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(RESEARCH ARTICLE)



Analysis of soil samples for its physicochemical parameters from Sangamner city

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Abstract

A physicochemical study of soil is based on various parameters like soil pH, electrical conductivity (EC), organic carbon (OC), available nitrogen (N), phosphorus (P), potassium (K), and micronutrients (Fe, Mn, Cu and Zn). Five representative samples were obtained and analyzed for its alkalinity content, pH, electrical conductivity, organic carbon, sodium, potassium. A five soil samples were collected at a depth of 0–20 cm and analyzed for soils were neutral to slightly alkaline. The value of soil pH found to be 7.60 to 8.81, conductivity was ranging from 0.50 to 0.73 dSm⁻¹, organic carbon was found to be 0.52 to 0.72%, range of sodium was 0.52 to 0.97meq% and potassium 125.31 to 630.15 kg/ha. Among the nutrients, available Nitrogen was found to be 140.01 to 252.68 kg/ha, Phosphorous was ranging from 15.11 to 54.13 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; Sangamner city

1. 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 [1-5]. Due to increasing demand for cash crops the practice of monoculture cropping pattern have further helped to deteriorate water as well as soil quality [6].

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 [7,8].

2. Material and methods

The quality test survey of the soil was conducted 2018. Five representative samples were collected in the depth of soil from different places of the city. Pravara and Mula Basin agriculture land is distributed in three parts, Irrigated land, non-irrigated land and Semi irrigated. Soil samples no. 1 to 5 from the eastern part of the city was collected for analysis. While collecting soil samples the upper layer of vegetation, surface litter, stones stubble if any were cleared away and then layer of soil immediately below (0-20 cm) was collected in polythene bag.

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2.1. Physicochemical analysis

The collected samples were analyzed for major physical and chemical soil quality parameter like soil pH, electrical conductivity (EC), organic carbon (OC), available nitrogen (N), phosphorus (P), potassium (K) [9-15].

Table 1 Methods use for estimation of parameters

Sr. No.	Parameter	Method
1	Colour	By viewing
2	pH	Pontentiometry
3	EC	Conductometry
4	Organic carbon	Wet oxidation
5	Available nitrogen	Alkaline permagnate
6	Available Potassium	Flame photometry
7	Available Phosphorous	Colorimetry

3. Results and discussion

The values of physicochemical parameters are presented in Table2 and figure 1 to 6. Colour of the soil sample was observed visually and black and red colour.

Table 2 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
1	Black	8.55	0.73	0.62	241.0	31.15	125.31
2	Black	8.81	0.58	0.71	252.40	54.13	321.20
3	Black	7.60	0.55	0.72	252.68	50.09	248.15
4	Black	7.92	0.50	0.65	230.51	28.12	630.15
5	Black	8.10	0.60	0.52	140.01	15.11	128.15

3.1. pH

pH measure the relative conc. of hydrogen ion in the solution. The soil pH was determine 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 greater than 7 . Alkalinity is measure of saline or salt effected 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.

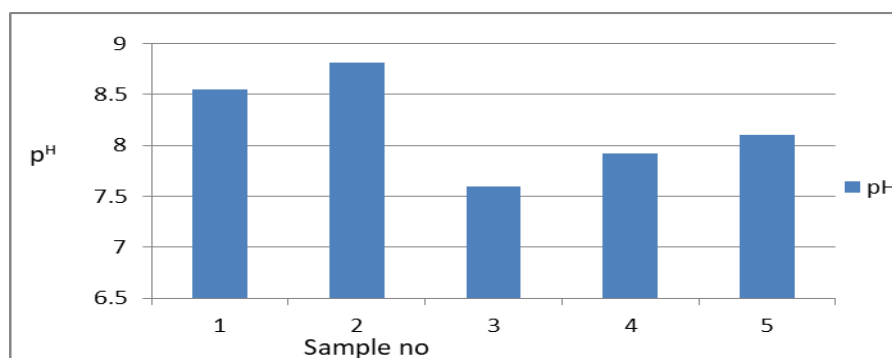


Figure 1 pH Indicator against sample no.

3.2. 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 clay/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_3 , HCO_3 , PO_4 . The conductivity values can be vary with chemical properties of soil. If EC is less than 4 soil type is normal. A soil from study area EC values ranges from 0.50 to 0.73 dSm^{-1} . All soil samples were lower EC values.

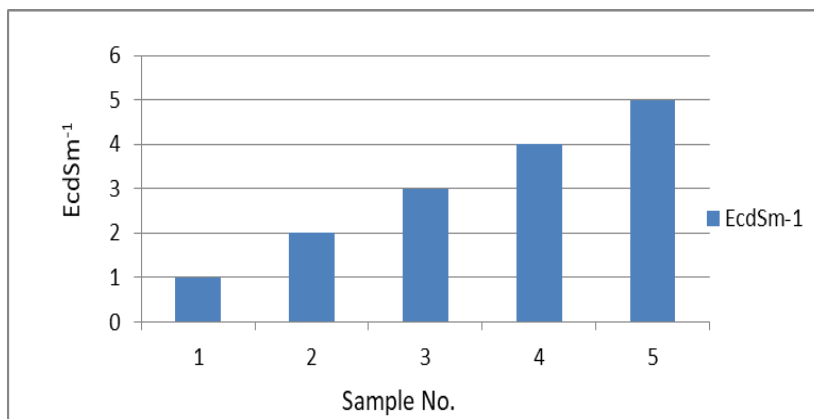


Figure 2 Electrical conductivity against sample no.

3.3. 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 release nutrient for plant growth. , increasing soil organic carbon improves soil health and fertility [16]. The data given in table 2. Organic carbon ranges from shows 0.52 to 0.72 %. Medium proportion of organic carbon.

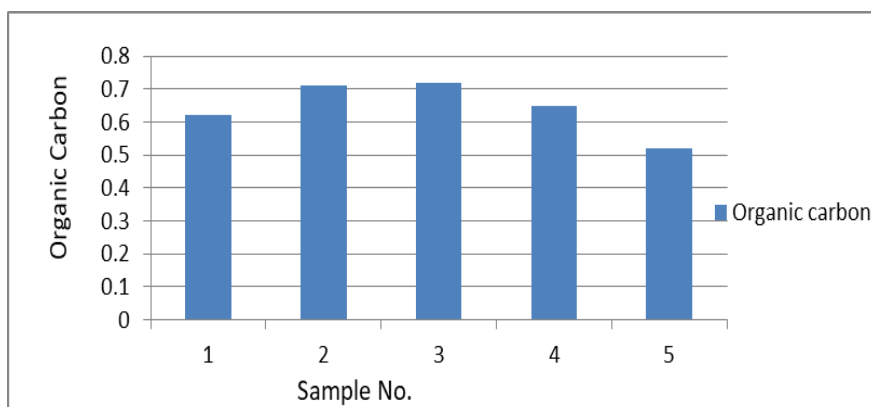


Figure 3 Organic carbon against sample no.

3.4. Nitrogen

The available nitrogen was determined by alkaline per magnet method [23] Nitrogen is an essential plant nutrient, for growth of plant canopy. 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.

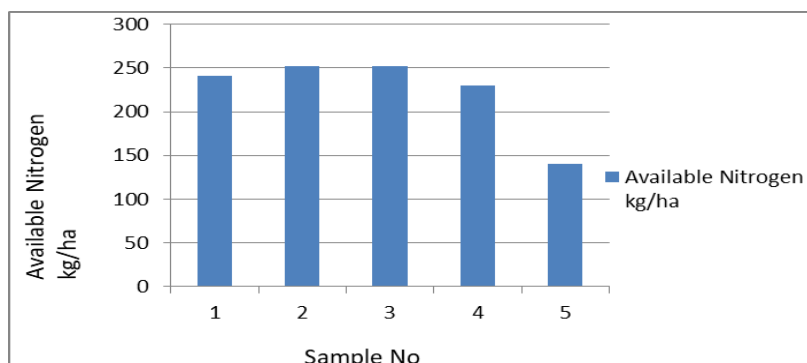


Figure 4 Fertility Status of study area

3.5. 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 [17]. Also it helps in energy storage and transfer. In study area phosphorous ranges 15.11 to 54.13 kg/ha.

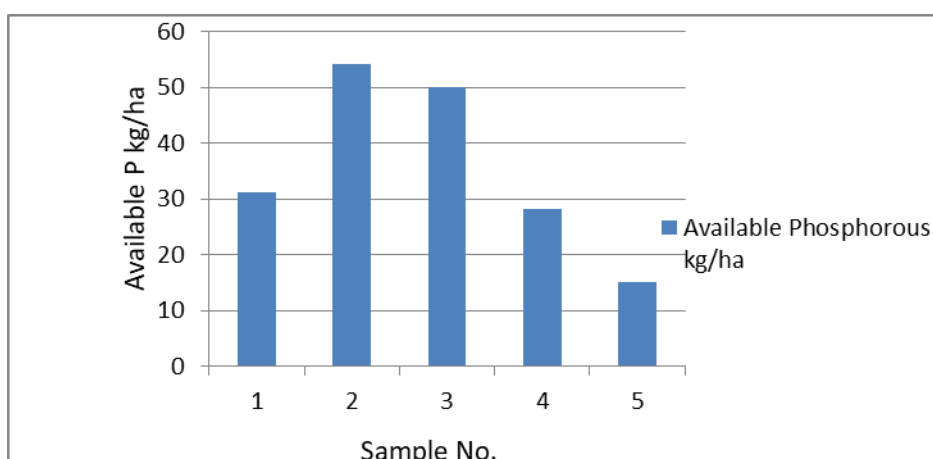


Figure 5 Fertility Status of study area

3.6. 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 125.31 to 630.15 kg/ha. Majority of the soil samples show high available potassium. The soil of the Marathwada contained high to medium available potassium [18-22].

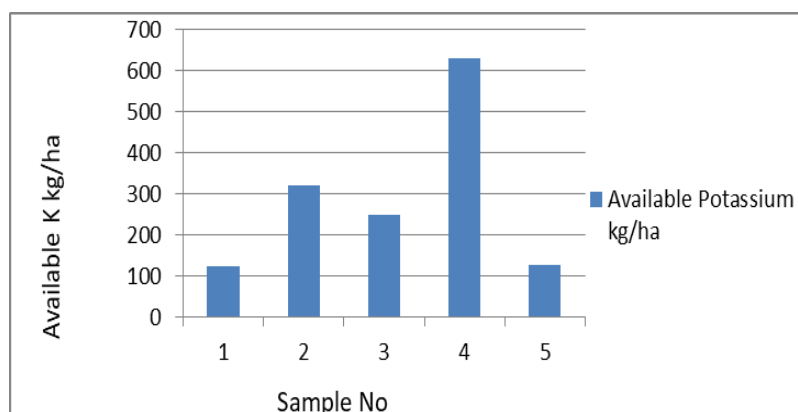


Figure 6 Fertility Status of study area

4. 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.

Compliance with ethical standards

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Disclosure of conflict of interest

The author declare that there is no conflict of interest

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