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ORIGINAL ARTICLE

Assessment of Soil Sample by Analysising Chemical Properties of Soil in Korba District of Chhattisgarh, India

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ABSTRACT
In the present study the investigation for chemical analysis of soil sample had taken under certain parameters and Systematic survey was carried out for evaluation of the soil fertility status of soil in korba district of chhattisgarh during 2016-17, on various aspects, a surface (0-15,15-30 and 30-45 cm, depth) soil samples were collected from 8 villages Ompur, Rajgamar, Kerakachhar, Patrapali, Tuman, Khodri, Sirki and Jatga. From each villages 3 farmer sites, by following the standard procedures of soil sample collection. Soil samples were collected with the help of soil auger and local spade with proper labels and GPS based. The soil samples were analysed for pH value, electrical conductivity, organic carbon, nitrogen, potassium and potassium levels. The value of pH was observed from. 6.03 - 7.41, EC in the range of 0.10 to 0.37 dSm^{-1}, organic carbon in the range from 0.42 to 0.64 percent. The available N content range from 163.46 to 289.21 kg ha^{-1}, The available P content was range from 9.24 to 17.06 kg ha^{-1}, The results showed that available potassium content range from 216 to 397 kg ha^{-1} .
Keywords : *Soil testing, Major nutrients, soil, parameters.*

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INTRODUCTION

Soil is the basic resource for agriculture and its proper management is essential to sustain agricultural production and maintain soil productivity. Soil testing is one of the best available tools, to ascertain the physical characteristics & nutrient status of a field so as to assess the fertilizer requirements for a crop or a cropping system or for knowing the reclamation requirements if the soil is saline/sodic in nature. Fertilizer application based on soil tests is the best available approach for harvesting the economically viable potential yields of crops by increasing input use efficiency and maintaining soil health. [6].

Soil test-based fertility management is an effective tool for increasing productivity of agricultural soils that have high degree of spatial variability resulting from the combined effects of physical, chemical or biological processes [2]. However, major constraints impede wide scale adoption of soil testing in most developing countries. In India, these include the prevalence of small holding systems of farming as well as lack of infrastructural facilities for extensive soil testing[7].

Chhattisgarh state is carved out of the erstwhile Madhya Pradesh. The total geographical area of the state is 136034.28 km^2.Chhattisgarh state lies between $17^0 46'$ - $24^0 8'$ N latitude and $80^0 15'$ -$84^0 24'$ E longitude. The state shares its boundaries with the 6 Indian states *i.e.*Madhya Pradesh on the north west, Uttar Pradesh on the north, Jharkhand on the north-east, Orissa on the south-east, Andhra Pradesh on the south and Maharashtra on the south-west Chhattisgarh state in Central eastern part of India. The state receives annual rainfall ranging from less than 1200 mm to greater than 1600 mm in different areas. Paddy is the main crop of the state and due to abundance of production of paddy Chhattisgarh was known as 'Rice Bowl of Central India.'

Study Area

The area is located at korba district lying between 22°35′ N latitude to 82°75′ E longitudes. Systematic survey was carried out for evaluation of the soil fertility status of soil in korba district on various aspects., a surface (0-15,15-30 and 30-45 cm, depth) soil samples were collected from 8 villages Ompur (V_1) Rajgamar(V_2), Kerakachhar(V_3), Patrapali(V_4), Tuman(V_5), Khodri(V_6), Sirki(V_7) and Jatga(V_8). From

each village 3 farmer sites, by following the standard procedures of soil sample collection. Soil samples were collected with the help of soil auger and local spade with proper labels and GPS based.

MATERIAL AND METHODS

Soil samples collected from different villages of Korba district in the year 2016-17. The study area were dried and crushed with the help of wooden rod and passed through 2 mm sieve and then used for the determination of soil pH, organic matter, macronutrients content by adopting standard laboratory method. Soil pH was determined in 1:2 soil water suspensions using Digital pH meter [5]. The Electrical conductivity with method [11]. Organic C by wet oxidation method [1, 12]. Available nitrogen was estimated by alkaline $KMnO_4$ method [8]. Available phosphorus was extracted by 0.5M $NaHCO_3$ solution buffer at pH 7.0 and phosphorus in the soil extract is determined colorimetrically using a Photoelectric Colorimeter after developing molybdenum blue colour [10]. Available potassium was extracted by shaking with neutral normal ammonium acetate for 5 minutes [9], and then K in the extract was estimated by flame photometer.

RESULTS AND DISCUSSION

Soil reaction (pH) :

A Study on soil pH of the samples of korba district were determined for pH and observed in the range of 6.03 – 7.41 (table 1).

pH estimation of the soil samples was observed and came to the result that it was moderately acidic to moderately alkaline in reaction. (table 2).

Electrical Conductivity (EC dSm^{-1})

A Study on electrical conductivity (EC) soil sample were determined for EC and observed in the range of 0.10 to 0.37 dSm^{-1} at 25^0 C (Table1) of the Korba District.

EC estimation of the soil sample was observed and came to the result that it was Salt free in nature(Table 2).

Organic carbon (OC %) :

Data presented in Table 1 analysed for organic carbon of the soil sample observed in the range of 0.42 - 0.64 per cent in korba district. (Table-1)

The result show that organic carbon of soil sample is within medium range (table 2). High temperature and good aeration in the soil increased the rate of oxidation of organic matter in reduction of organic carbon content. The high temperature prevailing in the area is responsible for the rapid burning of organic matter, thus resulting in medium organic carbon content of these soils. Similar results were also noted by Sharma *et al.* (2008).

Available macronutrients status of soils :

Available N status:

The available N content (Table 1) range from 163.46 - 289.21 kg ha^{-1}. Considering table 3 the soil test rating for available N (<250 as low, 250-500 as medium and >500 as high in the status of N), the soil sample were found as low to medium available N content . In this way, almost all the soil samples tested for available N were found to be deficient in N. Although, it is fact that the available N analyzed by alkaline $KMnO_4$ method as suggested by Subbiah and Asija, (1956).

Available P status :

The available P content in various soils was range from 9.24 - 17.06 kg ha^{-1}, (Table 1) in the study area. Considering table 3 the soil test rating for available phosphorus (0-10 kg ha^{-1} as very low, 11-20 kg ha^{-1} as low, 21-40 kg ha^{-1} as medium and >40 kg ha^{-1} as high) majority of the soils. soil samples were observed under very low to low status in available phosphorus.

Available K status :

The results showed that available potassium content range from 216 - 397 kg ha^{-1}, (Table 1). Considering table 3 the soils having 0-50 kg ha^{-1} as very low, 51-100 kg ha^{-1} as low, 101-250 kg ha^{-1} as medium and >250 kg ha^{-1} as high in available potassium contents. soil samples were observed under medium to High status in available potassium.

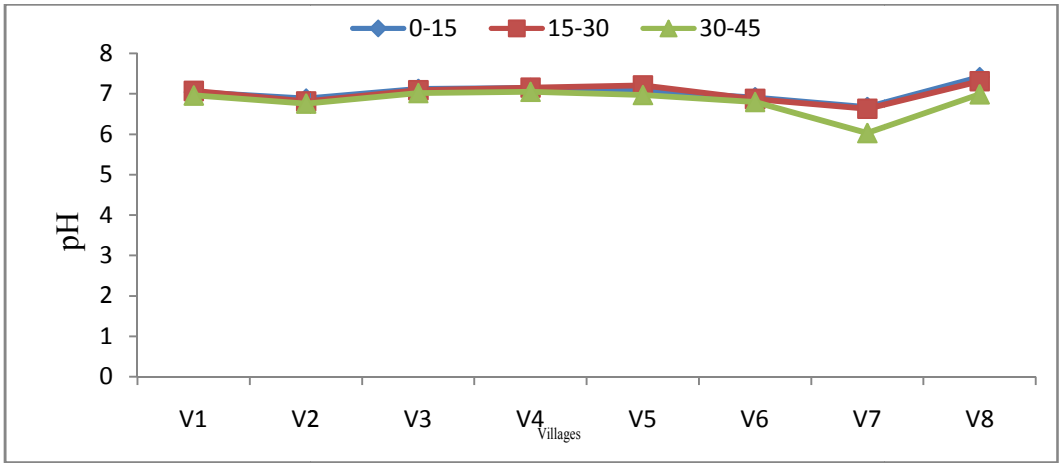

Fig. 1: Soil pH at different depths (0-15, 15-30 and 30-45 cm) of different villages of Korba district Chhattisgarh/ India

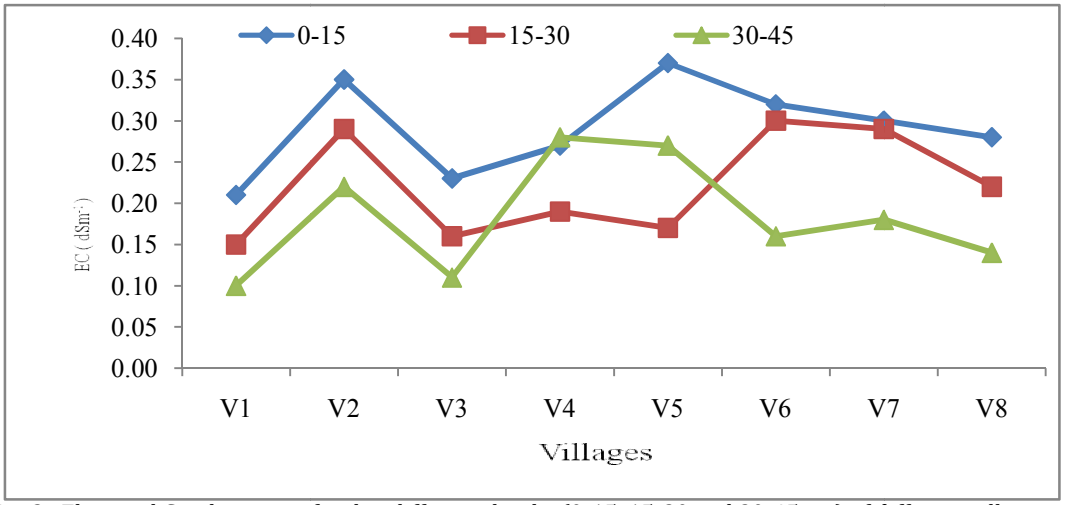

Fig. 2 : Electrical Conductivity of soil at different depths (0-15, 15-30 and 30-45 cm) of different villages of Korba district Chhattisgarh/ India.

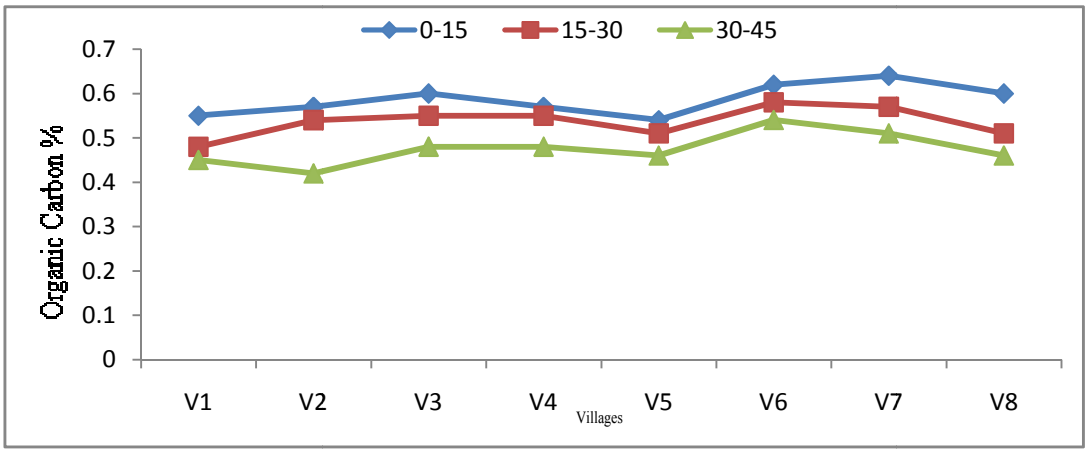

Fig. 3 : Soil Organic Carbon (%) at different depths (0-15, 15-30 and 30-45 cm) of different villages of Korba district Chhattisgarh/ India

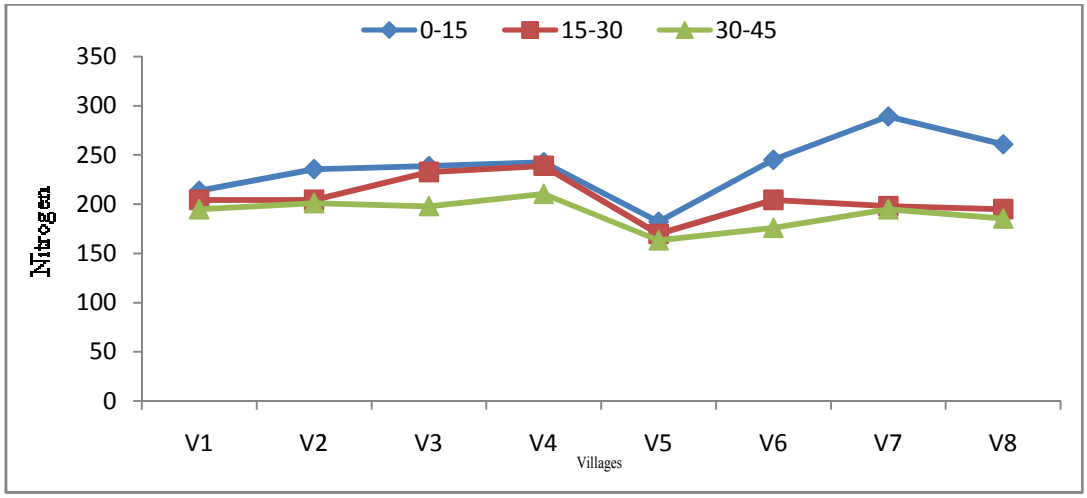

Fig. 4 : Available Nitrogen (Kg ha^{-1}) at different depths (0-15, 15-30 and 30-45 cm) of different villages of Korba district Chhattisgarh/ India

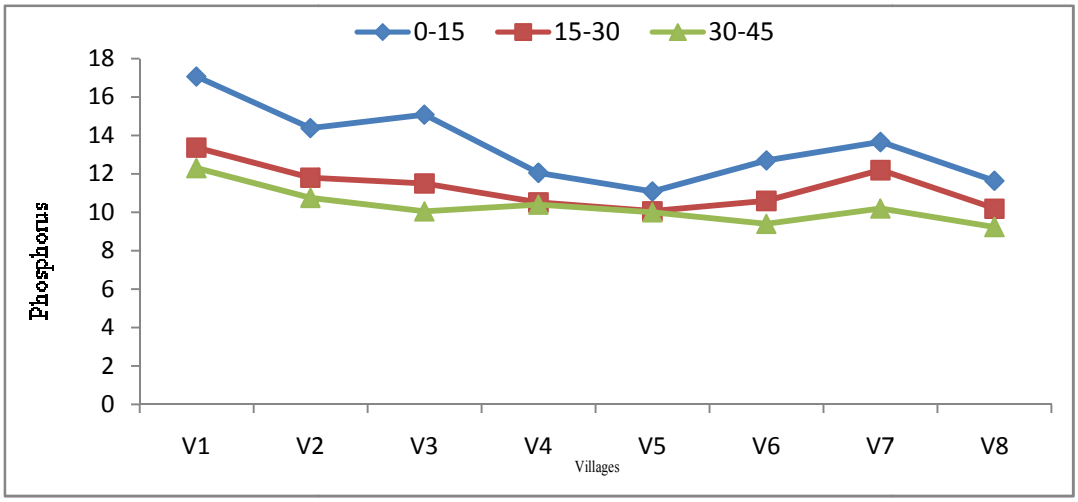

Fig. 5 : Available Phosphorus (Kg ha^{-1}) at different depths (0-15, 15-30 and 30-45 cm) of different villages of Korba district Chhattisgarh/ India

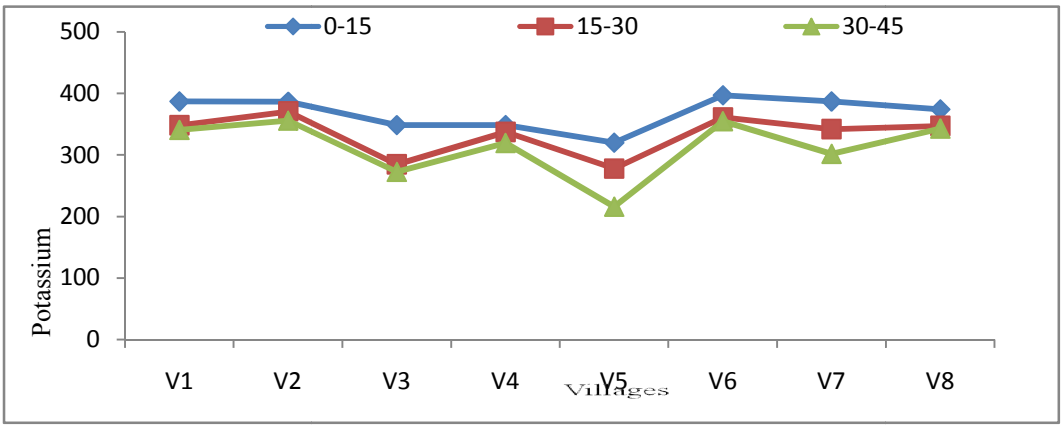

Fig. 6 : Available Potassium (Kg ha^{-1}) at different depths (0-15, 15-30 and 30-45 cm) of different villages of Korba district Chhattisgarh/ India.

Table No 1 SOIL FERTILITY PARAMETERS OF THE SOILS SAMPLE UNDER STUDY

Sample .N0	Village	Different depth	pH	EC dSm-1	OC %	Available nutrients (Kg/ha)		
						N	P	K
1	Ompur	0-15	7.04	0.21	0.55	213.76	17.06	387.00
2	Ompur	15-30	7.07	0.15	0.48	204.33	13.36	348.11
3	Ompur	30-45	6.96	0.10	0.45	194.9	12.3	340.70
4	Rajgamar	0-15	6.88	0.35	0.57	235.77	14.38	386.40
5	Rajgamar	15-30	6.81	0.29	0.54	204.33	11.8	370.60
6	Rajgamar	30-45	6.76	0.22	0.42	201.19	10.76	355.90
7	Kerakachhar	0-15	7.17	0.23	0.6	238.91	15.08	348.51
8	Kerakachhar	15-30	7.09	0.16	0.55	232.62	11.5	84.90
9	Kerakachhar	30-45	7.02	0.11	0.48	198.04	10.05	272.50
10	Patrapali	0-15	7.14	0.27	0.57	242.6	12.06	384.40
11	Patrapali	15-30	7.15	0.19	0.55	238.91	10.51	337.20
12	Patrapali	30-45	7.05	0.28	0.48	210.62	10.4	319.60
13	Tuman	0-15	7.07	0.37	0.54	182.33	11.09	320.00
14	Tuman	15-30	7.21	0.17	0.51	169.75	10.06	278.00
15	Tuman	30-45	6.97	0.27	0.46	163.46	10	216.00
16	Khodri	0-15	6.91	0.32	0.62	245.2	12.7	397.00
17	Khodri	15-30	6.87	0.3	0.58	204.33	10.6	361.00
18	Khodri	30-45	6.80	0.16	0.54	176.04	9.4	355.00
19	Sirki	0-15	6.67	0.3	0.64	289.21	13.66	387.00
20	Sirki	15-30	6.63	0.29	0.57	198.04	12.19	342.00
21	Sirki	30-45	6.03	0.18	0.51	194.9	10.2	301.90
22	Jatga	0-15	7.41	0.28	0.6	260.92	11.64	374.10
23	Jatga	15-30	7.31	0.22	0.51	194.9	10.19	347.00
24	Jatga	30-45	6.99	0.14	0.46	185.47	9.24	343.00

Table 2 Interpretation of soil properties (Reference :MMSOIL-Gov.of India-2011[3].

Parameters		Interpretation
pH	<4.6	Extremely acidic
	4.6-5.5	Strongly acidic
	5.6-6.5	Moderately acidic
	6.6-6.9	Slightly acidic
	7	Neutral
	7.1-8.5	Moderately alkaline
	>8.5	Strongly alkaline
EC dSm^{-1}	0-2	Salt free
	4-8	Slightly saline
	8-15	Moderately saline
	>15	Highly saline
OC %	< 0.5	Low
	0.5-0.75	Medium
	>0.75	High

Table 3 : Permissible limit of the chemical properties.

Properties	Very low	Low	Medium	High
Available Nitrogen in soil (kg ha^{-1})	-	<250	250-500	>500
Available Phasphorus in soil (kg ha^{-1})	0-10	11-20	21-40	>40
Available Potassium in soil (kg ha^{-1})	0-50	51-100	101-250	>250

Source : Soil Plant and Water Analysis [4].

CONCLUSION

The conclusion from the results under study of chemical parameters of soil samples in different villages of korba district of chhattisgarh was characterized under moderately acidic to moderately alkaline in

reaction and salt free in electrical conductivity. The organic carbon level exhibited under medium range. The soil samples of that area showed low to medium level in available N, very low to low status of P content and medium to high level of K status . Therefore, attention and regular monitoring required for the soil to yield high crop production.

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