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Status of Major and Micro Nutrients in Soils of Beed District (Maharashtra), India

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ABSTRACT

Studies were carried out on soil nutrient index and soil fertility of six tahsils of Beed district. The soils were alkaline in reaction and within safer limits of electrical conductivity. These soils were calcareous in nature, low to medium in organic content and low in available N,P and DTPA-Zn. While high in available K, and medium to high in DTPA-Fe,Mn and Cu

Keywords: Nutrient Index, DTPA –Zn, Fe, Mn, Cu, Beed

INTRODUCTION

Beed district situated at the central west of the Aurangabad. It is between 18.28° and 19.28° longitudinally and between 74-54° and 76.57° latitudinal. The total area of Beed district is 1061.5.3 Sq. Kms and it is 3.44% of Maharashtra state about 97.79% area in rural and there are 1365 villages as per census report of 2001 (Source: Socio economy of Marathwada region) and eleven talukas, Beed district comprises various types of soils with lot of variation in their nutrient availability status. Main crop grown in Beed district during kharif season are soybean, pigeonpea, pearl millet, maize(cereals) Black gram (pulses), sorghum, ground nut sunflower (oil seeds), and cotton, sugar cane (cash crops).

To understand or to study thorough, the key factors related to agriculture such as location climatic conditions, soil and water management gives rise to new challenges in basic and strategic researches the primary focus for less and dry land farmers. An increase in cropping intensity coupled with shift from traditional varities to that of nutrient demanding fertilizer responsive high yielding varities of field crops, fruit crops have lead to the large scale mining of nutrients from the soil. The information with respect to physicochemical properties and availability of some macro and micro nutrients of the study area is lacking, Therefore an attempt was made to assess the status of available nutrients in soils of Beed district.

EXPERIMENTALPROCEDURES

The present investigation was undertaken during year 2013-14, surface (20 cm) soil samples from 6 tahsils from Beed district were studied for available nutrients and for estimation of soil nutrient index.

Selection of sampling location

Out of 11 tahsils of Beed district 6 tahsils (30 Villages) were selected for the study. The villages were selected randomly. The selected 6 tahsils of Beed district viz., Parali, Georai, Ashti, Patoda, Beed and Majalgaon. The villages (5) selected from each tahsil viz. Daundwadi, Digras, Hivra gowardan, Nagdara, Parali (rural), Luckhamsala, Bhogalgaon, Malhivra, Tartevadi, Nagzari, Kinhi, Vaghluj, Daulvadgaon, Hotalan, Hivra, mahasangvi, Dhas Pimpalgaon, Waijala, Rohatvadi, Savargaon Sone, Jirewadi, Ketura, Charahata, Aher Dhanora, Talegaon, Abegaon, Sandas Chincholi, Nipani takli, Savargaon, Gangamasla were identified for collection of soil samples.

Standard procedures were followed for analysis of the soil samples collected from different villages of Beed district as out lined by Jackson [1], OC by Walkley and Black's rapid titration method [2], and available micronutrients Fe,Mn,Cu and Zn estimated by DTPA extractable method, Lindsay and Norvell [3]. Nutrient Index was calculated as per the formula suggested by Ramamoorthy and Bajaj [4] and values for low medium and high will be taken as <1.67, 1.67-2.33, 72.33 respectively for computing nutrient index following formula was used.

NIV =

RESULTS AND DISCUSSION

Status of available major nutrients in soils of Beed district.

(* figures are average values)
Table 1. Available N,P,K in soils of Beed district

Name of Tahsil	No of Samples	Available N (kgha-1)	Available P (kgha-1)	Available K (kgha-1)
1) Parali	25	102-398	4.12 – 24.02 (12.36)*	210.2 – 1058.3 (419.2)*
		(211)*		
2) Georai	25	70-332	2.95-19.9 (12.37)*	239-2203
		(150)*		(1002.7)*
3) Ashti	25	42-484	4.22-22.31 (12.33)*	276.2177 (730.52)*
		(170)*		
4) Patoda	25	58-356	2.05-17.13	350-62 – 1759.5
		(140.89)*	(6.02)*	(868.12)*
5) Beed	25	34-260	2.63-55.78	108.78-1885.2
		(117.1)*	(10.56)*	(722.47)*
6) Majalgaon	25	114-410.2	3.29-53.07	267.7-1791
		(272.7)*	(11.13)*	(763.1)*

The data (Table 1) revealed that the available nitrogen content in soils of six tahsils of Beed district was low from the results it was observed that majority of soil samples were low in available nitrogen content. The lower content of available nitrogen in this area might associated with hot and dry climate of this region. Low to medium content of organic matter and low total nitrogen reserve and in term C:N ratio of immobilized forms of nitrogen was reported by Malewar [5]. The available phosphorus in these soils ranged from 4.12 to 24.02, 2.95 to 19.9, 4.22 to 22.31, 2.05 to 17.13, 2.63 to 55.78 and 3.29 to 53.07 kgha1 with an average of 12.36, 12.37, 12.33, 6.02, 10.56 and 11.13 kg ha-1 respectively hence the soils from the six tahsils of Beed district were low in available phosphorus. The swell shrink soils of Maharashtra were very low to high in available P content as reported by patil et al. [6]. Similar results were recorded in Marathwada region which ranged from 10.0 to 19.1 kg ha-1 available P reported by Waikar et al. [7] An available potassium was maximum in these soil samples it varied from 210.2 to 1058. 239 to 2203, 276 to 2177, 350.62 to 1759.5, 108,78 to 1885.2 and 267.7 to 1791 Kg ha-1 with mean values of 419.2, 1002.7, 730.52, 868.12, 7.22.47 and 763.1 Kgha-1 respectively. Most of the soils samples contained high amount of available K.

Status of available Cu,Fe,Mn and Zn of soil samples in different soils of six above mentioned tahsils were recorded in Table 2. DTPA– Cu in these soil samples were ranged from 0.23 to 2.21, 0.11 to 0.53, 0.09 to 0.77, 1.89 to 5.52, 0.05 to 0.64 and 0.21 to 2.49 ppm with mean values of 0.96, 0.23 , 0.36, 3.53, 0.21 and 1.03 ppm respectively that all the soil samples showed sufficient content of DTPA –Cu, with 28% deficiency from Georai, from Ashti Beed, showed 20%, 44%. soil samples deficient in DTPA-Cu where as patoda, Majalgaon parali 100% soils showed sufficiency in DTPA-Cu.

Same results were reported by Age et al. The DTPA-Fe of six tahsils ranged from 0.29 to 2.21, 2.14 to 5.12, 2.80 to 7.08, 2.98 to 5.65, 1.97 to 8.05 and 0.4 to 2.10 ppm with mean values of 1.17,4.06, 4.56, 4.14, 4.52, and 0.70 ppm respectively from the above data analyzed from parali and Majalgaon 100% soils were deficient in DTPA-Fe., where

as 44%, 44%, 60% and 48% soil samples from Georai, Ashti, Patoda and Beed respectively showed deficiency with sufficiency in remaining soil samples.

(* figures showed mean value)
Table 2. Available micronutrients in soils of Beed district.

Name of Tahsils	No. of samples	DTPA-Cu (ppm)		DTPA –Fe (ppm)	DTPA-Mn (PPm)	DTPA-Z (ppm)
1) Parali	25	Range	0.23-2.21	0.29-2.21	0.12-9.17	0.10-5.60
		Mean	0.96*	1.17*	3.48*	1.13*
2) Georai	25	Range	0.11-0.53	2.14-5.12	0.96-4.13	0.43-1.58
		Mean	0.23*	4.06*	2.92*	0.43*
3) Ashti	25	Range	0.0.77	2.80-7.08	1.98-6.23	0.21–1.00
		Mean	0.36*	4.56*	3.74*	0.47*
4) Patoda	25	Range	1.89-5.52	2.98-5.65	2.56-540	0.15-0.37
		Mean	3.53*	4.14*	4.17*	0.25*
5) Beed	25	Range	0.05-0.64	1.97-8.05	0.45-6.21	0.16-1.39
		Mean	0.21*	4.52*	3.19*	0.48*
6) Majalgaon	25	Range	0.21-2.49	0.4-2.10	1.93-9.33	0.01-0.52
		Mean	1.03*	0.70*	6.17*	0.26*

The DTPA-Mn from above data (Table 2) Parali, Georai soil Showed 28%, 12%, respective deficient in Mn, Ashti, Patoda soils were 100% sufficient in DTPA-Mn where as from both Beed and majalgaon only 4% soils were deficient in DTPA-Mn from the observed data most of the soils were higher in range of Mn Kharche et al. [8] recorded the DTPA-Mn varied from 1.04 to 8.6 mgkg-1 in soil of Nashik district of Maharashtra. DTPA-Zn in all the six tahsils ranged from 0.10 to 5.60, 0.43 to1.58, 0.21 to 1.00, 0.15 to 0.37 0.16 to 1.39 and 0.01 to 0.52 with mean value of 1.13, 0.43, 0.47, 0.25, 0.48 and 0.26 ppm, respectively from studied data most of the soil samples 99% showed deficiency in Zn content.

All the soil samples showed some variations in micronutrients but considerably sufficient in DTPA–Cu, Fe, Mn with deficiency in Zn content. Geochemical point of view, basaltic parent material on which most of the soils are rich in ferromagnetism minerals.

Calcium and magnesium are the most abundant cations occupying the exchange sites of soil colloids both organic and inorganic. The micronutrients, though required in very less quantities. They are equally important as macronutrients for completing life cycle of plant. Zinc is essential for production of chlorophyll and carbohydrates.

Soils nutrient index value

The data on nutrient index value of Beed districts of six tahsils were presented in Table 3.

According to nutrient index value of the soils of these tahsils of Beed district were found in low category for available N,P. and Fe, Zn, while high with respect to available K, Mn, and Cu.

The nutrient index values for N were 1.16, 1.08, 1.12, 1, 1 and 1.64 respectively the values for P were 1.4, 1.48, 1.32, 1, 1.2 and 1.32 and for K are 2.96, 3, 3, 3, 2.76 and 3 respectively. The nutrient index value of Cu, Fe were 3, 2.44, 2.6, 3, 2.12 and 3, for Fe, 3, 2.12, 2.12, 1.8, 2.04 and 1 respectively. Nutrient index values for Mn and Zn were 2.44, 2.76, 3, 3, 2.92, 2.92 and 2.6, 1, 1.08, 1, 1.16, 1.08 respectively against the fertility index values < 1.67 for low, 1.67 to 2.33 for medium and > 2.33 for high fertility status (Ramamoorthy and Bajaj, 1969) of soils of Beed district.

Table 3. Nutrient Index Value of Six tahsils of Beed district.

Sr No.	Nutrients	Parli		Georai		Ashti		Patoda		Beed		Majalgaon	
	Category	NIV	Category	NIV	Category	NIV	Category	NIV	Category	NIV	Category	NIV	Category
1)	Available N	1.16	Low	1.08	Low	1.12	Low	1	Low	1	Low	1.64	Low
2)	Available P	1.4	Low	1.48	Low	1.32	Low	1	Low	1.2	Low	1.32	Low
3)	Available K	2.96	High	3	High	3	High	3	High	2.76	High	3	High
4)	DTPA – Cu	3	High	2.44	High	2.6	Medium	3	High	2.12	Medium	3	High
5)	DTPA - Fe	3	High	2.12	High	2.12	Medium	1.8	Low	2.04	Medium	1	Low
6)	DTPA – Mn	2.44	High	2.76	High	3	High	3	High	2.92	High	2.92	High
7)	DTPA – Zn	2.6	Low	1	Low	1.08	Low	1	Low	1.16	Low	1.08	Low

The data compiled on nutrient index value revealed that all the soils collected from surveyed area rated as low in nitrogen, thus soils of this region are expected to respond to the added N fertilizers to greater magnitude. The lower content of available nitrogen in this region is associated with hot and dry climate complex, low content of organic matter and total N reserve and intern C:N ratio of immobilized forms of Nitrogen Malewar et al. [9] reported N deficiency in soils of northern Marathwada. The investigated soils, however rated as low in available phosphorus become of continuous mining by crops from soils and higher amount of CaCO3 in these soil which get fix the native and applied phosphorus in soil. On the other hand, most of the soils were rated as higher in available potassium . The high content of available potassium in soils mainly associated with the presence of K rich minerals and associated black soils. Further available Cu, Fe, Mn and Zn were found high, medium and low fertility index value category respectively (Table 3)

CONCLUSION

A physicochemical studies of soil samples from six tahasils of Beed district shows that all the soil parameters conductivity, pH, Ca and organic carbon are in normal range. Available N and P are low and K was high in the soil samples, where as Cu, Fe, Mn were high to medium and Zn availability was in low category. These studies give information about nature of soil, present nutrients in soil, according to this analytical data farmer arrange the amount of which fertilizers and nutrients needed to soil to increase the percentage yield of crops and also save the expense on fertilizers and avoid the soil pollution.

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