THE CHROMIC ACID OXIDIZABILITY OF DIFFERENT ORGANIC MATTER FRACTIONS IN SOILS

The most widely followed method for the determination of the organic matter content of a soil is by the quick titration method due to Walkley and Black (1934) in which the organic matter is oxidised by chromic acid. Organic carbon estimated by this method is multiplied by the factor 1.72 to obtain the organic matter content. The assumption is made in this method that organic matter contains on an average 58% C and that all classes of soil organic compounds are equally susceptible to oxidation by chromic acid. In order to test the validity of this assumption the total organic matrer in the surface layers of four Kerala soils was determined by fractionating their organic matter contents using the method of Waksman and Stevens (1928) and then adding up the percentages of the different fractions, such as ether and alcohol :xtractives, water solubles, hemicellulose, cellulose, proteins and lignin. Organic carbon in the soils was determined by the quick titration method. The ratio of organic matter to organic carbon was calculated in each case and the results are given in Table 1.

Table   1

Ratios of organic matter to organic carbon in different soils

SI. No.	Locality	Total org. matter (sum of diff. fractions) %	Organic carbon %	Organic matter / Org. G
1.	Purakad	25.9	9.9	2.62
2.	Thottapally	19.8	8.8	2.25
3.	Changanacherry	10.6	4.4	2.41
4.	Konni	11.6	5.6	2.07
	Mean			2.34

In another experiment the carbon contents of the ether and alcohol extractives separated from a soil were determined by the quick titration method and the ratios of the weights of the fractions to the organic carbon contents were calculated. The results are given in Table 2.

The results in Table 1 show that the ratio of organic matter to organic carbon as determined by Walkley and Black's method ranges from 2.07 in the

Table 2

Ratios of the ether and alcohol extractives of a soil to their organic carbon contents as determined by the quick titration method

(Mean of four estimations)

Organic fraction	Wt. of extract mg	Wt. of carbon mg	% of C in the extract	Org matter $\frac{\text{Org matter}}{\text{Org. C}}$
Ether extractives	45.4	30.8	67.8	1.47
Alcohol solubles	54.6	12.3	22.5	4.58

soil from Konni to 2.62 in the soil from Purakad with an average of 2.34. This figure is appreciably higher than the conventional factor of 1.72 used for the conversion of organic carbon to organic matter. The data in Table 2 indicate that the carbon content as determined by chromic acid oxidation varies with the nature of the organic compounds. Thus the ether extract is found to have an average carbon content of 67.8% as against 22.5 for the alcohol solubles. The organic matter to organic carbon ratio for ether solubles is 1.47, while for alcohol solubles it is 4.58. Such variations are evidently due to the differences in the composition and the chromic acid oxidizability of the organic compounds present in the soils.

REFERENCES

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