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IMPACT OF INDUSTRIAL WASTE WATER ON SOIL QUALITY AND ORGANIC MATTER AROUND KURKUMBH INDUSTRIAL AREA DAUND, PUNE DISTRICT (MS)

D. V. SONAWANE[a], S. P. LAWANDE[a], V. B. GAIKWAD[b] and S. R. KUCHEKAR[c*]

P. G. Department of Environmental Sciences, P. V. P. College, Pravaranagar,
LONI (KD) - 413713 (M.S.) Tal.: Rahata, Dist.: Ahmednagar, INDIA
[a]Shri Chhatrapati Shivaji College, SHRIGONDA (M.S.) INDIA
[b]K. T. H. M. College, NASHIK (M.S.) INDIA

ABSTRACT

In the present investigation, an attempt has been made to assess the soil quality and impact of industrial pollution around Kurkumbh industrial area. The physicochemical parameters such as, pH, electrical conductivity, total alkalinity, chloride, calcium, magnesium, sodium, potassium, iron, sulphate, phosphate and organic matter of soil around Kurkumbh industrial area were analyzed. All the soil samples are free from salinity and hazards. The results reveals that the some sampling sites were affected by industrial pollution. The organic matter range was very low, which is required for soil fertility.

Keywords: Soil quality, Physicochemical parameters, Organic matter.

INTRODUCTION

Soil is one of the vital resources on living planet Earth. The comprehensive understanding of temporal variability, physicochemical parameters and affect on the environment is becoming an essential task in soil science and field of environment. In these areas, nutrient loading and physiochemical characteristics adversely affect water bodies and extreme extension causes sever eutrophication[1]. Inherent soil physicochemical properties influence the behavior of soil and hence, knowledge of soil property is important. Soil physicochemical properties deteriorate to the change in land use especially from agriculture and forest. Cropping and leaching of soil nutrients, in turn adversely affects physicochemical properties of the soil[2]. The waste material discharges from industrial activities causes

*Author for correspondence; E-mail: shashi17@gmail.com

adverse effects on soil and soil organic matter. The presence of heavy metals and residues from town and industrial wastes has been found to be the causes of pollution in soil. It needs some physicochemical analysis to know the status of this adverse impact on soil quality and also to find out the effect of industrial pollution on soil micro and macronutrients[3]. Soil as a natural dynamic body developed by natural forces acting on natural materials. It is usually differentiated into horizon from minerals and organic constituent of variable depth. These differ from the parent material below; in morphological properties, physical properties, chemical properties and composition and biological characteristics. Industries being voraciously consumer of natural recourses brought in pollution of air, water and soil environment. Soil pollution usually originates from the industries, chemical fertilizers, use of sewage sludge, city compost and other industrial wastes. The industrial effluents and water drainage from spoil and rubbish heaps either washes direct to near by fields and entire the local streams, river and ultimately into the soil. Once pollutants enter and are incorporated into the soil, the concentration in soil continuously increasing and accumulating, which is toxic to all forms of life like plant, microorganisms and human being[4]. For the plant growth, sixteen elements are essential. These elements are grouped into micro and macro nutrients. The deficiency or excess presence of micronutrient like iron, sulphate, phosphate, potassium, sodium, calcium, magnesium and organic matter may produce synergetic and antagonistic effects in the plants[5]. Around Kurkumbh industrial area; sugar cane, wheat, sorghum and onion are cultivated as main crops but the crops yield per acre are decreasing in many parts of this area. The present study deals with the physicochemical parameters of soil viz. pH, electrical conductivity, total alkalinity chloride, calcium, magnesium, sodium, potassium, iron, percent organic matter, inorganic phosphate and sulphate in different soil samples around 2 km periphery of Kurkumbh industrial area.

EXPERIMENTAL

The study area is located within 74^0 18’ 24 N and longitude 74^0 18’ 32 E in Pune district. The 16 samples were collected from selected sampling stations around Kurkumbh industrial area. These soil samples were brought in polythene bags to laboratory for the analysis of physicochemical parameters. The control dynamic pH meter, Elico digital conductivity meter (CM180), Elico (Model CL- 22D) Flame photometer, Synstronic digital Nephelometer (Model 132) and Elico Spectrophotometer (Model SL-159) were used for determination of physicochemical parameters. The organic matter was determined by the Walkley and Black method. Soil was collected as per standard procedure given in literature. The analysis was carried out using standards methods[6-8].

CT – 150000 Scale – 0.2cm = 1km Toposit – 47 j /11

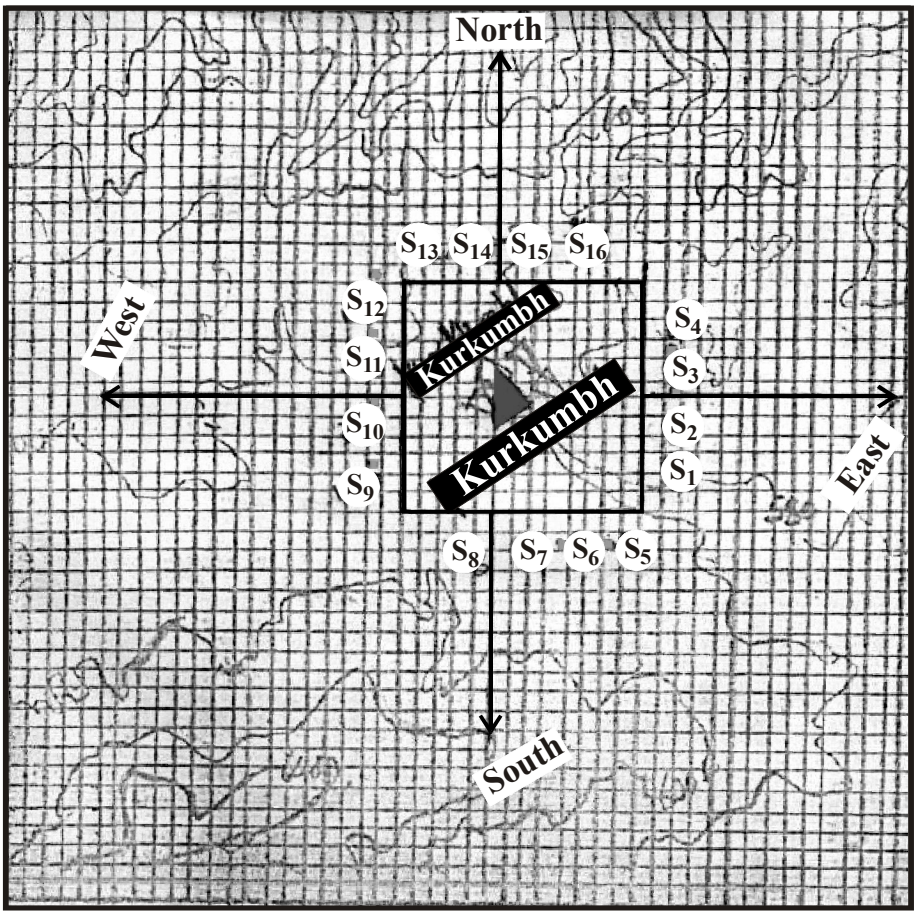

Fig. 1: Sampling spots and map of study area around Kurkumbh industrial area

RESULTS AND DISCUSSION

The results of analysis are reported in Table 1. The soil with pH greater than 8.5 is generally called as sodic soil. But pH of all soils samples are less than 8.5 indicating that soil samples are free from sodicity hazards. The decrease in pH could be due to the decreased amount of carbonate and bicarbonate. Electrical conductivity is a measure of the total concentration of the ionized substances. The mobility of ions, their valencies and their actual and relative concentration affects conductivity. The electrical conductivity was ranging in between 0.030 to 0.0335 µmho/ cm, the range behind the critical limit. Thus, all the soil samples can be considered as free from salinity hazards.

Table 1: Physicochemical parameters and organic matter in soil around Kurkumbh industrial area

Sites	pH	EC	TA	Cl^-	Ca^{2+}	Mg^{2+}	Na^+	K^+	Fe^{3+}	OM	SO_4^{2-}	PO_4^{3-}
S_1	7.48	0.030	300	206	16.00	31.67	90.00	15.00	11.00	0.698	40	0.70
S_2	4.64	0.0313	120	78.1	440.88	24.36	172.00	Nil	11.50	0.08	125	Nil
S_3	7.05	0.0318	100	49.7	16.00	2.44	4.00	2.00	11.50	0.132	39	Nil
S_4	7.52	0.0304	250	99.4	12.00	4.87	46.00	2.00	12.20	0.292	40	Nil
S_5	7.38	0.030	300	85.2	8.00	39.88	22.00	3.00	11.70	0.55	35	Nil
S_6	7.39	0.0314	250	127.8	8.00	21.93	79.00	Nil	11.50	0.620	40	Nil
S_7	7.95	0.0311	100	49.7	16.00	4.87	46.00	Nil	11.50	0.698	42	Nil
S_8	7.25	0.0313	150	56.8	12.00	2.40	24.00	8.00	7.00	0.132	45	Nil
S_9	7.43	0.0335	200	56.8	18.00	24.36	23.00	7.00	11.00	0.634	49	Nil
S_{10}	7.38	0.0307	150	127.8	64.12	24.36	28.00	6.00	6.10	0.698	42	Nil
S_{11}	7.48	0.030	300	206.0	16.00	31.67	90.00	15.00	11.00	0.698	40	Nil
S_{12}	7.20	0.0312	200	56.8	44.00	12.18	80.00	4.00	6.7	0.268	123	Nil
S_{13}	7.20	0.0314	150	63.9	16.00	19.50	30.00	2.00	7.00	0.0137	49	Nil
S_{14}	8.46	0.0309	120	113.6	8.00	14.62	180.00	3.00	5.00	0.358	109	Nil
S_{15}	7.45	0.0322	50	120.7	Nil	12.18	210.00	2.00	7.00	0.412	45	Nil
S_{16}	7.64	0.0312	71	71.0	64.12	58.48	17.00	Nil	5.60	0.634	68	Nil

All values except pH and E. C. are in mg/kg.

Iron is one of the important micronutrient for plant and it is present as complex in plant tissue. The status of available iron vary from 5.00 to 12.20 mg/kg, which was higher than critical limits due to discharge of industrial effluents on the soil surface around area. The alkalinity ranges between 50.0 mg/kg to 300.0 mg/kg. It shows high alkalinity may be due to presence of carbonate and bicarbonate. The chloride ranges between 49.7 to 206.0 mg/kg and it is in normal range in soil. The calcium ranges between 8.00 to 440.80 mg/kg. The magnesium ranges between 2.40 to 58.48 mg/kg, which shows normal range. The sulphate ranges between 35.0 to 125.0 mg/kg, which are within the critical limit. The potassium ranges between 2.00 to 15.00 mg/kg and it was found within the critical limit. The sodium ranges between 17.0 to 210 mg/kg, which are behind the critical limits because of use of fertilizers and discharge of industrial effluents in soil. The organic matter plays a vital role in the soil fertility. It was in a range between 0.08 to 0.698 mg/kg. The phosphate ranges between 0.00 to 0.70 mg/kg. The soil shows the deficiency of phosphate due to cropping pattern used by farmers.

CONCLUSION

The soil quality is disturbed due to the industrial pollution. Mainly, the biomass was affected because of industrial pollution, excess use of fertilizers and water for irrigation. There is a need for proper management to achieve sustainable agriculture progress. By all means, the natural quality of soil got contaminated in this area by anthropogenic activities.

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