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STUDIES ON THE STATUS OF AVAILABLE MICRONUTRIENTS FOR PLANT GROWTH IN DIFFERENT SOIL SERIES OF BHIMA RIVER LOWER BASIN AT SIDDHATEK IN AHMEDNAGAR DISTRICT (MAHARASHTRA)

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ABSTRACT

In ten soil samples of sugar cultivating area in Ahmednagar District of Maharashtra, available micronutrients along with other physico-chemical parameters have been studied. All the soil series are free from salinity hazards. Most of the soil samples contain excess available micronutrients like iron and copper. The ratio between iron and other micronutrients has been worked out.

Key words: Soil quality, Physico-chemical parameters, Micronutrients, Micronutrients ratio.

INTRODUCTION

In many part of India, surface as well as ground water has been used extensively for various purposes viz. drinking and agriculture etc. Sometimes water is not suitable for drinking and other purposes because of chemical and biological contaminations[1,2]. Different elements are essential for the healthy growth of plants; these elements are grouped in to macro and micronutrients. The deficiency or excess presence of micronutrients such as iron, manganese, zinc and copper may produce synergetic and antagonistic effects on the plant growth and crops yields[3]. Water is the most important component of the earth. About 99.70% of water found on earth is in the ocean and sea. The people used the water for irrigation as well as house hold applienceses[4]. Now pollution is major problem in developing

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countries. The waste water from manmade activities such as house hold appliances, industrial processes, high use of pesticides and fertilizers creates water pollution as well as soil pollution problems[5]. Bhima River is flowing through the Siddhatek and the people used waters for domestic and irrigation purposes, depending up on quality, quantity and resources available in the region. Knowledge about the water quality would help to decide the treatment, which should be given to water for different purposes[6]. Siddhatek is popular for Siddhivinayak Ganpati, which is one among the Ashtakvinayak in Maharashtra.

Hence, many people and many foreigners visit at this village, which is responsible for creates pollution of river basin. At Siddhatek sugarcane, wheat and sorghum are cultivated as main crops but from last few years the crop yields per acre are found to be decreasing in many parts of the Bhima river basin. The present study deals with the measurements of the pH, electrical conductance and estimation of available iron, zinc and copper in different soil samples.

EXPERIMENTAL

Soil samples were collected from ten villages studied on the bank of Bhima River around Siddhatek in Ahmednagar district. The collection of soil samples and brings to laboratory for analysis according to standard method prescribed in APHA[7]. The pH and electrical conductivity of the soil were determined with 1:2 soil water suspension (Instrument Ilico Pvt. Ltd. P. E. 130) are used. The available micronutrients like copper, zinc and iron were estimated for different soils using atomic absorption spectrophotometer. All the chemicals used were of AR grade.

RESULTS AND DISCUSSION

Soil with pH greater than 8.5 are generally called as sodic soils, hence only two soil samples are sodic in nature and remaining soil series are free from sodicity hazzards[8]. The increasing in pH due to the increased amount of carbonates and bi-carbonates. Conductivity is a measure of the total conductance of the ionized substances. The mobility of the ions, valences, actual and relative concentrations affects conductivity. The electrical conductivity is in the range of 0.200 to 380 µmho/cm as against the critical limits of 4 µmho/cm for saline soils. Thus all the soil series can be considered as free from salinity hazzards[9]. Iron is one of the micronutrients for plant and it is present as complexes in plant tissues[10]. The status of available iron varies from 7.0 to 12.0 ppm (critical limits 2.0 ppm). The status of available

copper for different soil samples in the range 2.50 to 7.50 ppm (critical limit1.0 ppm). The results are reported in Table 1.

Table 1: Concentration of physico-chemical parameters and micronutrients ratio

S. No.	pH	E. C. µmho	% Organic carbon	Available micronutrients (ppm)			Ratio Fe/Zn	Ratio Fe/Cu
				Copper	Zinc	Iron		
1	7.5	0.290	0.45	5.00	1.0	8.5	8.50	1.7
2	8.0	0.380	0.50	4.50	1.05	9.0	8.57	2.0
3	8.5	0.300	0.60	2.50	0.80	10.20	12.75	4.08
4	8.7	0.280	0.55	3.50	0.55	7.5	13.63	2.14
5	8.9	0.350	0.80	3.60	0.50	9.5	19	2.63
6	8.5	0.280	0.35	4.00	1.50	9.25	6.16	2.31
7	7.5	0.354	0.28	7.5	0.90	10.0	11.11	1.33
8	8.0	0.240	0.75	5.50	0.95	12.0	12.63	2.18
9	8.4	0.360	0.20	5.80	0.43	7.0	16.27	1.20
10	8.01	0.200	0.30	6.00	1.65	10.15	6.15	1.69

The results shows that all the soil samples are rich in available copper, hence it is very toxic to the plants. The germination percentage of the seeds generally decreases with the increase of copper concentration[11]. Zinc deficiency leads to widespread nutritional disorder in various crops. The available zinc supply to the plant may be diluted by the increased concentration of phosphorous. The available zinc for the plant is found to vary from 0.43 to 1.65 ppm (critical limits 0.80 to1.00 ppm). The soil from Birdi, Bhambora and Siddhatek (BK) are found to certain excess of zinc. It must be diluted by adding phosphatic fertilizes for increased up take by plant roots. Since other three soil samples have low zinc content, they need zinc fertilization for the growth of crop and better yield. In the physiology of plants, the relative amounts of iron, manganese and zinc present are essential for photosynthesis and biological reactions. Hence, the relative availability of the micronutrient is examined and results are reported in Table 2. The iron zinc ratio varies from 6.15 to 19.0 ppm[12]. The lower ratio affects the availability of iron to the plants, the higher ratio produces the mutual antagonistic effect of iron and zinc (critical limit 2.5 to 2.0 ppm).

Table 2: Relation of iron to other micronutrients

Name of village	Iron : Zinc	Iron : Copper
Siddhatek (KD)	12.75	4.08
Birdi	16.27	1.20
Deulgoan	19.00	2.63
Hingni	6.16	2.31
Pedgoan	13.63	2.14
Bhambora	6.15	1.69
Jalalpur	12.63	2.18
Baradgoan	8.57	2.0
Shirapur	11.11	1.33
Siddhatek (BK)	8.50	1.7

CONCLUSION

This study reveals that the lower basin of Bhima River at Siddhatek is rich content of iron and copper than the limits given in WHO and ISI. Sampling stations show pollution of Bhima River water and not suitable for irrigation as well as domestic use. Mainly, the biomass was affected because of excess use of fertilizer and water for irrigation. There is a need for proper management to achieve sustainable agriculture progress. By all means, the natural quality of water as well soil got contaminated in this area by anthropogenic activities.

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