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Chemical Composition of Soil from Godavari Basin of Jalna (M.S.) India

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ABSTRACT

Soil is an important natural resource and plays a crucial role in maintaining environmental balance. Regarding yield of the crops and growth regulation fertility of soil is most important But today's scenario of agriculture farming in India is not care about it. Without any analysis farmer used unwanted and abundant quantity of fertilizer and water, both results reduce fertility of soil. For sustainable agriculture development and production, analyse the chemical composition, micronutrient and microfauna from soil is must.

The paper is communicated with the chemical composition of soil from selected location of Godavari basin of Jalna (India). The composition of soil shows as follows pH ranges from 8.3-8.9, E.C. 0.24-0.38, Organic carbon 0.50-0.93, P_2O_5 51-83, K_2O 680-901, Ca 32.3-40, Mg 11.6-24.0, Na 110-125 and $CaCo_3$ 10.7-15.4.

The above nine parameters plays an important role about soil fertility and crop yield. But in this region farmer randomly prefer only soybean and cotton farming. From study area some fields are not good for soybean hence this study helps to farmer for their proper crop choice.

Key words: *Chemical composition, Soil fertility and Godavari Basin.*

INTRODUCTION

Soil provides a medium for plant growth to meet our food and fiber need. Soil filters water, decomposes waste, stores heat and exchanges gases and hence have great bearing on environmental balance Deshmukh K. K.[1]. Fertility of soil is one of the most important factors which regulate growth and yield of crops. Due to an imbalance and an inadequate use of fertilizers, improper irrigation and various cultural practices the soil quality depleting rapidly Medhe *et al.*[2]. Soil is an important natural resource and plays a crucial role in maintaining environmental balance Chaudhari and Ahire[4]. Its proper use greatly determines the capability of life support system and socio-economic development of nation Bacchewar and Gajbhiye[3]. Micronutrients play an important role in maintaining soil health and productivity of crops for the sustainable agricultural production. The information of soil characterization in relation to fertility status of the soils of the region will be useful. In order to meet the ever increasing food requirement for growing population, it is essential that soil and water resources should be used judiciously.

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The physico-chemical properties of soil play an important role in determining the retention and availability of nutrients in the soils. The nutrient supply in soils is depends on the level of organic matter, the degree of microbial activity, change in pH types and amount of clay and status of soil moisture. The physico-chemical properties such as soil pH, calcium carbonate ($CaCo_3$) and organic carbon are important as these affects the availability of nutrients in soil and there by on crop growth and production. Calcium is the secondary nutrient element required by all higher plants absorbed as Ca^{++} ion. It is constituent of cell wall, increases stiffness of plants and it plays an important role in cell elongation and division, root development and growth of plants.

Magnesium is the constituent of chlorophyll serve as a structural component of ribosome and plays a important role in protein synthesis. Sulphur plays a vital role in soil seed crops, It is important in formation of amino acids i.e. cysteine, cystine and methionine. It is also essential for protein, fatty acid synthesis, enzyme activation, formation of glucosides Bacchewar and Gajbhiye[3].The deficiencies of sulphur in soils and plants are being reported in several parts of the country and also in Maharashtra Bacchewar and Gajbhiye[3]. Out of 240 district surveyed in India near about 50% of soil samples have been found to be deficient in sulphur, where as extent of sulphur deficiency was 54% in Maharashtra soils Mali C. V. and Raut [5].

MATERIAL AND METHODS

Soil samples (0-15cm) were collected from 12 sites from Jalna district (Table 1). Soils were completely air dried and passed through 2mm sieve and stored in properly labeled plastic bags for analysis. The sieved out particles are then oven dried to a temperature around 110^{o}C for several hours in order to completely remove any trace of moisture.

Table 1. GPS location of study area

Sr. No.	Location	N	E	Survey Number	Name Of Farmer
1	Sastha Pimpalgaon	19^{o}23’02.3”	075^{o}38’27.7”	262	Sanjay Nanasaheb Katare
2	Balegaon	19^{o}23’17.5”	075^{o}36’54.0”	60-61	Haribhau Rambhau Zinzurde
3	Apegaon	19^{o}23’01.3”	075^{o}38’27.8”	69	Shivaji Vinayak Bali
4	Hasnapur	19^{o}23’58.8”	075^o.48’43.8”	81	Bhagwan Natha Mirkad
5	Ganesh Nagar	19^{o}23’57.8”	075^{o}47’42.7”	61	Bhagwan Pandurang Kute
6	Sadegaon	19^{o}24’02.4”	075^{o}52’27.0”	94	Shivaji Dashrathrao Khoje
7	Jogladevi	19^{o}23’40.2”	075^{o}54’05.7”	222	Raibhan santram Khoje
8	Ramasgaon	19^{o}22’39.2”	075^{o}50’04.7”	247	Sharad Dadarao Pawar
9	Banegaon	19^{o}21’11.8”	075^{o}54’19.7”	278	Paraji Tatyasaheb Udhan
10	Bhoggaon	19^{o}20’43.2”	075^{o}54’13.4”	102	Laxman Sopan Mule
11	Mangrul	19^{o}18’23.6”	075^{o}57’52.0”	214	Jayram Asaram Bewle
12	Golegaon	19^{o}17’22.8”	076^{o}09’44.2”	97	Bappasaheb Devidasrao Taur

Jalna district lies in Marathwada region of Maharashtra (Fig. 1). The geographical area of Jalna district is 7612 Sq. Km. The processed soil samples were analyzed for their physic-chemical properties as per standard methods suggested by Jackson Patil J. D. and Shingte[9]. Soil texture determination was carried out by hydrometer method as outlined by Bouyoucos. Soil pH was determined by using glass electrode pH

meter Patil J. D. and Shingte[9], free $CaCo_3$ was determined by rapid titration method Methods Manual[10], organic carbon was estimated by modified method of Walkly and Black Methods Manual[10], Exchangeable calcium and magnesium was determined by Versenate method Patil J. D. and Shingte[9], Sulphur was determined by turbidity method using spectrophotometer KVK Jalna Dist: Jalna and E.C. was determined by electrometrically.

Fig. 1: Map showing Godavari Basin of Jalna district from which soil samples collected

RESULTS AND DISCUSSION

pH is an important parameter as it helps in ensuring availability of plant nutrients e.g. Fe, Mn, Zn and Cu are more available in acidic than alkaline soils. It also helps in maintaining the soil fertility. A pH range of 6.5 to 7.5 of the saturation extract is considered as the pH range in which most of the soil nutrients are available to plants. Present study reveals that pH range recorded from 8.3 to 8.9 that reflecting alkaline nature of soil (Table 2).

The higher values of pH recorded in all the locations. These high values are possibly due to presence of soluble and exchangeable sodium along with HCO_3^- ions, which precipitates calcium and magnesium carbonates during evaporation. High pH values are thus indicative of development of salinity in the area, Hence it is necessary to use less water to that soil. The E.C. values range from 0.24 to 0.38 ds/m recorded in the study area. EC observed less at Bhoggaon i.e. 0.24 and maximum i.e. 0.38 in Sastha Pimpalgaon and Golegaon. The EC range is within the limit. Thus it indicates soil is salt free. The organic carbon range between 0.50 to 0.93 recorded in which high percentage of Organic carbon (O.C.) recorded in location number 2 where as low percentage of O.C. recorded in location number 7.The P_2O_5 range recorded in between 51.0 to 83.6 in the study area in which high value of P_2O_5 recorded in location number 7 where as lowest value of P_2O_5 recorded in location number 1(Table 2).

Table 2. Spot wise chemical parameters of study area

Sr. No.	Location	pH	EC (m/s)	O.C. (%)	P_2O_5 Kg/ha.	K_2O Kg/ha.	Ca m/100gm	Mg m/100gm	Na m/100gm	$CaCo_3$ (%)
1	Sastha Pimpalgaon	8.7	0.38	0.90	51.0	690	37.0	14.0	110	15.3
2	Balegaon	8.9	0.37	0.93	52.5	680	38.0	13.0	110	15.2
3	Gondi	8.8	0.30	0.80	55.0	900	38.1	13.1	112	15.3
4	Hasnapur	8.7	0.35	0.75	60.0	901	38.2	13.3	120	15.4
5	Ganesh Nagar	8.7	0.32	0.80	70.5	790	38.0	13.6	122	14.0
6	Sadegaon	8.8	0.24	0.97	82.0	794	30.0	24.2	115	11.0
7	Jogladevi	8.8	0.26	0.50	83.6	697	40.0	13.2	119	10.7
8	Ramasgaon	8.4	0.34	0.58	69.2	807	34.0	22.0	123	12.5
9	Banegaon	8.3	0.36	0.60	68.2	780	34.0	23.0	120	12.6
10	Bhoggaon	8.3	0.24	0.61	68.0	760	34.3	24.0	122	12.8
11	Mangrul	8.4	0.27	0.90	89.7	765	32.3	11.6	125	15.3
12	Golegaon	8.5	0.38	0.91	69.2	773	38.4	14.6	125	12.1

The K_2O value are recorded in the study area between 680 to 901 in which high value of K_2O recorded in location number 4 where as lowest value of K_2O recorded in location number 2.The Ca value are recorded in the study area in between 32.3 to 40.0 in which high value of Ca recorded in location number 7 where as lowest value of Ca recorded in location number 11. The mg value are recorded in the study area in between 11.6 to 24.0 in which high value of Mg recorded in location number 10 where as lowest value of Mg recorded in location number 11. The Na values are recorded in the study area in between 110 to 125 in which highest value of Na recorded in location number 11 and 12 where as lowest value of Na are recorded in location number 1. The $CaCo_3$ values are recorded in the study area in between 10.7 to 15.4 in which high value recorded in location number 4 where as lowest value recorded in location number 7.

CONCLUSION

(1) The study helps in determining the values of different chemical parameters and the nutrient concentrations of soil from Godavari Basin region.
(2) All the parameters either directly or indirectly influence on the soil ecosystem.
(3) There is a necessity to minimize the use of chemical fertilizers.
(4) Use of organic manure for agriculture.
(5) It is right time to take action about soil fertility other wise in few years soil will be reduce it's fertility and impact on agriculture economy of this year.
(6) I recommend use less water requirement for farming to preserve the fertility of soil.

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