Study of Micronutrients content in soil samples of Konkan Region, Ratnagiri District, Maharashtra State

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ABSTRACT:

India is gifted with heterogeneous landforms and variety of climatic conditions like high altitude forests, peninsular plateaus, the lofty mountains, the raverine deltas, variety of geological formations endowed with temperature varying from equatorial hot to arctic cold , and rainfall from per humid with world's maximum rainfall (1120 cm)of several hundred cms to extreme aridity with a few cms (<10cm) . These varying environmental situations in the country have resulted in a greater variety of soils. Therefore, the systematic appraisal of agro-ecological regions has tremendous scope in grouping relatively homogenous regions in terms of soil, climate and physiography and conductive moisture availability periods (length of growing season) in planning appropriate land use.

The agriculture and the other allied activities and in turn the prosperity and economic growth of a country depend on the soil resource. Soil is the basic source to produce food, fodder, fuel and fiber - the necessities of the human being. It is, therefore, important to understand the inherent potential and limitations of soil for managing it for sustained production in various seasons.

Attempt has been made to examine the the soil temporal variability of micronutrients viz. cadmium, cobalt, chromium, copper, mercury, nickel, lead, zinc and SAR in pre-monsoon and post-monsoon seasons in Feb 2014 and September 2014 in Konkan region Ratnagiri District, Maharashtra. All chemicals used were of AR grade , Copper and nickel are determined by spetrphotometrically and cadmium, cobalt, chromium, mercury, lead and zinc were determined by atomic absorption spectrophotometer. The concentration of some micronutrients is generally high in post monsoon season. The fertilizer input rate and continuous discharging of industrial waste water on soil surface are causing nutrient imbalance.

Key Words : Micronutrients, Soil Samples , SAR, Seasonal Variation

INTRODUCTION :

Ratnagiri is a famous city in Maharashtra from Konkan region. Soil samples were collected from five different locations from Ratnagiri district. The soil, water, climate, flora and fauna constitute the basic natural resources and the national treasure of any country. The soil is the most important among them. Excess nitrogen (N) and phosphorus (P) along with potassium (K) deficiency in soil is a result of improper recommendation of subsequent fertilizers , manure application etc.

For growth of plant, sixteen elements are essential. These elements are grouped in macronutrients and micronutrients. The deficiency or excess presence of micronutrients like zinc, iron, copper may produce antagonistic and synergetic effects in the plants. Residual water in course textured soil occur in intra-granule pores represents about 10% of the total soil porosity and is effectively hieratically immobile, while the opposite was true in case of fine textures soil.

Soil properties that can be changed with time by land use are dynamic soil quality indicators. The presence of heavy metals and residues from town and industrial waste has been found to be the causes of soil pollution. The pollutants enter and are incorporate in to the soil. Their concentration in soil continuously increases and accumulating as toxic to all forms of life like plant, micro organism and human beings.

The objectives of the presents study were to estimate the relationship between some soil micro nutrients from Ratnagiri district from nearby industrial area in pre-monsoon and post-monsoon seasons.

EXPERIMENTAL SECTION:

The study area was located at Konkan region , Ratnagiri district. Soil samples were collected from five different locations. At each sampling point soil pit was dug to determine the depth of the soil horizons and to carry out discrete depth sampling by natural horizons. Soil samples were air dried, samples crumbled in the case of bulk and sieved through 2 mm screen. All samples were stored in suitable polythene receptacles. The chemicals used throughout the experiments were of AR grade. The analysis was carried out using standard methods. Copper

and nickel were determined on spetrphotometer and cobalt, chromium, cadmium, lead, mercury and zinc were determined by atomicabsorption spectrophotometer. The sodium adsorption ratio (SAR) was calculated from the following equation

$SAR = Na^{+} / [(Ca^{++} + Mg^{++}) /2]^{0.5}$

Where Na^{+}, Ca^{++} and Mg^{++} were in mg/kg

RESULT AND DISCUSSION:

The results of analysis summarized in table 1. Feb-2014 to September-2014 in mg/kg. During study period "t" temperature of entire region was ranges between 22^0C to 42^0C.

Micronutrient		Sample1	Sample2	Sample3	Sample4	Sample5
Co	Pre-Monsoon	75.4	49.5	1.2	54.4	53.5
	Post-Monsoon	100.3	92.2	95.3	96.4	98.0
Cu	Pre-Monsoon	163.3	93.3	132.7	130.0	139.6
	Post-Monsoon	152.2	25.3	125.3	110.3	82.5
Cr	Pre-Monsoon	20.5	21.0	20.1	24.5	14.9
	Post-Monsoon	22.6	22.7	23.2	26.2	12.5
Cd	Pre-Monsoon	7.5	8.1	8.5	10.3	9.3
	Post-Monsoon	20.2	21.3	7.4	22.5	24.2
Ni	Pre-Monsoon	90.1	92.6	74.1	91.2	63.6
	Post-Monsoon	100.2	112.3	98.3	115.4	112.3
Pb	Pre-Monsoon	32.0	25.0	38.0	29.0	26.0
	Post-Monsoon	75.0	77.0	76.0	76.0	71.0
Hg	Pre-Monsoon	BDL	101	BDL	185	BDL
	Post-Monsoon	BDL	85	BDL	65	BDL
Zn	Pre-Monsoon	92.3	94.3	91.4	11.0	91.7
	Post-Monsoon	110.2	114.2	65.3	69.5	66.6
SAR	Pre-Monsoon	2.21	13.21	3.52	4.09	2.13
	Post-Monsoon	17.42	14.71	10.21	6.13	61.23

BDL-Below detectable limit

The cadmium concentration in soil was varying from 7.5 mg/kg to 24.2 mg/kg. The minimum concentration of cadmium was observed in pre-monsoon and maximum observed in post- monsoon season. The excessive concentration than the limit were observed due to discharge of industrial waste water on soil surface. The cobalt concentration was varied between 1.2 mg/kg to 100.3 mg/kg, in post-monsoon season and it was observed to maximum while in pre-monsoon it showed minimum. The values were higher than critical limits, required by higher plants. Only very small amounts are required by nitrogen fixing microorganism. Thus the concentration of cobalt in soil appears to be completely adequate for nitrogen fixation.

During the study period concentration of chromium varied between 14.9mg/kg to 26.2 mg/kg. Among the concentration it was observed minimum in post-monsoon and maximum in pre-monsoon season. The copper and mercury showed much variation during pre-monsoon and post-monsoon season. The concentration of nickel was ranges between 63.6 mg/kg to 115.4mg/kg, Pre-monsoon showed the minimum concentration of nickel where as maximum concentration observed in post-monsoon season. Concentration of lead varied between 25.0 mg/kg to 77.0 mg/kg during pre-monsoon season, concentration was maximum in post-monsoon season. It is due to percolation of industrial effluents. The seasonal variation of copper, mercury, nickel, lead, and zinc was observed in pre-monsoon and post-monsoon season because of use of high amount of inorganic fertilizer by farmers and continuous discharging industrial waste, effluents on soil surface and which was percolated in soil causes imbalance in micronutrients content.

Sodium adsorption ratio (SAR) ranges between 2.13 mg/kg to 61.23 mg/kg. The minimum value of SAR was observed in pre-monsoon and maximum in post-monsoon season. The higher value of SAR indicates loamy sand, clay loam and clay soil.

CONCLUSION:

- The soil quality is found to be highly disturbed due to the industrial pollution (Soil pollution). Mainly biomass was affected vastly because of excess use of fertilizer and water used for irrigation.
- To archive sustainable agricultural progress, there is need of a proper management

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REFERENCES :

[1] Mandal, C., Mandal, D.K., Srinivas, C.V., Sehgal, J. And Velayutham, M., 1999, *Soil Climatic Database for Crop Planning in India.Tech. Bull. No. 53. NBSS and LUP*, 1014p.

[2] JN Nigal, Asian J. of Chem., 2000, 12(4), 1364-1366.

[3] L Darilek , B Huang ,Y Qi , Y Zhao, W Sun, Z Gu, X Shri, Agricultural Ecosystem and Environment, 2007,129, 286 -292.

[4] I Ebtisum, El Dardiry, Aust. J. Basic and Applied Science, 2007, 1 (3) : 220-225.

[5] Sehgal, J., Mandal, D.K., Mandal, C. and Vadivelu, S., 1992, *Agro-Ecological Regions of India. Second Edition, Tech.Bull. No. 24, NBSS and LUP*, 130p.

[6] Wright, A. L, T. L. Provin, F. M. Hons, D. A. Zuberer, and R. H. White, 2007, *Compost Science & Utilization*, 15, 127–134.

[7] M Sanchez-Maranon, M Soriano, G Delgado, R Delgado, Soil Science Society, Am. J. 2002,66,928-958.

[8] DK Das, Introductory Soil science, Kalyani Publisher 2nd, Ed. 2006.

[9] Wright, A. L., Y. Wang, and K. R. Reddy, 2008, *Communications in Soil Science and Plant Analysis*, 39, 3074–3083.

[10] K Chan, YA Bowrnan, A. Oates, Soil Sci., 2001, 166:61-67.

[11] EY Oyinlola, IA. Aliyu, Chem. Class J., 2005, 2, 32-35.

[12] Anderson, D. L., K. N. Portier, T. A. Obreza, M. E. Collins, and D. J. Pitts. 1999, *Soil Science Society of America Journal*, 63,592–600.

[13] Beverly, R. B., and D. Anderson. 1986, *Soil Science*, 143, 301–303.

[14] APHA (American Public Health Association), 1989,17thEd.

[15] E Carpenter, J Tarr, EL. Rice, Proc. Okla. Acad. Sci., 1980,60:43-47.

[16] EA Kirkby, V Romheld, International Fertilizer Society York U.K., 2004, 1-51.

[17] Cancela, R. C., C. A. de Abreu, and A. Paz-Gonz´ alez., 2002, , *Communications in Soil Science and Plant Analysis*, 33, 2879–2893.

[18] Castillo, M. S., and A. L. Wright, 2008, *Geoderma*, 145, 130–135.Codling, E. E., 2008, *Soil Science* 173, 552–559.