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Research Paper Environment

Physicochemical Properties of Soil Samples of Ahmednagar Industrial Area

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ABSTRACT

Soil pollution is any chemical or biological alteration of soil that is harmful to living organisms. Virtually all soil pollution is the direct result of sources of pollution on the ground surface. The percolations of these surface pollutants through the soil cause soil degradation. One of the most harmful ecotoxicological effects is that of the eutrophication of water bodies. This occurs due to over use and bad management of phosphorous and nitrogen fertilizers and contaminated wastewater for irrigation. Bioaccumulation and biomagnifications of these poisons as they move along the food chain is also a major problem, which has influence on the whole ecosystem. In addition to the industrialization, the wrong practice of agriculture has also adversely affected the soil and surface as well as groundwater quality. Therefore, the present work was undertaken for the study of Impact of chemical industries on soil quality of Ahmednagar area. Soil samples were collected and analyzed for physico-chemical properties of soil in the study area in the year 2010-11 such as Ph, Alkalinity, Sodium, Potassium, Sulphate, Phosphte, Nitrate ect.

KEYWORDS : Physico-chemical Prosperities, Soil pollution, Ecosystem and Irrigation.

Introduction

Soil pollution is any chemical or biological alteration of soil that is harmful to living organisms. Virtually all soil pollution is the direct result of sources of pollution on the ground surface. The percolations of these surface pollutants through the soil cause soil degradation. Pollution on the ground surface is the cause of most soil pollution. This surface pollution comes from many sources like waste (solid or liquid) disposal practices, spills, agricultural practices and percolation of surface pollutants through unsaturated soil etc. There are two major categories of soil i.e. zonal and drift. The zonal soil occurs usually in relatively flat or undulating areas formed as result of weathering. Where as a drift are formed by mass movement deposits and are thus transported soils. These soils are classed on the basis of minerals, chemical composition and texture (Annon, 1975). On the basis of morphology, nutrient status, quantity of organic matter, color and general climatic consideration soils are placed to ten general categories (Keller, 1976). The soils in India also classified in eight groups as, red, lateritic, alluvial, black, forest, desert, saline-sodic and peaty and marshy soils. The use of pesticides and fertilizers as well as disposal of effluent in streams or on land has come under scrutiny for many reasons (Prashanthi and Jeevanrao, 1999). One of the most harmful ecotoxicological effects is that of the eutrophication of water bodies. This occurs due to over use and bad management of phosphorous and nitrogen fertilizers and contaminated wastewater for irrigation. In addition to the industrialization, the wrong practice of agriculture has also adversely affected the soil and surface as well as groundwater quality.

Therefore, the present work was undertaken for the study of Impact of chemical industries on soil quality of Ahmednagar area. Soil samples were collected and analyzed for physic-chemical properties of soil in the study area.

Material and Methods:

In the vicinity of Ahmednagar city there are various small industries viz. marble cutting and polishing, automotives etc. continuously adding effluent along with domestic sewage through drainages of the Sina river which get percolated and reused as well water or bore well water for the agriculture. Analysis of the samples was carried out seasonally throughout the year from 2010-11 each parameter was analysed seasonally. In order to undertake accurate estimation of soil quality, soil analysis were done for the parameters like pH, Sodium, Potassium, Sulphate, Phosphate and Nitrate. These analyses were carried out by referring the standard procedures according of APHA, AWWA, and WPCT, 1995, Trividy, and Goel (1986) and NEERI. The results are expressed as ppm or milligram per liter. In the study, the overall structure of the study area is taken into consideration while selecting the sampling cities.

Results and Discussion:

Soil and their characteristic are of great important in an agriculture economy. The pH is one of the most important factors in soil quality management. It indicates that acidity, neutrality and alkalinity of soil (Waugh, 2000).

During the present of study period (2010-11) the pH level in soil was ranged between 6.7 to 7.33. The lower level of pH was recorded in (S3) and higher level was recorded in (S8) and (S9) (Table no. 1).

In the present study pH level was recorded lower in rainy and higher in summer compared to two other seasons The successive effluent in river affected the pH of irrigated soil and lead to accumulation of salts in the soil. Increase in soil pH has significant effect on seed germination (Reddy, 1991).

The pH value of a normal soil can be considered as an index of its exchangeable cation saturation. Hence, the availability of many plant nutrients depends on the pH of the soil. The nutrients like iron (Fe), zinc (Zn), Copper (Cu), manganese (Mn) etc. are available more in acidic than in alkaline soils. In alkaline and calcareous soils, the availability of potassium (K), phosphorus (PO4), iron (Fe) and many minor elements is reduced and hence, the addition of fertilizers carrying these elements is necessary for such soils. Thus, the pH of soil plays a very important role in maintaining the soil fertility.

Alkalinity (mg/l):

The alkalinity is harmful for irrigation, which leads to the soil damage and crop yield and imparts bitter taste to the water.

Oomachan and Belsare (1986), pointed out that high alkalinity indicates pollution of water and is harmful for domestic purpose, irrigation which leads to the soil damage and crop yield and imparts bitter taste to the water (Jadhavar, 2013; Ghorade, 2013).

During the present of study period (2010-11) the alkalinity level in soil was ranged between 176.03 to 205.74 mg/l. The lower level of alkalinity was recorded in (S6) and higher level was recorded in (S3) (Table no. 1).

In the present study alkalinity level was recorded lower in summer and higher in winter compared to two other season. High value of alkalinity was observed in winter due to the anaerobic sediments, bacteria

reduce nitrate to ammonium and NP; phosphorus remains soluble because it does not form insoluble compounds with metals under these conditions (Wagh, 2012; Jadhavar, 2013; Ghorade, 2013).

Sodium (mg/l):
High concentration of sodium and potassium in water adversely affects the soil structure reported by (Pondhe, 2005). The high concentration of sodium affects soil permeability, texture and leads in reduction of water intake. It acts deflocculating agent and displaces the divalent cations like calcium, magnesium and cumulatively the soil losses its productivity.

During the present of study period (2010-11) the sodium content in soil was ranged between 106.03 to 126.50 mg/l. The lower level of sodium was recorded in (S1) and higher level was recorded in (S4) (Table no. 1).

In the present study sodium level was recorded lower in winter and higher in summer compared to two other season. The ratio of sodium to total cations is important in agriculture and human pathology. Soil permeability can be harmed by a high sodium concentration (APHA, 1995).

Potassium (mg/l):
Potassium is essential as plant nutrients. It originates from mineral weathering, inorganic fertilizers and soil amendments viz. gypsum, composts and manures and irrigation waters. During the present of study perid (2009-10), potassium content was ranged between 63.62 to 71.64 mg/l. The lower level of potassium was reported in (S5) but in (S8) it was reported to be at higher level (Table no. 1).

In the present study potassium content was recorded lower in summer and higher in rainy. The major source of potassium in natural water is weathering of the rocks but the quantities increases in the polluted water due to disposal of waste water.

Sulphate (mg/l):
Sulphates are soluble in water and can directly be determined in the soil solution.

During the present of study period (2010-11) the sulphate content in soil was ranged between 154.77 to 214.09 mg/l. The lower level of sulphate was recorded in (S10) and higher level was reported in (S6) (Table no. 1).

In the present study sulphate content was recorded lower in summer and higher in rainy compared to two other seasons. Sulphur-bearing minerals are common in most sedimentary rocks. In the weathering process gypsum (calcium sulphate) is dissolved and sulphide minerals are partly oxidized, giving rise to a soluble form of sulphate that is carried away by water.

Phosphate (mg/l):
Phosphates, mostly in the form of PO_4^{-3} are available in large quantities on agricultural lands as it is applied as a fertilizer, Polyphosphates used in water may combine with Ferric oxide to form a glassy phosphate films.

During the present of study period (2010-11) the phosphate content in soil was ranged between 2.35 to 4.00 mg/l. The lower level of phosphate was recorded in (S2) and higher level was reported in (S10) (Table no. 1).

In the present study phosphate content was recorded lower in rainy and higher in winter compared to two other seasons. Phosphates and nitrates are the main nutrients responsible for the process of eutrophication that leads to ultimate environmental degradation (Kodarkar et.al.,1991). Phosphate in the nature present mostly in inorganic forms. The major sources of phosphate are domestic sewage, detergents, agricultural effluents with fertilizers and industrial wastewaters.

Nitrate (mg/l):
The largest anthropogenic sources are septic tanks, application of nitrogen-rich fertilizers to turfgrass, and agricultural processes (Pondhe, 2005).

During the present of study period (2010-11) the nitrate content in soil was ranged between 2.46 to 3.07 mg/l. The lower level of nitrate was recorded in (S3 & S4) and higher level in (S10) (Table no. 1).

In the present study period of (2010-11) nitrate content in soil was recorded lower in summer and higher in rainy compared to two other seasons. Nitrate is a problem as a contaminant in surface water and (primarily from groundwater and wells) due to its harmful biological effects. High concentrations can cause methemoglobinemia, and have been cited as a risk factor in developing gastric intestinal cancer (Pondhe, 2005).

Table 1: Physico-Chemical Properties of Soil Samples from the Study area in the year 2010-2011.

Satiation No.	pH	Alkalinity	Sodium	Potassium	Sulphate	Phosphate	Nitrate
S1	6.84	200.98	106.03	65.8	197.32	2.86	2.48
S2	6.88	184.00	107.14	67.27	192.38	2.35	2.63
S3	6.7	205.74	106.19	65.31	195.64	2.81	2.46
S4	7.09	196.09	126.50	65.17	189.86	3.29	2.46
S5	7.10	189.08	108.13	63.62	193.68	3.29	2.47
S6	7.13	176.03	104.51	64.97	214.09	3.1	2.48
S7	7.00	215.5	120.06	65.71	181.46	3.55	2.66
S8	7.33	199.96	125.31	71.64	208.41	3.47	2.73
S9	7.33	183.33	119.85	69.36	198.94	3.80	2.95
S10	7.28	179.32	117.39	69.31	154.77	4.00	3.07

*** All values excepts pH are in mg/liter**

REFERENCES

American Public Helath Association (APHA), American Water works Association and Water Pollution control Federation 1995: Standards Methods for the examination of water and waste water (Ed. A.D.Eaton Clesceri, L.S., Greenberg, A.E. and Trussel, R.R.) (19th Ed.), APHA, Washington D.C. | Annon, 1975: What should an Environmental Impact Assessment of In: R.E. Munn (Ed) Environmental Impact Assessment principles and procedures, SCOPE Publ No. 5 John Wiley, New York.: P.190. | Ghorade, I.B. 2013: Ecosustainability Assessment of Godavari river water for sustainable Utilization, Ph.D. Thesis, Dr. B.A.M. University, Aurangabad. | Jadhavar, V.R. 2013: Impact of Chemical Industries on the water quality of Nagothane-Roha Industrial Area Dist. Raigad (Maharashtra), Ph.D. Thesis, Dr. B.A.M.University, Aurangabad. | Keller, E.A. 1976: Environmental Geology, Bull and Howell, Columbus (Ohio). P.488. | Kodarkar, M.S., E.V. Muley and Vasant Rao. 1991: Kukatpally – Hussainsagar, Ecological studies on industrially polluted stream and its impact on freshwater lake in Hyderabad. (IAAB) publication 1. pp: 150. | Reddy, Madhusudhana, P., N. Subba Rao and B.R. G. Reddy. 1991: Hydrogeochemcial studies in Seetammadhara of the Visakhapatnam urban area. Indian Journal of Environmental protection, 11 (8): 601-604. | Oomachan, L. and D.K. Belsare. 1986: Bottom sediments and bathymetric distribution of oligocaetes in the lower lake of Bhopal. J. Hydrobiol. 2 (4): 57-60. | Pondhe, G.M. 2005: Impact of Agrobase Industries on the ground water quality of Sonai area district Ahmednagar, Ph.D. Thesis, Dr. B.A.M. University, Aurangabad. | Prashanthi, V. and K. Jeevanrao 1999: Impact of land disposal of industrial effluent on properties of soil of Noor Mahammed lakebed. J. Envn. Biol. 20 (3): 271-274. | Trivedi, R.K. and P.K. Goel 1986: Chemical and biological methods for water pollution studies. Environmental publication, Karad, PP: 215. | Wagh, M.D. 2012: Ground water chemistry of Agrobased Industrial area of Deola, Dist. Nashik, Ph.D. Thesis, Dr. B.A.M. University, Aurangabad. | Wagh, N.S., M.Y.Khan, S.R. Thorat and S.B. Wagh. 2000: Study of physicochemical parameters of Pharmaceutical industry at Aurangabad, M.S., India. Proceeding on Environmental Issues and Sustainable Development of National Symposium held at Dr. B.A.M. University, Aurangabad, pp. 66-67. |