Bioscience Discovery, 5(1):15-18, Jan. 2014

ISSN: 2229-3469 (Print); ISSN: 2231-024X (Online)
Received: 16-08-2013, Revised: 30-11-2013, Accepted: 06-12-2013

Full Length Article

Chemical composition of soil from Godavari basin of Beed (MS) India

Shinde L V and G B Phalke

Department of Zoology, J.E.S. College Jalna-431203
kantshinde@gmail.com

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, analyze the chemical composition, micronutrient and micro fauna 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.

Keywords: Beeds District, Chemical composition, Godavari Basin and soil fertility.

INTRODUCTION

Soil may be defined as a thin layer of earth's crust which serves as a natural medium for the growth of plants. It is the unconsolidated mineral matter that has been subjected to, and influenced by genetic and environmental factors- parent material, climate, organisms and topography all acting over a period of time. Soil differs from the parent material in the morphological, physical, chemical and biological properties. Also, soils differ among themselves in some or all the properties, depending on the differences in the genetic and environmental factors. Thus some soils are red, some are black; some are deep and some are shallow; some are coarse-textured and some are fine-textured. They serve in varying degree as a reservoir of nutrients and water for crops, provide mechanical anchorage and favorable tilth. The components of soils are mineral material, organic matter, water and air, the proportions of which vary and which together form a system for plant growth; hence need to study the soils in perspective.

Some dominant groups of Indian soil, classified according to soil taxonomy and chemical property are Red soil which are quite wide in their spread and red color is due to diffusion of iron in the profile, Lateritic soil are composed of a mixture of hydrated oxides of aluminum and iron with small amounts of manganese oxide, Black soil contains a high proportion of calcium and magnesium carbonates and have a high degree of fertility, Alluvial soils is the largest and agriculturally most important group of soils, Desert soils which occur mostly in dry areas and important content in quartz and forest and Hill soils high in organic matter.

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 (Bear, 1976). 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 (Bacchewar and Gajbhiye, 2011). Soil is an important natural resource and plays a crucial role in maintaining environmental balance (R. Chandra and S.K. Singh, 2009). Its proper use greatly determines the capability of life support system and socio-economic development of nation (Chaudhari and Ahire, 2013). 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.

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.The deficiencies of sulphur in soils and plants are being reported in several parts of the country and also in Maharashtra (Chaudhari and Ahire, 2013). 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 (Deshmukh, 2012).

MATERIALS AND METHODS

Soil samples (0-15cm) were collected from 12 sites from Bed district. 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.

Beed district lies in Marathwada region of Maharashtra. The geographical area of Beed district is 10,693 Sq. Km. The rainfall of Beed District ranges between 458 mm to 814 mm. The maximum temperature of Beed District in summer i.e. 43^{o}C and minimum in winter i.e. 12^{o}C. The processed soil samples were analyzed for their physic-chemical properties as per standard methods. Soil texture determination was carried out by hydrometer method as outlined by Bouyoucos (1927). Soil pH was determined by using glass electrode pH meter (Shoemaker *et al*., 1961). Free $CaCo_3$ was determined by rapid titration method (Methods Manual, 2011). Organic carbon was estimated by modified method of Walkly and Black, 1934. Exchangeable calcium and magnesium was determined by Versenate method (Patil and Shingte, 1982). Sulphur was determined by turbidity method using spectrophotometer Krishi Vidgyan Kendra, Kharpudi Dist: Jalna. E.C. was determined by electrometrically (Methods Manual, 2011).

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. In the present study pH range from 7.3 to 8.5 reflecting alkaline nature of soil. In location number 1,2,5,7,8,9,10,11 & 12 high pH values are recorded, these high values 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 less at location number 6 and 10 i.e. 0.24 and maximum i.e. 0.38 in location number 4. The EC range is within the limit. It indicates soil is salt free. The organic carbon range between 0.39 to 0.90 recorded in which high percentage of O.C. recorded in location number 2 and 10 where as low percentage of O.C. recorded in location number 9.The P_2O_5 range recorded in between 50.5 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 2. The K_2O value are recorded in the study area between 685 to 895 in which high value of K_2O recorded in location number 4 where as lowest value of K_2O recorded in location number 1.The Ca value are recorded in the study area in between 18.4 to 39.1 in which high value of Ca recorded in location number 3 where as lowest value of Ca recorded in location number 10. The mg value are recorded in the study area in between 11.6 to 18.6 in which high value of Mg recorded in location number 6 where as lowest value of Mg recorded in location number 5. The Na values are recorded in the study area in between 115 to 123 in which highest value of Na recorded in location number 11 where as lowest value of Na are recorded in location number 1,4 & 6. The $CaCo_3$ values are recorded in the study area in between 8.37 to 14.3 in which high value recorded in location number 1 where as lowest value recorded in location number 9.

Table 1: GPS location of study area

Sr. No.	Location	N	E	Survey Number	Name Of Farmer
1	Rakshshbhavan	9°23’02.4”	075°39’28.9”	98	Bhausaheb Kachru Natkar
2	Bag Pimpalgaon	19°21’25.5”	075°41’45.4”	60-61	Haribhau Rambhau Zinzurde
3	Kat Chincholi	19°23’58.4”	075°48’43.8”	60	Limbaji Pawar
4	Bhogalgaon	19°23’03.1”	075°54’13.9”	69	Arun Ramkisan Madke
5	Borgaon	19°23’11.9”	075°54’48.0”	21	Prakash Appasaheb Khatke
6	Raheri	19°20’10.7”	075°51’20.8”	63	Rukhminbai Bhimrao phalke
7	Rajapur	19°17’21.2”	075°54’34.9”	80	Chandrabhan Narhari Gavte
8	Manubai Jawla	19°17’44.2”	075°57’43.2”	247	Sharad Dadarao Pawar
9	Ram Nagar	19°15’05.9”	076°01’47.5”	259	Sanjay Shantilal Redasni
10	Surdi Nagik	19°14’44.4”	076°04’34.1”	102	Shrimant Bajrang Garad
11	Kavadgaon	19°15’44.3”	076°05’34.0”	214	Ganesh Tukaram Kaud
12	Purushottampuri	19°16’52.1”	076°09’34.6”	97	Bappasaheb Devidasrao Taur

Table 2: Spot wise chemical parameters of study area

Sr. No.	Location	pH	EC (m/s)	O.C. (%)	P_2O_5 k/hec.	K_2O k/hec.	Ca m/100gm	Mg m/100gm	Na m/100gm	$CaCo_3$ (%)
1	Rakshshbhavan	8.5	0.35	0.89	52.0	685	35.0	15.0	115	14.3
2	Bag Pimpalgaon	8.4	0.32	0.90	50.5	689	36.0	14.0	120	14.2
3	Kat Chincholi	7.8	0.31	0.82	53.0	856	39.1	12.1	119	13.3
4	Bhogalgaon	7.4	0.38	0.78	58.0	895	36.2	14.3	115	14.4
5	Borgaon	8.0	0.32	0.81	68.5	795	37.0	11.6	120	13.0
6	Raheri	7.3	0.24	0.65	82.0	807	31.4	18.6	115	11.87
7	Rajapur	8.2	0.26	0.72	83.6	786	24.8	16.4	119	10.87
8	Manubai Jawla	8.1	0.31	0.60	65.2	800	32.0	20.0	118	11.5
9	Ram Nagar	8.0	0.36	0.39	68.2	765	29.6	20.6	120	8.37
10	Surdi Nagik	8.0	0.24	0.85	68.0	769	18.4	30.4	121	9.8
11	Kavadgaon	8.0	0.29	0.85	70.7	760	31.3	15.6	123	14.3
12	Purushottampuri	8.1	0.32	0.90	69.2	700	35.4	12.6	120	13.1

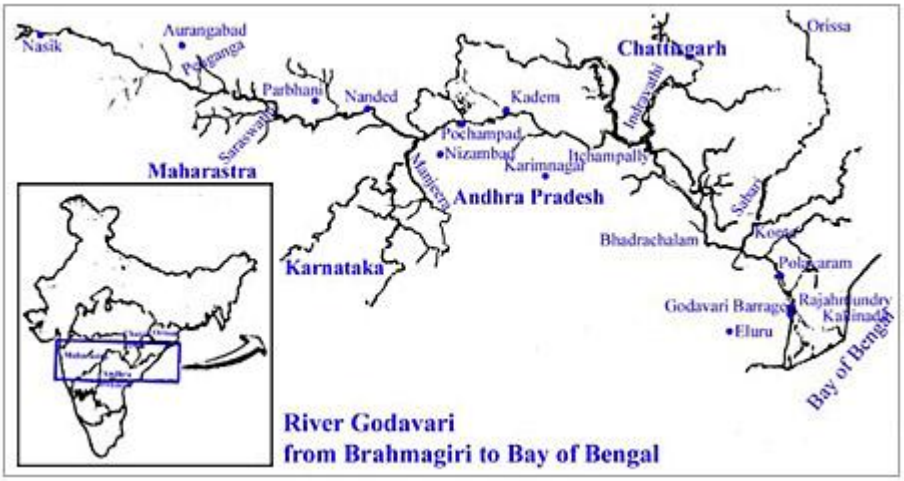

Fig 1: Map showing Godavari Basin of Marathwada including Jalna and Beed district from which soil samples are collected

Conclusion

The study helps in determining the values of different chemical parameters and the nutrient concentrations of soil from Godavari Basin region. All the parameters either directly or indirectly influence on the soil ecosystem. There is a necessity to minimize the use of chemical fertilizers. Use of organic manure for agriculture. It is right time to take action about soil fertility other wise in few years soil will be reduce its fertility and impact on agriculture economy of this year.

Acknowledgement

The authors are thankful to Dr. Rameshji Agrawal, Principal, J.E.S. College for providing facility to do practical work. The authors are also thankful to Director, Head KVK for providing laboratory facility.

LITERATURE CITED

Bear FE, 1976. Chemistry of soils 2nd oxford and IBH publishing corporation, New Delhi**.**

Bacchewar GK and BR Gajbhiye, 2011. Correlation studies on secondary nutrients and soil properties in soils of Latur District of Maharashtra**.** *Research Journal of Agricultural Sciences***, 2**(1)**:** 91-94**.**

Chaudhari PR and DV Ahire, 2013. ' Electrical conductivity and Dielectric constant as predators of chemical properties and available nutrients in the soil**.** *Journal of chemical, Biological and physical sciences***,** Vol. **3**, No.2, 1382-1388**.**

Chandra R and SK Singh, 2009. Fundamentals and management of soil quality**.** *Weatvile publishing House***,** New Delhi**.**

Deshmukh KK, 2012. Studies on chemical characteristics and classification of soils from Sangamner area, Ahmednagar District, Maharashtra, India**.** *Rasayan J. chemistry***,** vol**.5** No**.**1**,** 74-85**.**

Medhe SR, Takankhar VG and Salve AN, 2012. Correlation of chemical properties, secondary nutrients and micronutrients Anions from the soils of chakur Tahisil of Latur District**,** Maharashtra**.** *Trends in Life Sciences*. **1(**2):10.

Mali CV and Raut PD, 2001. Available sulphur and physico-chemical characteristics of oilseed dominated area of Latur District**.** *Journal of Indian Society of soil Science,* **26**(10)**:** 117-118**.**

Miller RW and RL Donahue, 1992. Soil: An introduction to soils and plant growth**,** *prentice Hall of India Pvt. Ltd***,** New Delhi**.**

Patil JD and Shingte AK, 1982. Micronutrient status of soils from drought prone area of Pune region (Maharashtra)**.** *J. Indian Soc. Soil sci*. **7**(3)**.**

Methods Manual, 2011. Soil Testing in India**,** *Dept. of Agriculture and cooperation, Ministry of Agriculture, Government of India***,** New Delhi**,** Jan**.**