Seasonal variation of some micronutrients in soil around kurkumbh industrial area, daund from pune district, MS

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Abstract

An extensive knowledge of the soil temporal variability of micronutrients and how this variation affects the environments is imperative to a wide range of discipline within agricultural science for optimum crop production and eco system preservation. Attempt has been maid 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 from March 2008 to September 2008 around kurkumbh industrial area. 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.

Keywords: Soil micronutrients, Kurkumbh industrial area, Seasonal variation, SAR.

Introduction

A comprehensive understanding of the temporal variability of soil fertility parameters and their effects on the environment is becoming increasingly essential in agricultural science and production. Specific nutrients recommendation and large scale environmental monitoring at increasing Crop production by minimizing negative environmental effects is aimed. Excess nitrogen (N) and phosphorus (P) along with potassium (K) deficiency in soil is a result of improper recommendation of subsequent fertilizers and manure application. However a through understating fertilizer and management process affects long tern soil fertility of conventional cropping system in large areas is still locking [1].

Residual water in course textured soil occur in intragranual 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 [2]. For plant growth sixteen elements are essential. These elements are grouped in macro and micronutrients. The deficiency or excess presence of micronutrients such as iron, zinc and copper may produce synergetic and antagonistic effects in the

plants[3]. Soil properties that can be changed in a short time by land use are dynamic soil quality indicators [4] . The presence of heavy metals and residues from town and industrial waste has been found to be the causes of soil pollution. Soil as a natural dynamic body developed by natural force acting on natural material. It is usually differentiated into horizon from mineral and organic constituents at variable depth. These are differing from the parent materials in morphological, physical and constituent's chemical properties, composition and biological characteristics. Industries being voraciously consumers of natural recourses brought it pollution of air, water and soil. Soil pollution usually originates from the industries, chemical fertilizers, swage, sludge, city compost, other industrial waste with industrial effluents and water drainage. Once 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[5,6]. The objectives of the presents study are to estimate the relationship between some soil micro nutrients around kurkumbh industrial area in pre-monsoon and post-monsoon seasons.

Experimental Section

The study area located within 74^0 18' 24 N latitude and 74^0 18' 32 E longitudes in pune district. Soil samples were collected from eight different locations Fig.1. 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 [7] . The analytical characteristic of the soil samples were determined in the following manner. Copper and nickel are determined by spetrphotemetrically and cadmium, cobalt, chromium, mercury, lead and zinc were determined by atomic absorption spectrophotometer. All chemicals used were of AR grade.

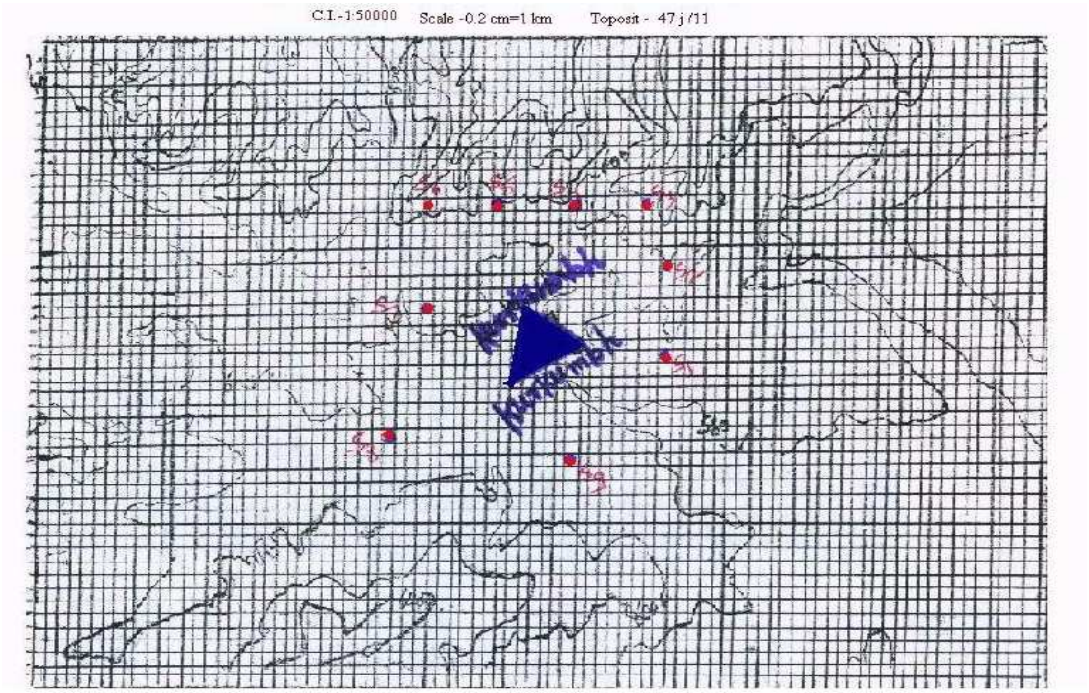

Fig.1. sampling sites (Red dots)

The analysis was carried out using standard methods [8,9] .The sodium adsorption ratio (SAR) was calculated from the following equation

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

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

Results and Discussion

The results of analysis summarized in table 1. March-2008 to September-2008(mg/kg); Pre. M.- Pre monsoon; Post. M.- Post monsoon; During study period "t" temperature of entire region was ranges between 25.22^{0}C (post-monsoon) to 35.08^{0}C (pre-monsoon). The cadmium concentration in soil was varying from 7.4 mg/kg to 75.0 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 0.9 mg/kg to 170 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 [10].

Table 1.Concentration of Various Elements in the Soil Samples Around Kurkumbh Industrial Area

Location	Season	Cd	Co	Cr	Cu	Hg	Ni	Pb	Zn	SAR
S1	Pre. M.	10.7	56.2	25.5	142.1	ND	120.7	30.0	103.4	4.99
	Post. M.	25.6	106.0	25.4	121.2	ND	160.0	83.0	87.1	18.44
S2	Pre. M.	8.7	54.3	23.2	136.9	1100	93.5	42.0	93.7	4.21
	Post. M.	24.9	107.5	22.6	145.9	190	146.3	90.0	760	11.28
S3	Pre. M.	9.0	79.6	26.5	174.0	2200	116.2	44.0	129.3	2.29
	Post. M.	21.0	113.8	21.0	159.7	210	144.8	89.0	105.0	18.44
S4	Pre. M.	9.4	51.6	2.1	97.4	ND	78.7	35.0	110.6	15.10
	Post. M.	10.3	95.1	21.8	27.4	270	152.7	80.0	330.0	15.84
S5	Pre. M.	11.4	64.2	24.8	120.8	2100	92.6	39.0	90.7	4.49
	Post. M.	22.3	9.5	24.9	142.3	ND	157.9	84.0	580.0	7.12
S6	Pre. M.	11.7	0.9	27.2	124.5	200	82.2	44.0	107.9	20.42
	Post. M.	7.4	117.5	18.8	14.5	70.0	160	83.0	90.0	53.56
S7	Pre. M.	9.4	52.6	12.9	145.7	500	69.8	35.0	92.6	14.25
	Post. M.	30.1	100	11.6	83.6	20.0	118.8	82.0	69.5	85.09
S8	Pre. M.	15.0	53.0	27.0	145	ND	92.5	45.0	10.0	2.17
	Post. M.	75.0	170	11.9	73.5	ND	170	90.0	75.0	8.94

During the study period concentration of chromium varied between 11.6mg/kg to 27.2 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 78.7 mg/kg to 170.0 mg/kg, Pre-monsoon showed the minimum concentration of nickel where as maximum concentration observed in post-monsoon season. Concentration of lead varied between 30.0 mg/kg to 90.0 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[11].

Sodium adsorption ratio (SAR) ranges between 2.17 mg/kg to 85.09 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 disturbed due to the industrial pollution. Mainly biomass was affected vastly because of excess use of fertilizer and water used for irrigation.
- It needs to be a proper management to archive sustainable agricultural progress.

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