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Note on the comparison of some methods of organic carbon estimation in soils

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The common methods employed for the determination of organic carbon in soil are either titrimetric (Walkley-Black) or colorimetric (Graham, 1948; Datta *et al.*, 1962) based on the principle of reduction of chromic acid by oxidizable organic matter. Since information on the relative precision of the colorimetric and Walkley-Black methods is not available, the present investigation was undertaken in some arecanut-growing soils. The effect of grinding soil samples to 12- and 100-mesh on the carbon values determined by photometric methods was also studied.

Twelve soil samples from depth ranging from 0 to 25 cm were collected from Vittal (South Kanara, Mysore), Hirehalli (Tumkur, Mysore), Peechi (Trichur, Kerala), Mohitnagar (Jalpaiguri, West Bengal) and Kahikuchi (Gauhati, Assam), where arecanut is extensively grown. Each sample was divided into 2 lots, one was passed through a 12-mesh sieve and the other through a 100-mesh sieve. Organic carbon was colorimetrically estimated in the samples of both the mesh sizes, and 100-mesh

samples only were used for the Walkley-Black method. Paired 't' test was employed to find out the differences, if any, in the carbon values among the following methods: (a) Datta *et al.* and Walkley-Black in 100-mesh samples, (b) Graham and Walkley-Black in 100-mesh samples, (c) Datta *et al.* and Graham in 100-mesh samples. (d) Datta *et al.* in 12- and 100-mesh samples, and (e) Graham in 12- and 100-mesh samples. Standard curves for both the colorimetric procedures were prepared with anhydrous A. R. sucrose. The green chromous colour was read in a Klett-Summerson colorimeter with a red filter both for standards as well as for soil samples.

The organic carbon range, along with the pH and texture of soils from 5 different centres estimated by 3 methods, are given in Table 1. The data in Table 2 show that except in the samples of Mohitnagar, the carbon values of soil groups determined on 12- and 100-mesh sizes differed significantly in both the colorimetric methods. Soils passed through 100-mesh showed carbon values higher than

Table 1. Texture, pH and organic carbon range of soils of major arecanut region

Location	Texture	pH	Walkley-Black 100-mesh	Datta <i>et al.</i>		Graham	
				100-mesh	12-mesh	100-mesh	12-mesh
Vittal	Sandy loam	4.5-6.0	0.45-1.77	0.56-1.91	0.22-1.36	0.41-1.96	0.28-1.41
Hirehalli	Clay loam	5.5-8.0	0.63-2.07	0.61-2.45	0.41-2.16	0.70-2.22	0.40-1.74
Peechi	Loam	3.5-5.9	1.25-2.56	1.54-2.63	1.24-2.35	1.28-2.46	0.98-2.28
Mohitnagar	Loam	5.0-6.3	0.39-2.59	0.48-2.61	0.41-2.41	0.34-2.56	0.28-2.20
Kahikuchi	Sandy loam	4.8-6.3	0.48-1.34	0.60-1.66	0.39-1.54	0.44-1.28	0.36-1.28

Table 2. 't' values of organic carbon in different soils

Method	Location	Vittal	Hirehalli	Peechi	Mohitnagar	Kahikuchi
100-mesh vs 100-mesh Datta <i>et al.</i> vs Walkley-Black	Walkley-Black	8.852***	3.065**	1.103 NS	1.646 NS	6.401***
100-mesh vs 100-mesh Graham vs Walkley-Black	Walkley-Black	1.133 NS	2.689*	1.295 NS	1.133 NS	4.432**
100-mesh vs 100-mesh Datta <i>et al.</i> vs Graham	Graham	3.518**	0.331 NS	1.499 NS	1.877 NS	0.984 NS
100-mesh vs 12-mesh Datta <i>et al.</i> vs 12-mesh	12-mesh	17.421***	9.960***	11.467***	2.163 NS	4.721***
100-mesh vs 12-mesh Graham vs 12-mesh	12-mesh	11.787***	7.374***	11.148***	0.590 NS	3.230**

*Significant at 5 per cent level of probability; **significant at 1 per cent level of probability; ***significant at 0.1 per cent level of probability.
NS, non-significant.

those passed through 12-mesh (Bhat and Mohapatra, 1971).

In the soils of Vittal, Hirehalli and Kahikuchi, the organic carbon contents of soils as determined by the method of Datta *et al.* significantly differed from those of Walkley-Black procedure (Table 2). In Graham's method, such a difference was noted with the soils from Hirehalli and Kahikuchi. There were no significant differences between the carbon values measured by the methods of Datta *et al.* and Graham for the most of the soil groups under study.

A major problem confronted with the method of Datta *et al.* was the formation of needle-shaped red chromic oxide crystals. This was overcome when the soil suspension was centrifuged immediately after the reaction time of 30 min. Graham's method appears to be more

handy and trouble-free than the procedure of Datta *et al.* for the colorimetric estimation of organic carbon in the soil.

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Note on the inheritance of style thickness in a cross of tomato (*Lycopersicon esculentum* Mill.)

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Style thickness is one of the important considerations in seed parents used for cheaper production of hybrid seed in tomato (*Lycopersicon esculentum* Mill.). The mode of inheritance and different genetic parameters needed in breeding programmes for this character are yet not known, which has been the purpose of the present study.

Two homozygous varieties, thick-styled (0.550 mm) 'Marglobe' and thin-styled (0.292 mm) 'Pusa Red Plum', were crossed to produce the F_1 ('Marglobe' × 'Pusa Red Plum'), F_2 , back-cross 1 and back-cross 2 generations. Seventy-two plants of each parent and the F_1 , 44 plants of back-cross generations and 116 plants of the F_2 were planted in a randomized-block design with 6 replications.

Genotypic variances were highly significant. This shows the genetically determined nature of style thickness. Heterosis in style thickness from mid-parent was negligible (0.47 per cent) and non-significant (0.0020 ± 0.0052 , $t=0.384$). Style diameter of the F_1 (0.423 mm) was significantly less from the superior parent (0.550 mm) also (-0.1270 ± 0.0059 , $t=$

21.525). This shows the additive genetic determination of the character. There were some transgressive segregants in the F_2 generation marked with still thinner styles (0.240 mm), which show that there are certain recessive genes or gene in 'Marglobe' also. Phenotypic and genotypic variances and coefficients of variabilities were maximum in the F_2 , followed by the back-cross 1.

Gene effects, d (0.0971 ± 0.0059), \hat{h} (0.1798 ± 0.0153), i (0.1778 ± 0.0144), j (-0.0638 ± 0.0132) and l (-0.1396 ± 0.0272) as estimated by the method of Jinks and Jones (1958) were highly significant. Duplicate epistasis was involved besides additive, dominant, additive × additive, and additive × dominant gene actions. Since additive × additive interaction is inherited as additive component in the next generation, breeding for thicker style may not be adversely affected by such gene actions.

Heritability in broad sense as estimated by the methods of Weber, Burton, Mahmud and Kramer, Gotoh, Hepler *et al.* and Chaudhary (Chaudhary, 1970) gave 60.62, 61.51, 60.15, 55.18, 57.27 and 60.93 per cent heritability estimates respectively. The method of Warner (1952), which estimates

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