Physicochemical Parametric Study of Soil Quality from Jalgaon District Chalisgaon Region

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Abstract: *Soil is one of the essential components which require for the healthy growth of a plant. Various types of nutrients, minerals and micronutrients required for growth and metabolic activities of plant which get fulfilled from a soil. With continual cultivation of crops and adversative practices, quality of soil get dropped so there is need of parametric investigation of soil with regular interval of time. The present study is based on the samples of soil collected from farms of some selected villages of Chalisgaon tehsil, Jalgaon district. We conduceted analysis of the collected soil samples using physico-chemical important parametric studies like colour of soil, measure of pH, measure of electrical conductivity (EC), percentage of organic carbon (O.C.), presence of (N-P-K) i.e., Nitrogen-Phosphorus-Potassium. This study helps to determine the composition of soil as well as able to find out deficient.*

Keywords: Soil, physicochemical parameters, nutrient, analysis, deficiency.

I. INTRODUCTION

Soil is considered as potent module which supports to life on earth, which composed of organic matter, air, liquid, minerals etc. It has been demonstrated that soil is one of the major constituent for production of variety of crops [1-2]. With the research and development in agriculture field like green revolutions, new hybrid varieties of different crops and irrigation techniques were adopted by farmers which results into increased level of productivity [3-4] .With application of new technologies nowadays most of countries were able to fulfil their food need rather in addition to that most of the countries start their export also. These developed methods of farming have more productive than traditional farming but it involved practices such as exhaustive use of fertilizers, insecticide, pesticide etc. The farmers were fascinated towards high yield intensive chemical based methodology cash crops cultivation. It has been seen that with constant and rigorous use of chemicals in the form of fertilizers and sprays, the properties of soil get changed with respect to its structure and composition results into reduced capacity of productivity [5].

Jalgaon district is well known as highest Banana producing district of India [6-7]. Along with banana other cash crops like cotton, sugarcane, maize and grains etc. cultivated at large scale in Jalgaon district. In the competition and thirst of highest productivity of cash crops farmers completely ignored soil quality and utilised higher doses of fertilizers and sprayed variety of pesticides, insecticides. This results into decrease soil quality and fertility as a major problem in front of farmers. To overcome this problem, there is need of analysis of soil with regular time intervals using physicochemical parameters [8].

II. MATERIAL AND METHODOLOGY

In analysis of soil samples chemicals were used of AR grade purchased from Merck. The samples of soils used for analysis were accumulated from seven villages of Chalisgaon tehsil and investigated with seven physicochemical features such as Colour of soil, measure of pH, Electrical conductivity (EC) measurement, percentage of organic carbon (O.C.), presence of (N-P-K) i.e., Nitrogen-Phosphorus-Potassium.

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Sample collection-

The present study is based on the samples of soil collected from farms of selected seven villages of Chalisgaon tehsil namely, Kargaon (CS-1), Waghali (CS-2), Mehunbare (CS-3), Khadaki (CS-4), Bahal (CS-5), Ranjangaon (CS-6) and Aadgaon (CS-7). The Soil samples were collected from farms of selected villages using tools like spade or shovel in the thick quality clean polythene bags. As the top six inches of soil has the most root activity and fertilizer application is generally restricted to this depth, so the depth for collecting the soil sample was in the range of 5 to 8 inch from the surface. During the soil samples collection, soil nearby the root of larger tree avoided. After the collection of soil samples, it immediately brought into laboratory for its assessment using various physico-chemical parameters. The above mentioned parameter were analysed for collected samples (CS-1 to CS-7) of soil, using standard procedure [9].

Methodology & Physicochemical analysis

The collected soil samples were directly brought in laboratory for its evaluation with respect to their physico-chemical parameters. In analysis, colour of soil samples determined by normal view. The others parameters such as pH, EC, OC, available N, P, K were determined by using different standard methods [9-14] which shown in Table-1.

Physicochemical Parameter	Method used
Colour	By viewing
pH	P^H metry
EC	Conductometrically
Percentage of Organic carbon	By oxidation using Wet-oxidation
Presence of N (Nitrogen)	Alkaline permanganate
Presence of K (Potassium)	Flame photometrically
Presence of P (Phosphorus)	Colorimetrically

Table-1:- Methods used in determination of physicochemical parameters of soil samples

The pH analysis of collected samples (CS-1 to CS-7) were measured using Digital pH meter while Electrical conductivity was determined using digital conductometer. The percentage of organic carbon in soil samples were calculated using wet oxidation method. Whereas, the presence of (N-P-K) i.e., Nitrogen-Phosphorus-Potassium was determined by using alkaline permanganate method, colorimetry and flame photometry respectively. Each parametric values were measured with respect to analysis methods. Its repeatability was established and confirmed by taking concurrent readings. In the analysis of collected soil samples all required precaution and standard operating procedure get followed [15-16].

III. RESULTS AND DISCUSSION

The collected soil samples were analysed for seven physicochemical essential and important parametric studies like colour of soil, measure of pH, measure of electrical conductivity (EC), percentage of organic carbon (O.C.), presence of (N-P-K) i.e., Nitrogen-Phosphorus-Potassium.[17-18]. The parameter amount determined using the standard procedure of analysis for collected soil samples. The physicochemical parametric evaluation values were determined and listed in the Table-2 as below.

Parameter	CS-1	CS-2	CS-3	CS-4	CS-5	CS-6	CS-7
Colour	Blackish	Blackish	Blackish	Blackish	Blackish	Blackish	Blackish
P^H	7.8	7.5	7.9	7.7	8.1	7.9	8.4
EC	0.45	0.38	0.84	0.78	0.97	0.91	1.2
% O.C.	0.67	0.56	0.64	0.73	0.70	0.69	0.78

Nitrogen	197.8	210.5	251.8	245.9	230.7	252.0	241.4
Phosphorous	43.2	39.9	48.1	40.5	51.4	50.6	46.7
Potassium	268.7	315.3	298.0	279.7	301.3	325.8	365.6

Table-2- Physico-chemical analysis data of soil samples from collecting points.

EC: Electrical Conductivity; % O.C. – Percent Organic Carbon; The observed parameter values are EC in dSm−1 and Available nitrogen, Phosphorous, Potassium in kg/ha.

Colour:

All the soil samples collected from respective sampling points were observed black in colour.

P^H:

The pH of all the soil samples determined by using standard procedure using Digital pH meter. The pH values of collected soil samples were observed in between a range of 7.5-8.1. The pH values more than neutral (pH 7) so that collected soil samples observed basic in nature.

Electrical Conductivity:

Electrical conductivity determined the amount of total soluble salts in a sample. The EC value determined by using Digital conductivity meter. It seen that the values of Electrical conductivity for all collected samples in range of 0.38-1.2 dSm−1. The values were observed in very lower amount which indicate soil samples are normal.

% Organic Carbon

The fertility of soil could measure by mean of organic carbon. Hence, organic carbon content is most important factor of a soil. The percentage of organic carbon for collected soil samples were determined in between the range of 0.56-0.78% which showed that soil samples are in normal range of organic carbon amount therefore, it has been determined than all soil samples are less fertile.

Nitrogen:

Nitrogen is most important nutrient which essential for plant growth. If soil is deficient in available nitrogen content then diminutive growth and reduced yields. The amount of available nitrogen determined by alkaline per magnet method [19]. The amount of available nitrogen in collected soil samples were measured in range in between 197.8-252.0 kg/ ha.

Phosphorous

In the plant cell division, growth of root and elongation seed phosphorous plays an important role [20] therefore phosphorous consider as one of the key nutrient element. Therefore in the analysis of soil amount of available phosphorous must be determined. The amount of "P" determined by using flame photometry method.In this study, the available phosphorous in collected samples lies in between range of 39.9-51.4 kg/ha.

Potassium

Similar to Nitrogen and Phosphorous, potassium is also important nutrient which contribute for physiological processes of plants [21]. In the collected soil samples the quantity of available Potassium ranges from 268.7 to 365.6 kg/ha.

IV. CONCLUSION

In present study, the physicochemical analysis of collected samples of soil were performed by using standard methods. The investigation data revealed that Chalisgaon tehsil's all soil samples are basic in nature and have normal range of electrical conductivity. Soil samples analysed were having lower percentage of organic carbon which notify reduced

fertility of soil samples and seeks attentions. The presence of essential nutrients such as N-P-K were determined and found be in normal range. The overall analysis of soil samples suggests parametrically deficient soil and needs focus on its improvement for enhancing the quality and fertility for increased crop production. This analysis report advisory conclude that farmers from study region should apply the fertilisers which capable to enhance soil with organic carbon content as well as essential N-P-K nutrients. This practice will definitely benefit to improve soil quality and yield of crops indirectly to human being and society.

V. ACKNOWLEDGMENT

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