CORRELATION OF SOIL ORGANIC CARBON WITH PH IN SOIL SAMPLES OF MULCHERA TEHSIL OF GADCHIROLI DISTRICT, MAHARASHTRA (INDIA)

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A B S T R A C T

Soil organic carbon plays an important role for the enhancement of crop in the agricultural field. For the same context the ten soil samples were collected from Mulchera tehsil of Gadchiroli District (M.S.) for the sessions 2015-16 and 2016-17 before and after the paddy crop season. All the samples are analyzed for the parameter such as soil organic carbon and pH. The correlation between soil organic carbon and pH was studied. It is observed that soil organic carbon shows, medium positive correlation with pH (r = 0.317*) and the result is not significant at p < 0.05.

Key words: Soil Organic carbon, Correlation, Mulchera Tehsil, Gadchiroli District, Maharashtra State.

Introduction

Soil carbon is an important attribute of soil quality and its productivity. The soil quality is define as, “the capacity of a soil to function, within ecosystem boundaries, to sustain biological productivity, improve environmental quality and support human and plant health”. Soil quality cannot be measured directly but inferred indirectly by measuring soil physical and chemical properties which serve as quality indicators [(1)]. However; soil properties do have different degrees of influence on soil quality. The soils native ability to supply sufficient nutrients has decreased with higher plant productivity levels associated with increased human demand for food. Therefore one of the greatest challenges today is to develop and implement soil, crop and nutrients management technologies that enhance the plant productivity and the quality of soil, water and air. If we do not improve the production capacity of our fragile soils, we cannot continue to support the food and fibre demands of our growing population [(2)]. Soil organic matter is not only important for maintenance of the soil physical conditions but it also supplies essential plant nutrients for successful crop production.

Soil characterization in relation to evaluation of fertility status of the soils of an area is an important aspect in context of sustainable agricultural production [(3)]. Periodic assessment of important soil physical, chemical and biological properties and their responses to changes in land management is necessary to apply appropriate agricultural technologies and effective design of soil fertility management techniques; and to improve and maintain fertility and productivity of soil [(4)].

Soil fertility plays a key role in increasing crop production in the soil. It comprises not only in supply of capability. Moreover fertility of soil is subject to man's control. The evaluation of soil fertility includes the measurement of available plant nutrients and estimation of capacity of soil to maintain a continuous supply of plant nutrients for a crop. The availability of nutrients depends on various factors such on types of soils, nature of irrigation facilities, pH and organic matter content [(5)].

In the present work, an attempt has been made to estimate soil organic carbon status in before and after rice based cropping system (before Sowing and after cutting of crop) and to correlate the organic carbon status with soil pH,

for the ten samples collected for Mulchera tehsil of Gadchiroli district.

Materials and Methods:

- **Study Area:** Mulchera is one of the tehsil of Gadchiroli District in Maharashtra. The Mulchera tehsil has between latitude 19.66 and longitudes 79.99. Mulchera tehsil is situated 90 km away from Gadchiroli city. Mulchera tehsil is less densely populated by human community and having thick forest, having rich biodiversity with numerous flora and fauna. Similarly it consist number of lakes, rivers and tributaries. The soil of the tehsil is rich in minerals, commonly found laterite type of soil and rice is the main crop of this tehsil.

  Soil Sampling: The study was carried out in 10 villages namely Mulchera, Sundernagar, Gomani, Ganeshnager, Kotari, Mohurli, Ambela, Shrirampur, Harinager and Koperalli. The soil samples were taken from 15 cm depth with the help of auger of 20 sites were randomly selected in each form; soil sampling was done in a zigzag pattern within each field and mixed thoroughly following a standard procedure for soil sampling and sample preparation (Andreas and Berndt, 2005). All the collected samples were air dried in shade, crushed gently with pestle and mortar, and then sieved through 2.0 mm sieve to obtain a uniform soil sample. The samples were analyzed for determination of soil organic carbon (OC), soil pH, electrical conductivity (EC) and Calcium Carbonate ($CaCO_3$) followed as per guidelines given by Indian Council of Agriculture Research (ICAR).

Table 1: Table showing sample survey numbers and villages

Sr. No.	Sample Code	Villages	Survey No.
1	Mu-1	Mulchera	168 [31]
2	Mu-2	Sundernager	122 [93]
3	Mu-3	Gomani	107 [111]
4	Mu-4	Ganeshnager	59 [37]
5	Mu-5	Kotari	75 [22]
6	Mu-6	Mohurli	68 [1]
7	Mu-7	Ambela	23 [14]
8	Mu-8	Shrirampur	10 [75]
9	Mu-9	Harinager	8 [81]
10	Mu-10	Koperalli	14 [68]

Mu- Mulchera tehsil

Table 2: Methods used for analysis of soil parameters-

Sr. No.	Parameters	Methods	References
1.	Organic Carbon	Combustion	7
2.	Soil pH	Water extract (1:2.5)	8

Results and Discussion: In the present study agricultural soil organic carbon from rice based cropping systems was evaluated and compared. Total ten (10) soil samples, before sowing and after cutting the crop for the seasons 2015-16 and 2016-17 were studied of Mulchera tehsil of Gadchiroli District (M.S.).

Result of the present study includes estimation of soil organic carbon (%) and pH present in soil from all selected sites of Mulchera tehsil.

To estimate the status of soil organic carbon, and soil pH from soil of Mulchera tehsil of Gadchiroli district before and after the cutting crop.

Table 3: Showing the results of percentage organic carbon of soil from paddy field-

Sr. No	Sample Code	OC (%) (Jun.-2015)	(Dec.-2015)	(Jun.-2016)	(Dec.-2016)	Mean
1	Mu-1	0.92	0.86	0.94	0.89	0.90
2	Mu-2	0.81	0.78	0.89	0.86	0.83
3	Mu-3	0.42	0.41	0.45	0.43	0.42
4	Mu-4	0.84	0.79	0.87	0.86	0.84
5	Mu-5	0.41	0.39	0.49	0.44	0.43
6	Mu-6	0.34	0.33	0.37	0.35	0.34
7	Mu-7	0.48	0.41	0.51	0.47	0.46
8	Mu-8	0.57	0.53	0.61	0.56	0.56
9	Mu-9	0.74	0.71	0.75	0.74	0.73
10	Mu-10	0.59	0.54	0.65	0.63	0.60

Table 4: Tabulated formats of range of organic carbon in soil-

Range of Organic Carbon	Name of Samples	Number of Samples
Low Range **(< 0.50 %)**	Mu-3, Mu-5, Mu-6, Mu-7	04
Middle Range **(0.50 to 0.75%**	Mu-8, Mu-9, Mu-10	03
High Range **(> 0.75 %)**	Mu-1, Mu-2, Mu-4	03

In the ten samples, the variation of Organic carbon in Jun. 2015 is from 0.34% to 0.92%. The variation of organic carbon in Dec. 2015 is from 0.33% to 0.86%. The variation of organic carbon in Jun. 2016 is from 0.37% to 0.94%. The variation of organic carbon in Dec. 2016 is from 0.35.to 0.89 and out of ten samples, four samples were in low range, three samples in middle range and three samples in high range were found as shown in Table 4.

Table 5: Showing the results of pH of soil from paddy field-

Sr. No.	Sample Code	pH (Jun.-2015)	(Dec.-2015)	(Jun.-2016)	(Dec.-2016)	Mean
1	Mu-1	7.12	7.13	7.17	7.10	7.12
2	Mu-2	7.23	7.20	7.28	7.14	7.21
3	Mu-3	6.89	6.79	6.83	6.78	6.83
4	Mu-4	7.01	6.97	7.05	6.93	6.99
5	Mu-5	7.18	7.10	7.19	6.90	7.1
6	Mu-6	6.98	6.87	6.94	6.81	6.89
7	Mu-7	6.97	6.79	6.99	6.73	6.88
8	Mu-8	6.51	6.43	6.57	6.41	6.47
9	Mu-9	7.12	7.13	7.27	7.11	7.17
10	Mu-10	7.15	7.13	7.17	7.10	6.12

In the ten samples, the variation of pH in Jun. 2015 is from 6.11 to 7.23. The variation of pH in Dec. 2015 is from 6.43 to 7.20. The variation of pH in Jun. 2016 is from 6.57 to 7.27. The variation of pH in Dec 2016 is from 6.41 to 7.14 were found .

Correlation of soil organic carbon with soil pH by using statistical analysis Pearson Correlation Coefficient (r)-

Figure 1: Correlation in between organic carbon with pH of paddy field soil of Mulchera tehsil.

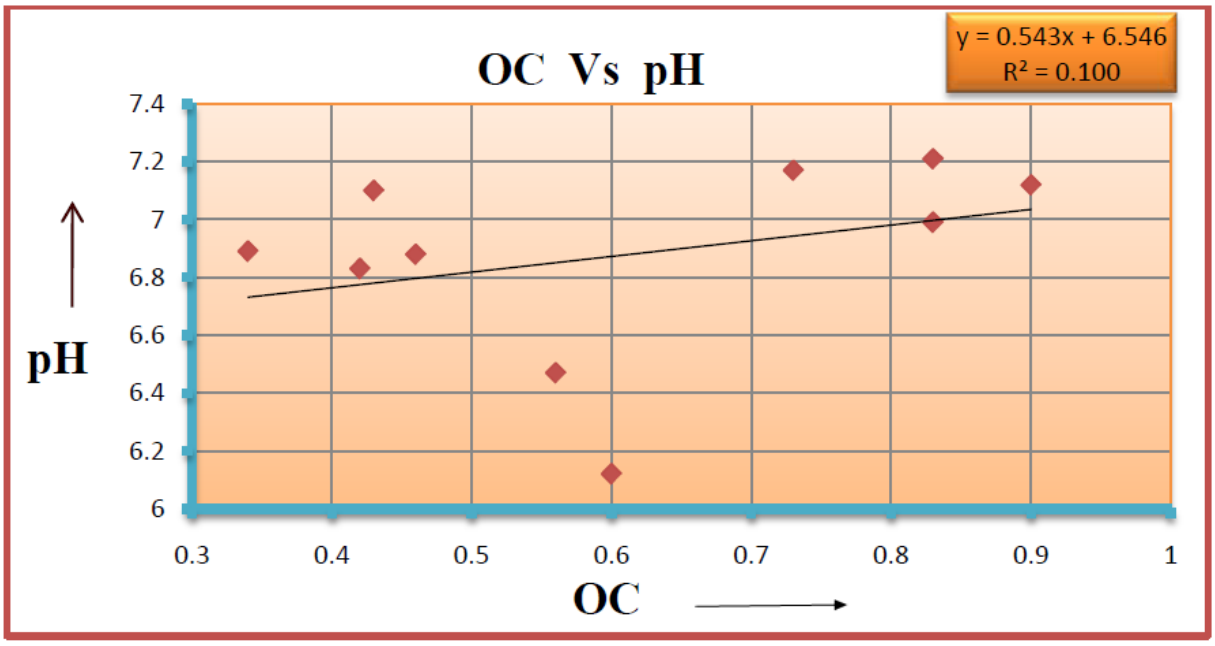

Table 6: Interpretation for correlation between organic carbon and pH-

Variables	Mean	SD	r	P Value	Level of Significance at 5%
X (OC)	0.61	0.19	0.317	0.3712	P < 0.05
Y (PH)	6.878	0.325			

*Significant at 5 % level.

It is observed from table 6, there is a low positive correlation between organic carbon and pH by having correlation value of (r = 0.317*). The P value is 0.3712, the result is not significant at P<0.05 for r = 0.317*.

Conclusions

Soil organic carbon and pH of soil were analyzed for ten samples of Mulchera tehsil of Gadchiroli District. For organic carbon, four samples found in low range, three samples found in middle range and three samples in high range in study area. The variation in pH ranges from 6.11 to 7.27 which is slightly acidic to neutral in nature. The correlation in between organic carbon with pH of paddy field soil of Mulchera tehsil showed that, medium positive correlation (r = 0.317*), The result is not significant at $p < 0.05$.

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