



## **Status of Available Major and Micro Nutrients in Soils of Ashti Tahasil of Beed District Of Central Maharashtra, India**

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### **ABSTRACT**

*The soil samples were collected during summer season in 2013 in Ashti tahasil of Beed district of Maharashtra. As that state was known for drought and whole district suffer that. Great revolution has greatly increased the food production in Ashti Tahasil but continuous use of fertilizers and high yielding crop varieties have led to depletion of natural soil nutrients and soil fertility. There were 25 soil samples collected and analysed for the basic parameters pH, EC, OC and CaCO<sub>3</sub>. The major nutrients N, P and K also the micro nutrients like Cu, Fe, Mn and Zn by using Atomic absorption spectrophotometer. Soils were light yellowish brown to black in colour, excessive to poorly drained, slightly neutral to slightly alkaline, low to medium in organic carbon and within range in EC suitable for germination.*

**Key words:** Beed District, Ashti, major and micro nutrients, soil parameters.

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### **INTRODUCTION**

Management of soil resources on scientific principle is essential to maintain the present level of soil productivity and prevent soil degradation [1]. In the recent years increasing emphasis has been on characterization for land evaluation. This call for comprehensive knowledge on soil resources in terms of soil type, their spatial extent, physical chemical properties and limitations of capabilities, remote sensing technology has merged as a powerful tool for studying soil resources because it helps in studying soil resources in spatial domain in time and cost effective manner [2].

Marathwada is known for drought from Maharashtra state, Beed is one of the district contributing major share of kharif and rabbi harvest with production of cotton, cane sugar, wheat, bajra, pulses. Soil resources information and use of fertilizers planning options are useful to this area, keeping this in mind, the present investigation was taken to characterize the soils of this district using analysis method of soil parameters and also used for achieving sustainable crop production.

### **MATERIALS AND METHODS**

The study was conducted in Beed district is located in west side of Aurangabad division. It is 18° – 28° north latitude and 75- 54° to 76-57° East longitude covering about 10615.3Sq.Ms. and it is 3.44% of Maharashtra state. The average rainfall ranges from 450 to 800 mm. But this district mainly known for drought affected by climate changes. The major and micro nutrients govern the soil fertility and control the yield of crops. The soil fertility evaluation of an area or region is an important aspect in context of sustainable agricultural production, particularly for drought region. Where cropping depends on rain water and the farmers having less land.

Random soil samples from 0.20 cm. Depth were collected from five villages of Ashti tahasil. From each village five samples were collected, about 25 representative soil samples were analysed for important physico-chemical properties by following standard methods. The pH and EC of soils were estimated by using soil suspension (1:2.5) [3], organic carbon (oc) by method of Walkley and Black (wet oxidation method), P<sub>2</sub>O<sub>5</sub> estimated by Olsen et al. K<sub>2</sub>O IN soil using flame photometer and micronutrients were obtained by DTPA- method [4, 5, 6] with the help of atomic absorption spectrophotometer (AAS).

**Soil Site:** The 25 representative soil samples were collected from the Ashti tahasil Viz; Kinhi, waghaj, daulwadgaon, hatolan and hivara selected randomly. Generally vegetation from that area was cotton, bajra, jawar, wheat and soybean.

## RESULT AND DISCUSSION

The important and relevant soil characteristics are presented in table 1. The pH values of soils of ashti tahasil varied from 7.2 -8.2 with pooled mean value 7.6 . From that samples about 56% samples had alkaline soil reaction, 44% samples shows neutral soil reaction this indicates that soils are in general neutral to alkaline in nature on the basis of Muhr *et al.* [7],and the formation of these soils from basaltic parent material which inherently rich in basic cations Age [8]. About 100% samples were found normal EC (<1.0dS<sup>-1</sup>). 56% soil samples were calcareous in nature and remaining 40% non calcareous in nature 4% samples found highly calcareous (CaCO<sub>3</sub>> 10). In the absence of sufficient natural drainage as in water logged soils and without a proper leaching and drainage program to remove salts, this would lead to a high soil salinity and reduced crop yields in the long run. Low level of CaCO<sub>3</sub> enhance soil structure and are generally beneficial to crop production but at higher concentration they may induce iron deficiency and when cemented limit the water storage capacity of soil

**Available Major Nutrients:** The major nutrients N,P and K in soils of ashti region are presented in table no. 1 with their mean values . The organic content (OC) in these soil samples rated low to medium in organic carbon this also reflects on the poor availability of nitrogen status in soils. Age [8], Malewar *et al.* [9] , also reported the lower content of organic matter in these soils has been attributed to high temperature and good aeration in these soils increased the rate of oxidation of organic matter resulting in the reduction of soil organic carbon content [10, 11, 12]. About the nitrogen content 88% soils are low, 4% medium and 8% are high . Low nitrogen shows organic contents in the soil sample were low. The low content is due to poor vegetation and high rate of organic matter decomposition under hyper thermic temperature regime leads to extremely high oxidizing condition. The available phosphorus in soils ranged from 4.22kgha<sup>-1</sup> – 12.33kgha<sup>-1</sup> with mean value of 12.31kgha<sup>-1</sup> on the basis of limits suggest by [7], 68% soil samples contained low, 32% soils medium content of available phosphorus also reported by [13] and [8]. This may be due to lower doses of P fertilizers , fixation of phosphorus on clay minerals or CaCO<sub>3</sub> surfaces with time elapsed between fertilizer application and crop uptake. The available potassium content varied from 276 kgha<sup>-1</sup> – 2177 kgha<sup>-1</sup> with pooled value of 730.52 kgha<sup>-1</sup>. All the soil samples are high in K content, this indicate that these soils of ashti have K-rich clay minerals like illite and kaolinite.

**Available Micronutrients:** The status of available micronutrients ie. DTPA- Cu, Fe, and Zn content of these soil samples were analysed and shows the recorded values as. On the basis of critical limits of available Cu ranges from 0.09ppm-0.77ppm with mean value of 0.36ppm . Copper availability is dependent on soil characteristics it increase in organic matter but decreases with increase in pH and CaCO<sub>3</sub> content of soil.On the basis of critical limits 80% of soil samples were sufficient in copper and 20% soil samples found deficient. DTPA –Fe in the soil samples varied from 2.80 ppm- 7.08 pmm with mean value 4.56 ppm . The available Fe decreased with significantly with increase in pH and CaCO<sub>3</sub>. On the basis of critical limits of available Fe, 56% soil samples found sufficient where as 44% soil samples were deficient in Fe . DTPA- Mn in these soil samples ranged from 1.98ppm- 6.23ppm with pooled mean of 3-74ppm.Manganese availability is mostly affected by soil PH, organic matter and soil moisture .On the basis of critical limits of available Mn, 100% soil samples were found sufficient .In case available Zn in these soil samples varied from 0.21ppm- 1.00ppm with mean value of 0.47ppm that indicate that about 10% soils found sufficiency in Zn and 90% of the soils were found deficient. Zn content of soil depends on the parent material, organic matter, the available of Zn reduced with increased in pH , OC. and CaCO<sub>3</sub>

## CONCLUSION

It can be concluded from the result under study area that the soil properties pH, EC, OC and CaCO<sub>3</sub> the main characteristics playing major role in controlling the available of micronutrients. Among the micronutrients the deficiency of Fe is medium and Zn of major concern require application of Zn fertilizers to maximize crop yield. These soils were neutral to alkaline in soil reaction, the salinity was in safe limit. Organic carbon content low to medium, calcareous to non calcareous with 4% soil samples highly calcareous. Available nitrogen and phosphorus is very low and require organic compost , where high level of K content . Hence the soils require attention regarding integrated nutrients management approaches and regular monitoring for soil health for high and healthy , nutritious food productivity and sustainable agriculture.

**Table 01 : Soil Parameters of Ashti Tahsil of Beed District.**

Villages Of Ashti Tahsil											
Village	pH	EC (dsm <sup>-1</sup> )	OC (%)	CaCO <sub>3</sub> (%)	N (Kgha <sup>-1</sup> )	P <sub>2</sub> O <sub>5</sub> (Kgha <sup>-1</sup> )	K <sub>2</sub> O (Kgha <sup>-1</sup> )	Cu (ppm)	Fe (ppm)	Mn (ppm)	Zn (ppm)
Khini	7.3	0.2	0.36	3.9	72	17.49	293.61	0.31	6.97	3.95	0.26
--/--	7.3	0.19	0.47	3.5	94	7.84	804.79	0.27	4.52	4.26	0.51
--/--	7.4	0.21	1.66	3.0	332	21.72	857.6	0.58	2.98	4.35	0.50
--/--	7.4	0.20	0.4	2.5	80	12.65	662.2	0.43	5.89	6.23	0.27
--/--	7.4	0.3	0.35	3.9	70	10.86	488.0	0.43	6.21	3.32	0.43
Average	7.3	0.22	0.64	3.3	130	14.11	621.23	0.40	5.31	4.42	0.39
Range	7.3 - 7.4	0.2 - 0.21	0.4 - 1.66	2.5 - 3.9	70 - 332	7.84 - 21.72	293 - 858	0.27 - 0.58	2.98 - 6.97	3.32 - 6.23	0.26 - 0.51
Waghluj	7.5	0.12	1.05	4.8	210	10.25	1523.1	0.67	6.25	4.99	0.31
--/--	7.6	0.08	0.76	6.3	152	16.58	1096.2	0.54	2.79	3.10	0.57
--/--	7.7	0.13	0.9	7.4	180	22.31	1197.6	0.41	2.80	4.60	0.28
--/--	7.5	0.09	0.73	4.9	146	12.36	875.56	0.51	3.18	2.99	0.46
--/--	7.4	0.2	0.59	4.1	118	10.85	2176.7	0.28	4.24	5.9	0.31
Average	7.5	0.12	0.80	5.5	161.2	14.47	1373.83	0.48	3.85	4.31	0.38
Range	7.4 - 7.7	0.08 - 0.13	0.9 - 1.05	4.1 - 7.4	118 - 210	10.25 - 22.31	875 - 2177	0.28 - 0.67	2.80 - 6.25	2.99 - 5.9	0.28 - 0.57
Daulvad gon	8.2	0.12	0.74	13.1	148	9.65	276.75	0.17	4.72	2.02	0.29
--/--	7.9	0.09	0.62	9.5	124	19.6	485.83	0.36	3.88	4.94	0.84
--/--	7.6	0.09	2.02	6.2	404	8.74	425.50	0.40	5.45	4.25	0.21
--/--	7.4	0.08	0.78	3.9	156	6.33	924.17	0.24	5.56	3.97	0.34
--/--	7.2	0.27	0.64	1.9	128	12.66	402.5	0.44	3.28	3.65	0.41
Average	7.6	0.13	0.96	6.9	192	11.39	502.95	0.32	4.57	3.76	0.41
Range	7.2 - 8.2	0.08 - 0.27	0.62 - 2.02	1.9 - 13.1	124 - 404	6.33 - 19.6	276 - 925	0.17 - 0.44	3.28 - 5.56	2.02 - 4.94	0.21 - 0.84
Hatolan	7.7	0.15	0.62	7.2	124	12.06	403.45	0.22	3.25	2.12	0.35
--/--	7.7	0.22	0.73	7.5	146	16.58	397.12	0.09	4.22	2.64	0.97
--/--	7.6	0.08	0.57	7.9	114	4.22	523.86	0.12	4.65	2.37	0.35
--/--	7.7	0.16	0.9	5.9	180	20.15	348.53	0.77	7.08	4.21	1.00
--/--	7.8	0.12	0.59	8.6	118	12.06	463.65	0.19	4.63	3.66	0.42
Average	7.7	0.14	0.68	7.4	136.4	13.01	427.32	0.27	4.76	3.00	0.61
Range	7.6 - 7.8	0.12 - 0.22	0.9 - 0.73	5.9 - 8.6	114 - 180	4.22 - 16.58	348.53 - 523.86	0.09 - 0.77	3.25 - 7.08	2.12 - 4.21	0.35 - 1.00
Hivra	8.1	0.28	0.21	9	42	6.33	1530.3	0.39	5.64	1.98	0.67

--/--	7.5	0.16	2.42	8	484	4.52	758.32	0.24	4.18	2.81	0.44
--/--	8	0.12	0.74	7.1	148	6.03	708.68	0.29	3.25	3.33	0.22
--/--	7.2	0.94	1.74	5.2	348	9.65	321.07	0.40	5.27	3.85	0.59
--/--	7.7	0.48	0.66	7	132	16.88	317.9	0.14	3.18	3.92	0.72
Average	7.7	0.39	1.15	7.2	230.8	8.68	727.25	0.29	4.3	3.17	0.52
Range	7.2 - 8.1	0.12 - 0.94	0.21 - 2.42	5.2 - 9	42 - 484	4.52 - 16.88	317.9 - 1530.3	0.14 - 0.40	3.18 - 5.64	1.98 - 3.92	0.22 - 0.72

## REFERENCES

- Sharma R. P., Sing M., and Sharma J. P. (2003). Correlation studies on micronutrients vis-a vis soil properties in some soils of Nagaur District in semi arid region of Rajasthan, *Journal of Indian society of soil science*, **51** (4) : 522-522
- Saxena , R. K. (2003) applications of remote sensing in soils and agricultural. *Journal of the Indian society of soil science* **51**, 431-447.
- Jackson M. L. (1973) soil chemical Analysis, Pentice Hall of India (p) ltd. New Delhi.
- Black C. A. (1965). Method of soil analysis American Agronomy Inc., Madison, Wisconsin, USA
- Olsen, S. R. , Cole c. V., Watanabe , F. S. And Dean, L. A. (1954). Estimation of available phosphorus in soils by extraction with sodium bicarbonate, *US Department of agriculture circular*.
- Lindsay, W.L. and Norvell W. A. (1978). Development of DTPA soil test for zinc, iron, manganese and copper , *soil science society of America journal* **42**, 421-428.
- Muhr G. R., Datta, N. P. Shankar Subraney, N., Dever, F., Lecy, v. K. And Donahue, R. (1963) . Soil testing in India. USAID mission to India.
- Age A. B., Magar S. M., Godhawale G. V. And Borgaonkar S. B. (2007), Studies on available micronutrients status in Beed district of Maharashtra state. *International jour. Of Tropical Agriculture*, **25** (3) : 491-494.
- Malewar G. U. And Vineetha V. (2009), Physico-chemical properties and fertility status of sweet orange orchards in Marathwada region. *Journal of Agric chem.*, **42** (1&2) :71-78
- Mehara R. K. , Dadheech, R. C. ,Sharma Manoj, k. Jat, J. R. And Meena (2006). Characterization and evaluation of critical limits of micronutrients and sulphur in soils of sub humid southern plain of Rajasthan. *Indian J. Of Agric. Chem.* **39** (2&3) :74-82.
- Sing S. K., Mahesh Kumar, Sharma B. K. And Tarafdar, J. C., (2007) Depletion of organic carbon, phosphorous and potassium under pearl millet based cropping system in the arid region of India. *Arid land research and management*. **21**, 119-131.
- Mahesh Kumar, Prveen Kumar and Bohra P. C. (2009), Effect of land use systems on soil properties and relation between soil organic carbon and available nutrients in typical arid soils of Rajasthan. *Annals of Arid zone*. **48**, 25-28.
- Gajbe, M.V. Lande M.G. and Varade S.B. (1976). Soils of Marathwada. *J. Maharashtra Agric. Univ.* **1** (2) : 55-59.

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