Assessment of Farming Soil Quality from Some Villages of Chandrapur District (MS), India

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Abstract *The physicochemical analysis of farming soil is important because it gives information about presence of macro and micro nutrients in soil. It will help farmers problems associated with soil nutrients, amount and types of fertilizers to be applied to increase the yield of crops. In the present study, farming soil samples were collected, analysed and evaluated nutritional level and then after make action plan before planting for maximum crop production. The evaluation of soil was carried out for parameters like colour, pH, electrical conductivity, organic carbon, organic matter, nitrogen, phosphorous and potassium. The results obtained revealed that the concentrations of soil parameters in the farming soil were not in the standard range and therefore addition of organic manure and or chemical fertilisers to farming soil is require before planting.*
Keyword: *Farming soil, Soil parameters, Crop yield, physicochemical analysis*

I. INTRODUCTION

The soil can be considered as good sources of essential nutrients for growth of plants. It is complex, unconsolidated thin, variable layers of mineral and organic material covers on earth surface [1-4]. During crop production, now a day's several fertilizers in high dose are used instead of manures for crop production. Anthropogenic pollution as well as industrial pollution declines farming soil quality[5-10]. So it becomes essential to characterise the soil parameters by its physicochemical analysis. Thus, it help us to control the adverse effects of chemical fertilizers on soil, plants, animals and human being. The chemical analysis of farming soil in present study is carried out for colour, pH, electrical conductivity, organic carbon, organic matter, available nitrogen, phosphorous and potassium. The results reveals that parameters of soil alters randomly and require treatment with major quantity of organic manure and requisite quantity of chemical fertilisers on or before one to two weeks of planting.

II. MATERIALS AND METHODS

Study Area: The soil samples were collected from Warwat 1, Warwat 2, Datala, Dewala, Dhanora, Padoli, Tadali, and Korpana village of Chandrapur District in summer season. This area is well known for soyabean, cotton in rainy season and wheat crops in winter season.

Soil sampling: The samples were collected at 0 to 20 cm depths from the surface of soil. Then they were dried and grinded using mortar and passed through 2 mm sieved to get uniform particle size. The sieved samples were packed in clean polythene bag, labelled as S_1, S_2. S_3, S_4, S_5, S_6, S_7 and S_8 for Warwat 1, Warwat 2, Datala, Dewala, Dhanora, Padoli, Tadali, and Korpana village farm samples respectively. It is then analysed for characterisation of farming soil. The SD fine chemicals (AR Grade) were used during chemical analysis. The standard methods[11-15] was used for determination of different quality parameters of soil samples which is described in table 1

Table 1 Methods use for estimation of soil parameters	
Colour	By viewing
pH	pH Meter
EC	Conductometry
Organic carbon	Wet oxidation
Organic Matter	% Soil organic matter = % organic carbon x 1.72
Nitrogen	Kjeldhal Method
Potassium	Flame photometry
Phosphorous	Colorimetry

III.   RESULTS AND DISCUSSION

The analytical values of physicochemical analysis of farm soil is presented in table 2. The farm soil at S_1, S_2, S_5 and S_8 site were black in the colour whereas rest farm samples were brownish in colour. The pH value determines acidic, basic and neutral behaviour of farm soils. Its value varies absorption of minerals and microbial activity present in the soil[16]. The pH value of all farm samples were found close to neutral pH (Table 2) and lie in the range prescribed by standard agency. The S_6 sample showed high pH values. The electric conductivity is indicator of ionic content in the farm soil. The EC of all farm soil lies in the prescribed range (Table 2). These values indicated significant presence of ionisable materials in the soil. The major sources of organic carbon in the farm soil are crop residue and organic manure. The organic matter provides essential nutrients like nitrogen, potassium and phosphorous and has excellent water holding capacity give physical strength to plant[17]. It prevent erosion of soil. It is obtained by multiplying soil carbon content by 1.72 factor. The OC and OM contents of soil at S_1, S_3, S_6 and S_8 were insufficient. Therefore it is advised to treat farming soil with organic manure before planting crops. The soil at S_2, S_4, S_5 and S_7 indicated normal range of OC and OM. The available nitrogen is key nutrient for plant growth. It play important role in photosynthesis, helps in seed formation and increases crop production[18]. The nitrogen content in the soil sample at S_1, S_2, S_6 and S_8 were insufficient. It is advised to use organic manure or chemical fertilizer in requisite quantity on or before one to two week of planting (Table 2). The phosphorous is necessary for seed germination and essential for flowering and fruits development[19]. In present study, soil at all sites found to have sufficient phosphorous content. The potassium is very essential macro nutrients for plant growth[19]. In potassium deficient farm soil, plant growth gets altered and the productivity of crop yield is decreases. In present study, soil at S_3 and S_8 showed insufficient quantity of potassium and require to treat farm with fertiliser rich in potassium.

		Table 2 The analytical values obtained during physicochemical analysis of soil samples								
S. N.	Parameters (Units)	Observed analytical value at different sites								Standard limits
		S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	
1.	Colour	Black	Black	Brown	Brown	Black	Brown	Brown	Black	--
2.	pH	7.0	6.90	6.88	6.87	6.83	7.30	6.92	6.98	6.5-7.0
3.	EC (dS/m)	0.63	0.54	0.89	0.65	0.84	0.73	0.91	0.53	0.0-1.0
4.	OC (%)	0.34	0.72	0.30	0.59	0.55	0.31	0.53	0.39	0.41-0.60
5.	OM (%)	0.58	1.23	0.51	1.01	0.94	0.53	0.91	0.67	0.71-1.03
6.	N (Kg/H)	239.78	207.08	413.02	405.76	345.12	217.98	413.02	273.02	280-420
7.	P (Kg/H)	21.71	21.93	29.02	16.35	17.28	19.08	19.08	17.54	14.0-21.0
8.	K (Kg/H)	224.96	256.65	132.02	178.55	185.45	217.98	226.96	147.25	150-200
Abbreviations: EC=electrical conductivity, OC= organic carbon, OM= Organic matter, N= Nitrogen, P= Phosphorous and K= Potassium										

IV.   CONCLUSION:

The analytical reports of farm soil showed variation in physicochemical parameters. From the data, it is observed that conductivity of soil samples is found in prescribed limit. The organic carbon, organic matter, nitrogen and potassium is insufficient at some sites. So organic manure and or chemical fertilizers containing organic carbon, nitrogen and potassium must be added for proper growth and development of the crops on or before one to two weeks of planting.

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REFERENCES

[1].   Borkar, A.D.; Study on some physicochemical parameters of soil samples in Katol Taluka District Nagpur (MS), India, Research J. of Agriculture and Forestry Sci., 3(1): 16-8, (2015).

[2].   Kumar, P., Rajakumar, R., Kumar, S. and Kumar, K.; Assessment of chemical properties of soils from different ecosystems located in Hyderabad. Journal of Pharmacognosy and Phytochemistry 8, 1909-1912, (2019)

[3].   Thakre Y.G., Choudhary M. D. and Raut R. D.; Physicochemical Characterization of Red and Black Soils of Wardha Region. Int. J. Chem. and Phys. Sci. 1(2): 60-66, (2012)

[4].   Wagh G. S., Chavhan D. M. and Sayyed M. R. G.; Physicochemical Analysis of Soils from Eastern Part of Pune City; Universal J. of Environmental Research and Tech. Vol. 3, Issue 1: 93-99

[5].   Raut P. P. and Ekbote P. D.; Physicochemical Analysis of Soil Collected from Babhulgaon Region, Dist. Yavatmal (MS), Int. J. of Basic and Applied Research Special Issue,112-116 (2012)

[6].   Kulkarni A. N., Balkhande J. V., Waghmare B. D. and Ratnakar P.U.; Studies of Some Physicochemical Factors of Teak Forest from Kinwat Area, Nanded, Int. J. Life Science, 437-438 (2011)

[7].   Moor, C., Lymberopoulou T. and Dietrich V. J., Determination of heavy metals in soils, sediments and geological materials by ICP-AES and ICP-MS. Microchimica Acta., 136, (3-4), (2001).

[8].   Muniafu, M. and Otiato E.; Solid Waste Management in Nairobi, Kenya. A case for emerging economies. Journal of Language, Technology & Entrepreneurship in Africa, 2(1): 342-350, (2010).

[9].   Ganorkar R. P. and Chinchmaiatpure P. G.; Physicochemical Assessment of Soil in Rajura Bazar in Amravati District (MS), India, Int. Journal Che. Env. and Phar. Res., 4 (2-3), 46-49 (2013).

[10]. Vrseas B.; Soil Protection Activities and Soil Quality Monitoring in South-Eastern Europe. P. Panagos, V. Toma, & H. ustovi (Eds.). Publications Office, (2011).

[11]. Jackson M. L.; Soil Chemical Analysis: Prentice Hall of India Pvt. Ltd., New Delhi, (1973).

[12]. Jackson M. L. Soil Chemical Analysis: Prentice Hall of India Pvt. Ltd., New Delhi, (1967).

[13]. Walkley A. J., Black I. A. Estimation of soil organic carbon by the chromic acid titration method. Soil Science, 37:29-38, (1934).

[14]. Subbiah B. V., Asija G. L.; A rapid procedure for estimation of available nitrogen in soil. Current Science, 25: 259-260 (1956).

[15]. Olsen S. R., Cole C. V., Watnabe F. S., Dean L. A.; Estimation of available phosphorus in soil by extracting with sodium bicarbonate. USDA Circular No.989, United state department of agriculture, Washington DC, (1954).

[16]. Brady N.C., Weil R. R.; The nature and properties of soils (13th edition). Pearson Education, New Jersey, (2002).

[17]. Johnston A. E.; Soil organic matter, effects on soil and crop, Soil use and management, 2 (3): 97-105, (2007).

[18]. Mesfin A.; Nature and management of Ethiopian soils. Ethiopia: Alemaya University of Agriculture, 272, (1998).

[19]. Sumithra S.; A case study on physicochemical characteristics of soil around industrial and agricultural area of Yerraguntla, Kadapa district, A.P. India. Int .Journal Geo Earth Environ Sci.3 (2), 28-34, (2013).