 23 (51.11) | 0 | 0 | 1.68 |
| Kothari | 0.63-1.20 | 0.99 | 0 | 0 | 9(21.95) | 32(78.04) | 0 | 0 | 2.28 |
| Nipana | 0.33-1.26 | 0.76 | 0 | 11 (27.5) | 16(40) | 11 (27.5) | 2 (5) | 0 | 1.55 |
| Anvi | 0.39-1.30 | 0.90 | 0 | 5 (12.5) | 13 (32.5) | 20(50) | 2 (5) | 0 | 1.73 |
| Pahadpur | 0.44-1.22 | 0.94 | 0 | 2 (4.44) | 14 (31.11) | 27 (60) | 2 (4.44) | 0 | 1.82 |
| Office Area | 0.89-1.30 | 1.05 | 0 | 0 | 1 (33.33) | 1(33.33) | 1 (33.33) | 0 | 1.99 |
| Overall average | 0.33-1.30 | 0.86 | 0 | 45(16.78) | 87 (31.07) | 139(49.64) | 7 (2.5) | 0 | 1.68 |

(Figures in parenthesis are percentages)

**Table 5:** Block wise status and nutrient indices of available Iron in soils of western part of CDF, Dr. PDKV, Akola

| Blocks | Range (mg $kg^{-1}$) | Mean | No. of samples | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Acute def. | Deficient | Latent def. | Marg. sufficient | Adequate | High | NIV |
| Sukali | 3.55-8.59 | 6.23 | 0 | 3 (10) | 10 (33.33) | 16 (53.34) | 1 (3.33) | 0 | 1.75 |
| Wani | 3.98- 9.11 | 6.00 | 0 | 6 (16.67) | 14 (38.89) | 11 (30.55) | 5 (13.89) | 0 | 1.70 |
| Rambhapur | 4.11-9.22 | 6.04 | 0 | 4 (8.88) | 23 (51.12) | 16 (35.56) | 2 (4.44) | 0 | 1.67 |
| Kothari | 3.31-9.45 | 5.98 | 0 | 7 (17.07) | 15 (36.59) | 17 (41.46) | 2 (4.88) | 0 | 1.67 |
| Nipana | 3.88-10.07 | 5.97 | 0 | 6 (15) | 19 (47.5) | 13 (32.5) | 2 (5) | 0 | 1.63 |
| Anvi | 3.10-8.51 | 6.01 | 0 | 7 (17.5) | 12 (30) | 20 (50) | 1 (2.5) | 0 | 1.68 |
| Pahadpur | 2.97-10.67 | 6.36 | 0 | 7 (15.56) | 16 (35.65) | 17 (37.78) | 4 (8.88) | 1 (2.22) | 1.73 |
| Office Area | 6.45-7.04 | 6.76 | 0 | 0 | 1 (33.33) | 2 (66.67) | 0 | 0 | 1.83 |
| Overall average | 2.97-10.67 | 6.09 | 0 | 40 (14.29) | 110 (39.29) | 112 (40) | 17 (6.07) | 1 (0.35) | 1.69 |

(Figures in parenthesis are percentages)

**Table 5:** Block wise status and nutrient indices of available Copper in soils of western part of CDF, Dr. PDKV, Akola

| Blocks | Range (mg $kg^{-1}$) | Mean | No. of samples | | | | | | NIV |
|---|---|---|---|---|---|---|---|---|---|
| | | | Acute def. | Deficient | Latent def. | Marginal sufficient | Adequate | High | |
| Sukali | 0.70-1.36 | 1.05 | 0 | 0 | 0 | 3 (10) | 7 (23.33) | 20 (66.66) | 2.78 |
| Wani | 0.27-1.77 | 0.89 | 0 | 3 (8.33) | 6 (16.66) | 6 (16.66) | 6 (16.66) | 15 (41.66) | 2.33 |
| Rambhapur | 0.29- 2.24 | 1.05 | 0 | 2 (4.44) | 2 (4.44) | 4 (8.88) | 13 (28.88) | 24 (53.33) | 2.61 |
| Kothari | 1.03- 2.91 | 1.87 | 0 | 0 | 0 | 0 | 0 | 41 (100) | 3 |
| Nipana | 0.44-2.27 | 0.87 | 0 | 0 | 4 (10) | 18 (45) | 9 (22.5) | 9 (22.5) | 2.28 |
| Anvi | 1.76-2.99 | 2.43 | 0 | 0 | 0 | 0 | 0 | 40 (100) | 3 |
| Pahadpur | 1.19- 2.85 | 1.87 | 0 | 0 | 0 | 0 | 0 | 45 (100) | 3 |
| Office Area | 1.99 -2.33 | 2.16 | 0 | 0 | 0 | 0 | 0 | 3 (100) | 3 |
| Overall Average | 0.27-2.99 | 1.47 | 0 | 5 (1.78) | 12 (4.2) | 31 (11.08) | 35 (12.5) | 197 (70.36) | 2.72 |

(Figures in parenthesis are percentages)

**Table 5:** Block wise status and nutrient indices of available Manganese in soils of western part of CDF, Dr. PDKV, Akola

| Blocks | Range (mg $kg^{-1}$) | Mean | No. of samples | | | | | | NIV |
|---|---|---|---|---|---|---|---|---|---|
| | | | Acute def. | Deficient | Latent def. | Marginal sufficient | Adequate | High | |
| Sukali | 3.46-10.46 | 5.24 | 0 | 0 | 20 (66.6) | 5 (16.66) | 3 (10) | 2 (6.66) | 1.74 |
| Wani | 2.28-9.56 | 4.72 | 0 | 13 (36.11) | 11 (30.55) | 6 (16.66) | 4 (11.11) | 2 (5.55) | 1.59 |
| Rambhapur | 3.44-12.14 | 7.55 | 0 | 0 | 9 (20) | 9 (20) | 12 (26.66) | 15 (33.33) | 2.36 |
| Kothari | 4.31-15.63 | 9.79 | 0 | 0 | 2 (4.87) | 3 (7.31) | 16 (39.02) | 20 (48.18) | 2.65 |
| Nipana | 4.7-18.74 | 8.08 | 0 | 0 | 2 (5) | 13 (32.5) | 13 (32.5) | 12 (30) | 2.43 |
| Anvi | 9.52-19.92 | 15.05 | 0 | 0 | 0 | 0 | 0 | 40 (100) | 3 |
| Pahadpur | 6.12-11.40 | 8.52 | 0 | 0 | 0 | 6 (13.33) | 23 (51.11) | 16 (33.55) | 2.55 |
| Office Area | 8.27-10.28 | 9.43 | 0 | 0 | 0 | 0 | 1 (33.33) | 2 (66.66) | 2.83 |
| Overall Average | 2.28-19.92 | 8.59 | 0 | 13 (4.65) | 44 (15.72) | 42 (15) | 72 (25.71) | 109 (38.92) | 2.39 |

(Figures in parenthesis are percentages)

**Table 5:** Block wise status and nutrient indices of available Boron in soils of western part of CDF, Dr. PDKV, Akola

| Blocks | Range (mg kg$^{-1}$) | Mean | No. of samples | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Acute def. | Deficient | Latent def. | Marginal sufficient | Adequate | High | NIV |
| Sukali | 0.74-1.26 | 1.03 | 0 | 0 | 0 | 4 (13.34) | 16 (53.33) | 10 (33.33) | 2.59 |
| Wani | 0.70-1.33 | 1.05 | 0 | 0 | 0 | 7 (19.44) | 16 (44.45) | 13 (36.11) | 2.58 |
| Rambhapur | 0.70-1.29 | 1.02 | 0 | 0 | 0 | 11 (24.45) | 19 (42.22) | 15 (33.33) | 2.54 |
| Kothari | 0.78-1.31 | 1.0 | 0 | 0 | 0 | 13 (31.71) | 18 (43.90) | 10 (24.39) | 2.46 |
| Nipana | 0.80-1.27 | 1.07 | 0 | 0 | 0 | 7 (17.5) | 14 (35) | 19 (47.5) | 2.65 |
| Anvi | 0.82-1.51 | 1.06 | 0 | 0 | 0 | 3 (7.5) | 27 (67.5) | 10 (25) | 2.58 |
| Pahadpur | 0.76-1.39 | 1.10 | 0 | 0 | 0 | 8 (17.78) | 9 (20) | 28 (62.22) | 2.72 |
| Office Area | 0.98-1.22 | 1.07 | 0 | 0 | 0 | 0 | 2 (66.67) | 1 (33.33) | 2.66 |
| Overall Average | 0.70-1.51 | 1.05 | 0 | 0 | 0 | 53 (18.32) | 121 (43.21) | 106 (37.86) | 2.58 |

**(**Figures in parenthesis are percentages)

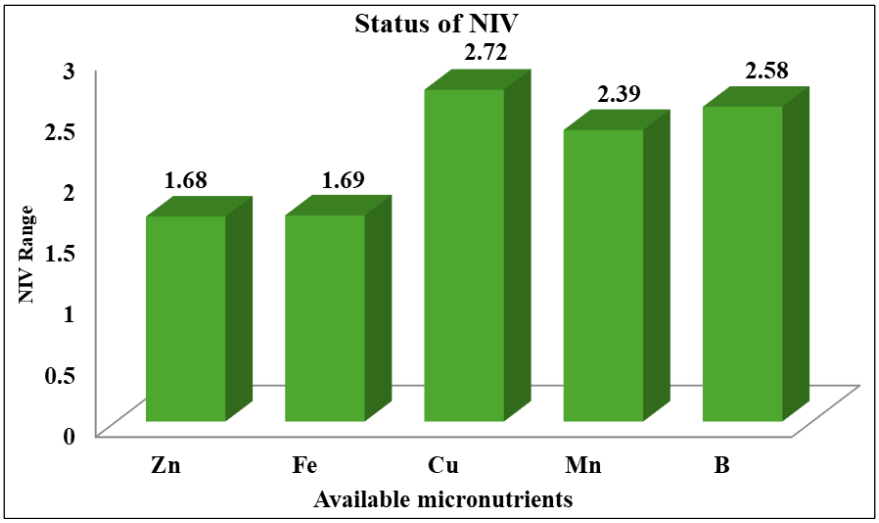


**Fig 1:** Nutrient Index Values (NIV) of available micronutrients (Zn, Fe, Cu, Mn, B) indicating highest availability of Cu and lowest of Zn.

## 4. Conclusion

From the present investigation it can be concluded that the soil of western 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 moderate for zinc and iron; high for manganese and boron and very high for copper.

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