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Analysis of soil samples for its physico-chemical parameters from Abohar city

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Abstract

The natural environment is clean, but due to multifarious activities of man, it gets polluted resulting in what is called environmental pollution. This Physico-Chemical study of soil is based on various parameters like pH, Electrical Conductivity (EC), Total Organic Carbon, Available Nitrogen (N), Available Phosphorus (P_2O_5) and available Potassium (K_2O). Five representative samples were obtained and analyzed for its alkalinity content, chloride, sulphate, pH, conductivity, sodium and potassium. The value of alkalinity was found to be from 20 to 64.0 meq/100 gm, chloride content was ranging from 1.23 to 1.98 g/100g, sulphate was found to be between 0.063 to 0.742g, conductivity was ranging from 0.4 to 1.9 micro mohs, range of sodium was between 150.6 to 50 ppm and potassium from 100.9 to 135.5 ppm. As a very small fraction of the huge soil mass is used for analysis. This information will help farmers to decide the problems related to soil nutrients amount of fertilizers to be added to soil to make production economic.

Keywords: Soil samples, physico-chemical parameters, Abohar city

Introduction

The soil forms the intermediate zone between the atmosphere and the rock cover of the earth, the lithosphere. It also forms the interface between water bodies (hydrosphere) and the lithosphere and thus forming a part of biosphere. The soil may be defined as the uppermost weathered layer of the earth's crust in which are mixed organisms and products of their death and decay. It may also be defined as the part of the earth's crust in which plants are anchored. Soil sampling is perhaps the most vital step for any soil analysis. As a very small fraction of the huge soil mass is used for analysis, it becomes extremely important to get a truly representative soil sample of the field. Soil test based nutrient management has emerged as a key issue in efforts to increase agricultural productivity and production since optimal use of nutrients, based on soil analysis can improve crop productivity and minimize wastage of these nutrients.

Experimental

The quality test survey of the soil was conducted in 2017. Five representative soil samples were collected in the depth of 0-20 cm from the surface of soil from different places of the city in the year 2017. Sample no 1 to 2 from central Abohar, samples from 3 to 4 numbers from western part of Abohar and samples from 5 from the eastern part of the city were collected for analysis. The soil samples were preserved in polythene bags for further analysis. The chemicals and reagents used for analysis were of A.R. grade.

Physico - chemical analysis

The collected samples were analyzed for major Physical and Chemical soil quality parameter like PH, Electrical Conductivity (EC), Organic Carbon (OC), Nitrogen (N), ^[15, 16]. Organic matter is oxidized with chromic acid (Potassium Di-chromate). This method is widely used in Indian Laboratories. The K and P analysis by standard method. PH was measured using PH meter (Model no. 361), EC was measured using a conductivity meter (Model no. 304), OC was measured using colorimeter (Model no. 112), Potassium was measured using Flame photometer (Model no. 130), Phosphorus was measured using Spectrophotometer (Model no. 166).

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Table 1: Methods Use for Estimation of Parameters

S. No.	Parameter	Method
1	Color	By viewing
2	Alkalinity	Volumetric method
3	Chloride	Volumetric method
4	Sulphate	Gravimetric method
5	pH	pH metry
6	Conductivity	Conductometry
7	Sodium	Flamephotometry
8	Potassium	Flamephotometry

Result and Discussion

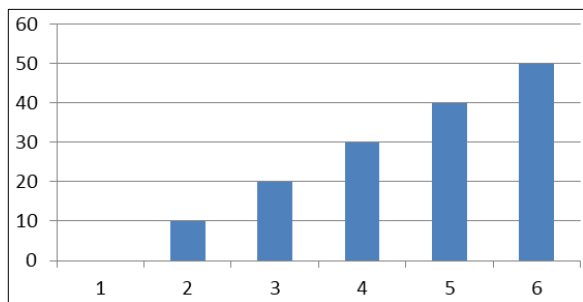
The values of physicochemical parameters are presented in

table 2. The color of soil sample was observed visually and it was found to be red for all the samples.

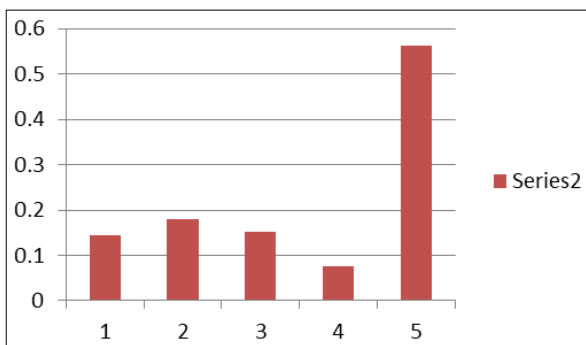
Table 2

Sample no.	Color	alkalinity	chloride	Sulphate	pH	Conductivity $\times 10^{-3} Scm^{-1}$	Sodium ppm	Potassium ppm
1	Red	64.0	1.86	0.145	8.33	1.8	50.1	130.8
2	Red	61.6	1.23	0.180	7.98	1.9	100.5	125.6
3	Red	26.2	1.93	0.152	8.30	1.6	121.3	100.9
4	Red	22.4	1.44	0.076	7.98	1.8	128.4	123.5
5	Red	26.8	1.98	0.563	8.42	1.4	144.5	BDL

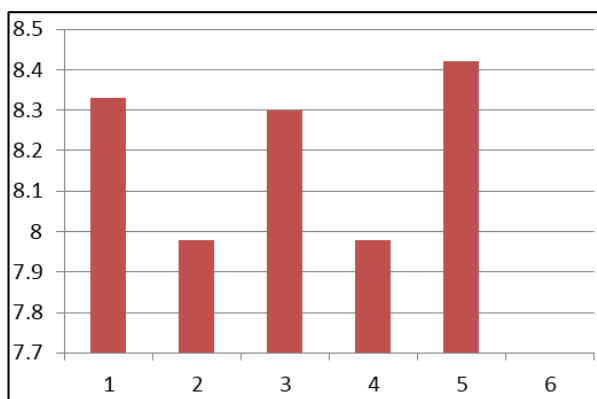
BDL: Below Detectable Limit



pH



Chloride g/100gm pH



Sulphate (gm)

Alkalinity is a measure of saline or salt effected soil, the pH of these soils is greater than 7. These soils occur most extensively in aired climates and as the city is aired the alkalinity value is ranging from 25 to 84 meq/100gm. Chloride in the soil samples was found by titration method, the chloride content was very variable at all the places, it ranged from 1.23 to 1.98 g/100gm. The values of pH showed that they lie in the alkaline side of the pH scale. Many workers have reported the values of pH in their investigations. The value of conductivity is lying within the range of 1.3 to 1.9 m mohs. The value of conductivity is the measure of ions present in the sample. The conductivity values can vary with the chemical properties of soil, if the soil is contaminated by chemicals or if it is saline, the depth of soil sample.

- pH:** The most significant property of soil is its pH level, Its effects on all other parameters of soil. Therefore, pH is considered while analyzing any kind of soil. If the pH is less than 6 then it is said to be an acidic soil, the pH range from 6-8.5 it's a normal soil and greater than 8.5 then it is said to be alkaline soil.
- Electrical conductivity:** Electrical conductivity is also a very important property of the soil, it is used to check the quality of the soil. It is a measure of ions present in solution The electrical conductivity of a soil solution increases with the increased concentration of ions. Electrical conductivity is a very quick, simple and inexpensive method to check health of soils. It is a measure of ions present in solution. The electrical conductivity of a soil solution increases with the increased concentration of ions.
- Phosphorus:** Phosphorus is a most important element present in every living cell. It is one of the most important micronutrient essential for plant growth. Phosphorus most often limits nutrients remains present in plant nuclei and act as an energy storage.
- Potassium:** Potassium plays an important role in different physiological processes of plants; it is one of the important elements for the development of the plant. It is involved in many plant metabolism reactions, ranging from lignin and cellulose used for the formation of cellular structural components, for regulation of photosynthesis and production of plant sugars that are

used for various plant metabolic needs.

5. **Sulfur:** Sulfur is as necessary as phosphorus and is considered an essential mineral. Sulphur in plants helps form important enzymes and assists in the formation of plant proteins. It is needed in very low amount, but deficiency can cause serious plant health problems and loss of vitality.
6. **Carbon:** Soil organic carbon is the basis of soil fertility. It release nutrient for plant growth, promotes the structure, biological and physical health of soil, and is buffer against harmful substances. Increasing soil organic carbon has two benefits- as well as helping to mitigate climate change, it improves soil health and fertility.

Conclusion

The conclusion can be drawn that this study of physicochemical parameters of soil samples showed dissimilar values at different places. This can be due to the irregular distribution of different parameters present in soil. Such type of monitoring of soil samples is beneficial to know the concentrations of various parameters present in soil samples.

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