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Evaluation Nutrient Index by Using Organic Carbon to Determine Soil Fertility Status of Kurkheda Tahsil of Gadchiroli District, Maharashtra (India)

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ABSTRACT

Soil is an important natural resource on the earth. The present paper deal with the study of evaluation nutrient index by using organic carbon and to determine soil fertility status of Kurkheda tahsil of Gadchiroli district. Spatial distributions for chemical properties were examined in the soil samples of selected agriculture fields in ten different location of Kurkheda tahsil. It is observed that soil organic carbon content of soil samples was in the range of 0.54 to 0.82 and majority of the soil samples belongs to nearly high level as per the nutrient index (2.30).
Keywords: Nutrient index, soil organic carbon, Kurkheda tahsil, soil fertility.

I. INTRODUCTION

Soil is a vital natural resource, that is nonrenewable on the human time scale and it is a living, dynamics, natural body that play money key role in terrestrial ecosystem. (Jenny 1980). The earth's soil cover is one of the main reservoirs of organic carbon in biosphere. In accordance with long –term international strategies (IPPC, 2001). It is essence of life and health for the well-being of mankind and animals and major sources of most of our food production. The maintains of soil health of soil health is essential for sustained productivity of food, the decomposition of waste, storage of heat, sequestration of carbon and the exchange of gases. However, only limited area of the soil can actually be used for growing food and when improperly managed. It can be eroded, polluted or even destroyed. (Brandy and Weill, 2000).

Historically, few former used chemicals, but maintains soil fertility by allowing long fallow period. Today, former have increased uses of chemical fertilizer and herbicides, and follow cycles have decreased or disappeared, with the continued use of the land becoming more frequent (Zhang and Zhang, 2007). Frequently, loss of productivity has been related to the loss soil organic matter (SOM) and stored nutrients that result from cultivation (Juo, et al, 1996). Hence an understanding of the distribution of the soil properties at the fields scale is important for refining agricultural management practices and assessing the effect of agricultural on environment quality (Cambardella et al, 1994). If cropping is continued over a period at a time without nutrients being restored to the soil, its fertility will be reduced and crop yields will decline poor soil fertility conceives spare plant cover, which promote erosion vulnerability. This happens becomes 90% of plants available N and S, 50-60% K, 25-30% P and almost 70% of micronutrients residue in organic matter (Stevenson, 1982).

The addition of manure, compost, fertilizer, mulch and lime. Hence, soil testing will determine the current status and provide the information regarding nutrients availability in soil which form the basis for fertility recommendation for maximizing crops yields and further to maintain optimum fertility in the soil year after year.

II. METHOD AND MATERIALS

2.1 Study site:

The investigated carried out at lowland experimental fields of Kurkheda tahsil of Gadchiroli district, Maharashtra (India) for the period of three year (2014, 2015 and 2017) starting from pretransplanting period (June) till post harvest period (December). The geographical position of the study site at lies between 19 to 21 degree North Latitude and 80 to 81 degree East longitude.

2.2 Soil Sampling:

Soil sampling is perhaps the most vital step for analysis. Due to care was taken to collect the soil sample since it was Guideline from soil sampling as lard down by Indian Council of Agriculture Research (ICAR) were strictly followed. Ten Soil samples were collected aseptically from the surface (0-15 cm) from the Kurkheda tahsil, Gadchiroli district. The composite samples were collected. Where in 5 soil samples were taken from each field (four from corner + one from center). These five samples were thoroughly mixed, grinded and sieved from 0.2 mm mesh sieve (Jayant Company). Then dried and stored in clean polythene bag. Soil organic carbon was estimated by walkley and black titration method. (C.S. Piper, (1966) and M.L. Jackson, (1973).

III. RESULT AND DISCUSSION

3.1 Soil Analysis:

The analytical results of organic carbon analyzed in the soil samples from the study area are presented in Table 1.

Table 1. Analysis of soil Organic carbon of Kurkheda tahsil.

Mean	OC (%)				Sample Code	Sr. No.
	2016 (Nov- Dec)	2016 (May-June)	2015 (Nov-Dec)	2015 (May-June)		
0.55	0.53	0.62	0.51	0.55	Ku-1	1
0.67	0.67	0.71	0.63	0.67	Ku-2	2
0.60	0.63	0.69	0.51	0.58	Ku-3	3
0.78	0.76	0.81	0.78	0.79	Ku-4	4
0.79	0.79	0.83	0.75	0.81	Ku-5	5
0.54	0.55	0.58	0.52	0.54	Ku-6	6
0.60	0.59	0.64	0.57	0.62	Ku-7	7
0.72	0.74	0.77	0.69	0.71	Ku-8	8
0.82	0.82	0.87	0.77	0.82	Ku-9	9
0.62	0.59	0.65	0.61	0.64	Ku-10	10

3.2 Nutrient index:

To evaluate the soil fertility status of Kurkheda Tahsil of Gadchiroli district with respect to organic. Were calculated based on the specific rating chart (Table 2) representing chart followed to the rate the soil analysis result and criteria to calculate nutrient index respectively.

3.3 Organic Carbon (OC):

Table 2. Rating chart of soil test values and their nutrient indices:

High	Medium	Low	
Above 0.75	0.5-0.75	Below 0.5	**Range (%)**
III	II	I	**Nutrient index**

The nutrient index in soil was evaluated for the soil samples analyzed using the following formula:

Nutrient index =

$$\frac{(1\times \text{No. of sample in low range})+(2\times \text{No. of sample in medium range})+(3\times \text{No. of sample in high range})}{\text{Total no. of sample}}$$

$$= \frac{(1\times 0)+(2\times 7)+(3\times 3)}{10}$$

= **2.30**

Table 3. Nutrient index with range and remarks.

Remarks (OC)	Range	Nutrient index
Low	Below 1.67	I
Medium	1.67-2.33	II
High	Above 2.33	III

3.4 Percentage of organic carbon (OC) and Percentage of Organic Matter (OM):

The important of organic matter in the soil is implied in the identification of soil, which recognizes fertility status of the soil, as a unique feature distinguishing soil from the parent rock / other non-fertile soil. It increases the soil fertility / nutrient status and control erosion and runoff of the soil and water, besides it is a major determinant of improved soil structure, moisture content and general nutrient status of the soil. The percentage of organic carbon ranged from 0.54 to 0.82 in the study area (Table No.1). Depending upon the organic carbon content (%), the quality of soil may be graded as low, medium and high. In the Kurkheda tahsil, 0.00 % of the soil sample showed low percent organic carbon (< 0.50 %). Majority, 70% soil samples showed in medium range and 30 % soil samples showed in high range. (Table 4) and it is necessary to apply organic wastes as an important source of nutrient to these agricultural fields.

Table 4. Classification of soil quality based on organic carbon content

Percentage of sample	No. of Sample	Name of Sample	Rating	Range of OC	Sr. No.
00%	00	Nill	Low Range	(< 0.50 %)	1
70%	07	Ku-1, Ku-2, Ku-3, Ku-6, Ku-7, Ku-8, Ku-10	Middle Range	(0.50 To 0.75%)	2
30%	03	Ku-4, Ku-5, Ku-9	High Range	(> 0.75 %)	3

IV. CONCLUSION

In the Kurkheda tahsil of Gadchiroli district, the overall quality of soil in the study area appears to be very fertile except for certain parameters. It is observed that soil organic carbon content of soil samples was in the range of 0.54 to 0.82 and majority of the soil samples belongs to nearly high level as per the nutrient index (2.30).

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