

A preliminary note on the influence of cultural practices on some physical characteristics of the soil of a coconut plantation

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INTRODUCTION

ACCORDING to popular conception, soil fertility is related to the availability of plant nutrients in the soil, but in reality it is the sum total of all those physical and chemical characteristics which have measurable effects on the productive capacity of the soil. In fact, even though a soil may be rich in plant nutrients, it may not sustain a good crop simply because of its bad physical characteristics. On the other hand, a soil in good heart will enable maximum benefit to be derived out of fertilisation. Soil physical properties are thus of great importance in relation to soil fertility.

The physical properties of a soil are intimately connected with its structure which is usually described in terms of the size and shape of aggregates and their stability. The size and arrangement of soil particles have much to do

with the water and air relationships of the soil. Physical analysis is mainly concerned with the determination of soil physical properties such as water-holding capacity, pore space, permeability to water and air, colour, etc. Though texture of a soil cannot be changed, it is possible, by adopting suitable management practices, to assure the maintenance of desired structure in soils.

In the coconut, regular cultivation of coconut gardens has been seen to have spectacular beneficial effect on the yields of the palms even in the absence of manuring (Krishna Marar and Pandalai, 1959). Discussing the results, they have mentioned that the beneficial effects may be due to the increased conservation of soil moisture and that the physical properties of the soils might have also improved. Based on these observations another field trial had been laid out in 1953 to study the relative effects on yield

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of different intercultural practices such as ploughing, digging with mamotty, piling mounds, forming basins, etc. This trial which was in progress for a period of six years appeared to indicate that among the different practices tried, piling mounds is better than the others. It was felt that a study of the physical properties of the soil in relation to cultural practices was worth investigation to get a clue to the differences observed. The results of a preliminary study in this direction are presented in this note.

EXPERIMENTAL

The cultural experiment with five intercultivation treatments replicated 4 times in randomised blocks was continued from 1953 to 1959. From the experimental plots soil samples were taken to a depth of 9

inches at the rate of 5 samples per plot during the hot weather season of 1960 and was studied for various physical properties such as pore space, moisture-holding capacity, hygroscopic moisture, apparent density, specific conductivity and soil reaction (pH).

The first four physical properties were determined by the methods described by Piper (1958). The pH of the soil was determined in a 1:5 soil extract using Heiliges' comparator, specific conductivity of the sample was determined in a 1:5 soil water suspension using Mullard conductivity bridge.

RESULTS

The results of the studies carried out are summarised below.

TABLE 1.
Showing the physical characters of soil samples from the different cultural experimental plots

Physical characters examined	Control (No inter-cultivation)	Cultural operations			
		Forming basins	Forming mounds	Ploughing	Digging
Pore space %	37.47	35.30	38.06	35.41	36.17
Moisture (hygroscopic) %	1.165	0.843	1.018	1.033	0.894
Moisture holding capacity	24.81	22.57	25.69	22.61	24.04
Specific conductivity (micromhos per cm.)	68.80	79.84	81.72	79.86	63.21
Apparent density	1.470	1.516	1.469	1.567	1.538
pH	6.5	6.6	6.5	6.7	6.6

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It may be seen that in general the values for the different characters studied are maximum for 'forming mounds treatment' and minimum for 'forming basins' treatment. It, therefore, appears reasonable to conclude that the beneficial effects observed on yield in the 'piling mounds' treatment may have something to do with the improvement in some of the physical properties of the soil. How far is this a consequence of the improved physical structure of the soil, viz., crumb structure has been taken up for investigations and will form the subject matter of a future communication. This is expected to throw some light on the nature of improvement brought about. The beneficial effects of cultural practices on soil physical properties and subsequent crop yield have been referred to in recent time by several workers [Leydon, R. F. (1960), Doyle J. J. and Hamlyn, F. G. (1960); Hiltel, Dand Daberg, S. (1960); Anderson, S. and Wiklert, P. (1960); Dip. N. Ram and Zwerman, P. J. (1960) and Kusch, P.K. (1959) and Sudha Rao, K. *et al.* (1955)]

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