STUDY OF SOIL CHARACTERISTICS: PH AND ELECTRICAL CONDUCTIVITY, FROM KOLHAPUR DISTRICT

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Abstract :

Soil pH is an indication of the acidity or alkalinity of soil and is measured in pH units. The Electrical Conductivity (EC) of a soil is a measure of the ability of the soil to conduct electricity. The results showed that, among all the tested soil samples, seven soil samples are having normal pH i. e medium pH which is optimum for most crops. Two soil samples having acidic pH and require liming for reclamation of soil and remaining two soil samples having alkaline pH and require application of organic manures. Electrical conductivity of tested soil samples was normal except soil from Bhuyewadi and it is critical for salt sensitive crops.

Keywords : Soil, pH, Electrical Conductivity (EC)

Introduction :

Soil pH is an indication of the acidity or alkalinity of soil and is measured in pH units. The pH scale goes from 0 to 14 with pH 7 as the neutral point. As the amount of hydrogen ions in the soil increases, the soil pH decreases, thus becoming more acidic. From pH 7 to 0, the soil is increasingly more acidic, and from pH 7 to 14, the soil is increasingly more alkaline or basic.

Soil pH measurement is useful because it is a predictor of various chemical activities within the soil. As such, it is also a useful tool in making management decisions concerning the type of crops suitable for location, the possible need to modify soil pH (either up or down), and a rough indicator of availability of nutrients for the plants in the soil. Soil pH is an important factor for plant growth. It affects nutrient availability, nutrient toxicity, and microbial activity, as well as extending a direct effect on protoplasm of plant root cells (Larcher, 1980; Marschner, 1986).

Soil pH directly affects the activity of Nitrogen Fixing Microbes, once the soil pH has decreased to 4.7 or lower, the ability of the microbes to convert nitrogen is greatly reduced. Soil pH directly affects

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the solubility of many of the nutrients in the soil needed for proper plant growth and development. Some elements like potassium, magnesium Calcium and phosphorus are likely to be unavailable to plants in acidic soil and in basic soil elements like copper, zinc, boron, manganese and iron are not easily absorbed by plants. Thus by maintaining proper pH of soil, we can create an ideal environment for plants because different plant species requires different needs of pH range to survive. (Larcher, 1980; Grubb, 1985; Leskiw, 1998). It has been reported that forest soils should be slightly acidic for nutrient supply to be balanced (Leskiw, 1998). Grassland species richness is highest at a soil pH range of 6.1-6.5 (Grime, 1973).

The Electrical Conductivity (EC) of a soil is a measure of the ability of the soil to conduct electricity. When ions (salts) are present, the EC of the solution increases. If no salts are present, then the EC is low indicating that the soil solution does not conduct electricity well. Frequent use of irrigation water will directly influence the salts in the soil profile. Salts are influenced by factors such as rainfall amount and timing, internal soil drainage, and irrigation practices. Usually, rainfall contains low amounts of salts and acts to dilute salts that are present in the soil. If the rainfall is of sufficient volume or duration, and the soil has internal drainage, the added rainfall is enough to leach salts from the soil. During drying conditions, water is lost from the soil due to evaporation, and salts are effectively concentrated.

Correct soil pH and EC is essential to ensure optimal plant growth and crop yield, because it allows nutrients to be freely available for plants to absorb. Testing the pH and EC of soil helps to determine which plants are best suited for a particular area. Hence the present study was undertaken to determine pH and EC of soil from different villages of Kolhapur district.

Material and Method :

The soil samples were collected from Thirteen villages, Alabad, Belewadi, Benikre, Bidri, Kapshi, Madhyal, Mangnoor, Jainyal (Taluka-Kagal), Atigre, Bhadole (Taluka-Hatkanagale), Bhuyewadi, Parite, Shiye (Taluka-Karveer) of Kolhapur districts in the month of February, 2018. The soil samples were collected in plastic containers. Prior to use, cans were cleaned thoroughly and rinsed with distilled water. They were dried, cooled, and labeled. In laboratory these samples were analyzed for pH and EC by following standard methods.

The pH and EC of soil was measured by using Deluxe Water and Soil Analysis Kit (Model LT-68)

A. Procedure for measuring pH. :

Sample solution prepared by mixing 20 gms of soil in 40 ml distilled water in a 100 ml capacity beaker. Sample was stirred well and allowed to stand for 30 min. pH meter was standardised.

Before measuring the soil pH sample was stirred. Do not place the electrode(s) directly in the sand layer at the bottom of the container. The electrodes should be positioned in the solution just above the sand layer. Subsequently pH was recorded.

B. Procedure for measuring Electrical conductivity. :

Sample solution prepared by mixing 20 gms of soil in 40 ml distilled water in a 100 ml capacity beaker. Sample was stirred well and allowed to stand for 30 min. Conductivity meter was standardised.

Before measuring the EC of the soil sample was stirred. Do not place the electrode(s) directly in the sand layer at the bottom of the container. The electrodes should be positioned in the solution just above the sand layer. Subsequently EC was recorded in mS/cm- unit.

Results :

Table 1: Soil Samples were categorized in following manner (pH)

Category	Range of pH value	Suggestion for remedy
Acidic (Low pH)	<6.5	Requires liming for reclamation
Normal (Medium pH)	6.5- 7.8	Optimum for most crops
Alkaline (High pH)	>7.8	Requires application of organic manures

Table 2: Soil samples were categorized in following manner (EC)

Conductivity in mS/cm	Nature of Soil
<0.8	Normal
0.8 – 1.6	Critical for salt sensitive crops
1.6 –2.5	Critical to salt tolerant crops
>2.5	Injurious to most crops

Table 3: pH and EC values of different localities of Kolhapur district.

Sr. No.	Name of the Village	pH	EC
1	Alabad	7	0.50
2	Benikre	8.5	0.38
3	Belewadi	8.5	0.65
4	Bidri	7	0.74
5	Kapshi	8.5	0.8
6	Madhyal	6	0.59
7	Mangnoor	7.5	0.79
8	Jainyal	6	0.49
9	Atigre	7	0.52
10	Bhadole	7.5	0.50
11	Bhuyewadi	7.5	0.87
12	Parite	7	0.75
13	Shiye	8.5	0.60

Discussion

The results showed that, among all the tested soil samples, seven soil samples are having normal pH i. e medium pH which is optimum for most crops. Two soil samples having acidic pH and require liming for reclamation of soil and remaining two soil samples having alkaline pH and require application of organic manures. Electrical conductivity of tested soil samples was normal except soil from Bhuyewadi and it is critical for salt sensitive crops.

In Kanagal (Nalgonda district, Andhra Pradesh); most of the soil pH was represented by the presence of strong concentration of neutral soluble salts (Narsimha *et. al.,* 2013). (Narsimha *et. al.,* 2013) also reported that, electrical conductivity of soil from localities like Madanapuram and Rayibavigudem have high and low values. Higher conductivity may be attributed to high salinity and high mineral percentage in groundwater samples.

(Pavan, 2016), reported that, the pH and Electrical Conductivity of soil from Deulgaon Raja taluka is with normal pH, which is good for crop. Some soil samples found to be alkaline (5.97 %) in nature so farmers are ask to use organic manure.

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