



# Investigating Physicochemical Parameters Of Soil Samples From Shegaon Town Of District Buldhana

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## Abstract

A physicochemical study of soil is based on various parameters like soil pH, electrical conductivity, organic carbon, available nitrogen, phosphorus, potassium, and micronutrients (Fe, Mn, Cu and Zn). six representative samples were collected at a depth of 0–20 cm and analysed for soils were neutral to slightly alkaline. The value of soil pH found to be 7.2 to 8.5, electrical conductivity was ranging from 0.60 to 0.78 dSm<sup>-1</sup>, organic carbon was found to be 0.57 to 0.84%, range of sodium was 0.45 to 0.89 meq% and potassium 123.12 to 228.15 kg/ha. Among the nutrients, available Nitrogen was found to be 105.08 to 189.72 kg/ha, Phosphorous was ranging from 13.14 to 74.12 kg/ha. This information will help the farmers to know amount of fertilizers to be added in soil to make production.

**Keywords:** Soil samples, physicochemical parameters, Shegaon Town

## Introduction

The soil test based nutrient management has emerged as a key issue in efforts to increase agriculture productivity. In recent years agriculture development has been changed from conventional and traditional farming method too more intensive practices using chemical fertilizers and pesticides with irrigation facilities. Continuous use of chemical fertilizers slowly changed soil properties; ultimately the production in long run is reduced. It has resulted in leaching of chemical into the surface and ground water (Agarwal RR and Gupta RN. 1968, Bhattacharya T, et al.,1989). Due to increasing demand for cash crops the practice of monoculture cropping pattern have further helped to deteriorate water as well as soil quality (Biswas BC 1985). Soil and water are most important natural resources in cultivation of crops. The main objectives of the study were to assess the present status of soil. The physicochemical properties like soil pH, electrical conductivity (EC), organic carbon (OC), available nitrogen (N) and phosphorus (P), potassium (K) of soil samples from seven different sampling sites were analyzed (Black CA. 1965, Chopra SL and Kanwar JS. 1991).

## Material and methods

The quality test survey of the soil was conducted 2025. six representative samples were collected in the depth of soil from different places of the town. Shegaon town agriculture land is distributed in three parts, Irrigated land, non-irrigated land and Semi irrigated. While collecting soil samples the upper layer of vegetation, surface litter, stones stubble if any were remove away and then layer of soil immediately below (0-20 cm) was collected in polythene bags.

## Physicochemical analysis

The collected samples were analyzed for major physical and chemical soil quality parameter like soil pH by using potentiometric method, electrical conductivity (EC) by conductivity meter, organic carbon (OC) with wet oxidation, available nitrogen (N) by Alkaline permagnate, phosphorus (P) by colorimeter, potassium (K) flame photometry (Dahama AK. 2002, Daji JA. et al.,1998, Johnston AE. 1986).

## Results and discussion

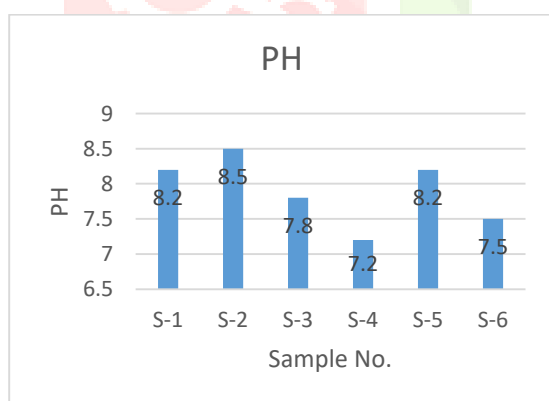
The values of physicochemical parameters are presented in Table 1 and figure 1 to 6. Colour of the soil sample was observed visually black and brick red colour.

**Table 1 Physicochemical characteristics of study area**

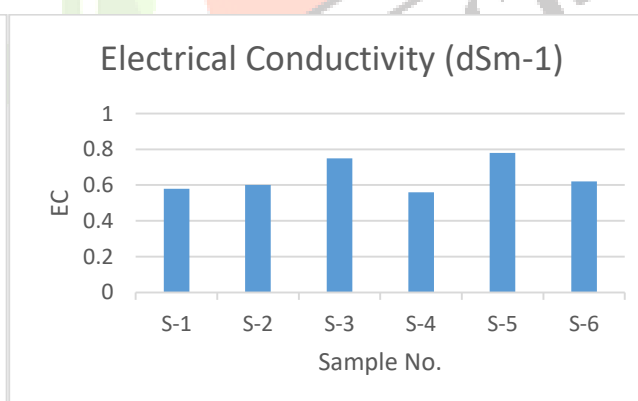
Sample No.	Colour	PH	EC dSm-1	Organic carbon%	Available nitrogen kg/ha	Available Phosphorous kg/ha	Available Potassium kg/ha
S-1	Black	8.2	0.58	0.57	115.24	54.13	211.13
S-2	Blake	8.5	0.60	0.52	162.23	24.08	123.12
S-3	Brown red	7.8	0.75	0.78	105.08	42.32	158.42
S-4	Black	7.2	0.56	0.84	128.03	22.4	228.15
S-5	Black	8.2	0.78	0.66	189.72	15.11	185.12
S-6	Brown red	7.5	0.62	0.57	170.12	37.18	192.18

**Table 2 Micronutrient characteristics of study area**

Sample No.	Cu (ppm)	Fe (ppm)	Zn (ppm)	Mn (ppm)
S-1	5.01 ± 0.07	2.14 ± 0.64	0.53 ± 0.01	9.08 ± 2.12
S-2	1.77 ± 0.14	0.14 ± 0.10	0.8 ± 0.36	7.50 ± 0.19
S-3	1.07 ± 0.16	4.04 ± 1.72	0.7 ± 0.36	11.08 ± 1.69
S-4	1.14 ± 0.21	2.26 ± 0.59	0.408 ± 0.1	9.28 ± 2.38
S-5	1.81 ± 0.01	6.17 ± 0.05	0.43 ± 0.00	7.79 ± 0.09
S-6	5.01 ± 0.04	0.18 ± 0.00	13.71 ± 0.14	36.01 ± 0.11



**Figure 1 PH against Sample**



**Figure 2 Electrical Conductivity against Sample**

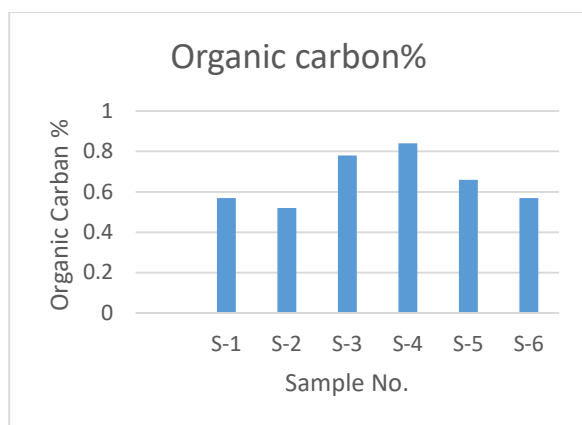


Figure 3 Organic Carbon% against Sample

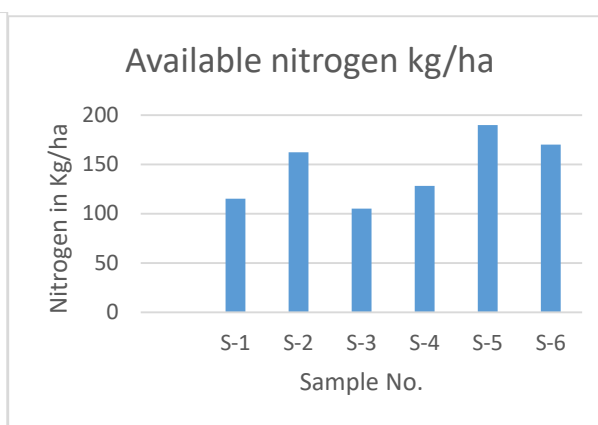
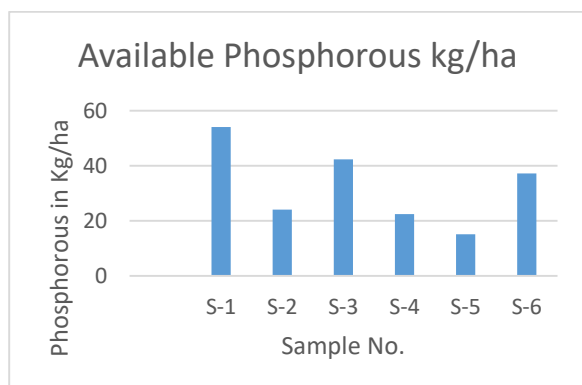
Figure 4 Available N<sub>2</sub> against Sample

Figure 5 Available Ph. against Sample

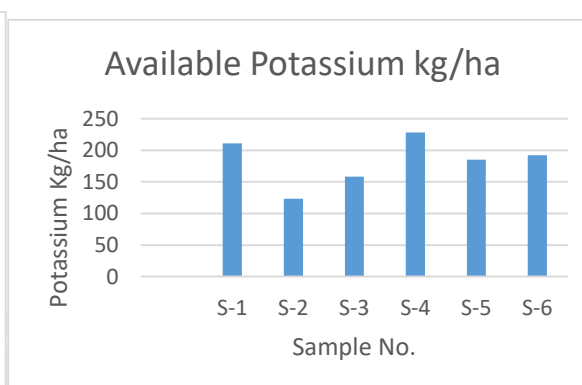


Figure 6 Available K against Sample

## Discussion

### pH

pH measures the relative conc. of hydrogen ion in the solution. The soil pH was determined by potentiometric pH meter using 1:2.5 soil water suspension ratio by Jackson. The value of pH showed lie in the alkaline side, pH of these soil is above 7. Alkalinity is measure of saline or salt affected soil. If pH is less than 6.0 then soil type is acidic, the soil pH range from 6-8.5 its type is normal soil and greater than 8.5 then it is said to be alkaline type soil. A soil from study area was found to be in between 7.2 to 8.5.

### Electrical conductivity

Electrical conductivity is very important property of the Soil. It indicates total soluble salts content of the soils. The value of conductivity is the measure of ions present in the soil sample. During this process the cations of the colloidal matter are exchanged in equivalent quantities with the cations of soil and salt solutions. This process of exchanges of cation of soil and salt solution is known as cation exchange. Cations like Ca, Mg, Na, K and anions such as CO<sub>3</sub>, HCO<sub>3</sub>, PO<sub>4</sub>. The conductivity values can be varying with chemical properties of soil. If EC is less than 4 soil type is normal. A soil from study area EC values ranges from 0.60 to 0.78 dSm<sup>-1</sup>. soil samples were showing lower EC values.

### Organic carbon

The organic matter is an important of the soil that contributes to soil fertility. Soil organic carbon is the basis of soil fertility. It releases nutrient for plant growth. Increasing soil organic carbon improves soil health and fertility (Johnston AP, et al.,2008). The data given in table 2. Organic carbon ranges from 0.57 to 0.84%. Medium proportion of organic carbon.

### Nitrogen

The available nitrogen was determined by alkaline per magnet method (Subbiah BV and Asija GL.1956) Nitrogen is an essential plant nutrient, for growth of plant. Deficiency of nitrogen shows stunted growth development of yellowish green leaves and also deduces protein content and yields. Nitrogen is low in all soil samples, ranges from 105.08 to 189.72 kg/ha.

## Phosphorous

Phosphorous is called the master key element in soil quality. It is a most important element in every living cell. It is essential for growth, cell division root growth and elongation seed and fruity development and early ripening (Kachhave KG and More SD. 1982). Also it helps in energy storage and transfer. In study area phosphorous ranges from 15.11 to 54.13 kg/ha.

## Potassium

Potassium plays an important role in different physiological processes of plants. Potassium is major nutrient for the production of superior quality crop. Its main role is catalytic in nature. Available potassium content ranges from 123.12 to 228.15 kg/ha. Majority of the soil samples show high available potassium. The soil of the vidarbha contained high to medium available potassium (Miller RW and Donahue RL. 1992, Somwanshi RB,1999).

## Micronutrients

Notably, the organic farm control showed markedly higher organic carbon (0.85%), extreme K accumulation, and higher micronutrient availability (Cu, Fe, Zn, Mn), suggesting that organic amendments enhance soil fertility and micronutrient balance, consistent with previous findings that organic manures improve micronutrient solubility and soil biological activity (Lalrintluangi *et al.*, 2019). Similarly, forest soils had the highest OC (1.06%) and moisture content, alongside elevated Fe and Mn, highlighting the role of natural vegetation in sustaining soil quality. These comparisons underscore how land-use practices directly shape soil nutrient status, with forest and organic systems outperforming conventional monoculture soils.

## Conclusion

Conclusively from study area soil sample show medium proportion of organic carbon. The higher nutrient fertility status in irrigation fields might be associated with intensive cultivation and plantation of cash crops like sugarcane, cotton, fruit crops etc. in which use of fertilizers as practiced by the cultivators. Classification criteria the study area soils showed normal pH. The majority of soil samples low status of available phosphorous was found in all soil samples the generated nutrient status information can serve as an effective tool for farmers and policy makers in adoption of site specific nutrient management practices.

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