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Studies on the Conjoint Effect of Tillage and Soil Amendments on the Yield of Tapioca and Physical Properties of Soils

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ABSTRACT

Four tillage treatments *viz.*, 10, 20, 30 and 45 cm depths and three amendments viz., farm yard manure, rice husk and flue dust including control were tested on the yield of tapioca and the physical properties of soils where a tapioca crop was raised. The results showed that ploughing upto 10 and 20 cm depth in red sandy loam soil increased the yield of tapioca tubers besides improving permeability, porosity and aggregate stability of soils. Farm yard manure, flue dust and rice husk improved the physical properties of soils when incorporated at depths of 10 and 20 cm.

INTRODUCTION

Tillage is one of the management techniques used to provide the best possible soil environment for crop development. It is well known that the structure of soil can be modified by incorporating suitable amendments at appropriate depths. Birecki *et al.* (1961) reported that shallow tillage in black soil produced highest yield of peas, while high yield of rye required deep ploughing. Novacek (1961) observed that ploughing upto 15 cm promoted maize yield by its beneficial effect on soil structure and moisture. However, Laws (1953) found that different methods of tillage did not affect the moisture content of soil or yield of crop. Almeida (1961) also noticed a non-significant tendency of deep ploughing for obtaining higher yield. Dvoracesk and Dvoracesk (1961) reported that ploughing to 20 cm depth did not affect the total porosity of soil.

Morachan *et al.* (1972) reported that lucerne, maize straw, saw dust and oat straw, when applied to a silty clay loam increased the aggregate stability, water retention and yield of crops. Divergent views have been reported by workers on the effect of tillage and soil amendments relating the physical properties of soil and yield of crops and investigation was undertaken with tapioca in red sandy loam soil to test this concept.

MATERIALS AND METHODS

Trial was laid out under irrigated conditions in Tamil Nadu Agricultural University Farm, Coimbatore, with tapioca (*Manihot esculenta* Crantz.) variety Malavella as a test crop. A split plot design was adopted with four tillage treatments as main plot and four amendments sub plot treatments which were replicated four times. The main plot treatments of tillage treatments were 10 cm (T_1), 20 cm (T_2), 30 cm

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(T_3) and 45 cm (T_4). The subplot treatments were farm yard manure (A_1) at 250 q/ha, rice husk (A_2) at 250 q/ha, flue dust (A_3) at 50 q/ha and control (A_4). For easy and quick decomposition of rice husk, 100 kg N/ha as ammonium sulphate was mixed. The amendments were allowed to decompose for eight weeks after which Tapioca setts were planted on tridges.

Preplanting and post harvest soil samples were collected and examined for the physical properties of soils like hydraulic conductivity, porosity, and aggregate stability. The yield data of tubers were also recorded.

RESULTS AND DISCUSSION

The yield data (Table 1) indicated that ploughing upto 20 and 45 cm depths were significantly superior in increasing the tapioca tubers than 10 and 30 cm depths. This is in agreement with the findings of Novacek (1973) who had reported that ploughing upto 20 cm depth increased that yield of cereals and tuber crops. Appreciable variation in the yield of tapioca due to different amendments were not observed.

TABLE 1. Yield of tapioca tubers (kg/ha)

Amendment	Tillage				Mean
	T_1	T_2	T_3	T_4	
A_1	7080	8538	7747	7622	7747
A_2	7830	8538	7373	7455	7799
A_3	7497	8205	7497	7330	7632
A_4	7455	8996	7705	8200	8090
Mean	7465	8569	7580	7653	

S. E. = 0.928

C. D. = 2.97 (P = 0.05)

Mean yield (kg/plot)

T_1 = 16.02

T_2 = 20.28

T_3 = 16.65

T_4 = 18.34

In the tillage treatments ploughing upto 10 and 20 cm were improved the hydraulic conductivity and non-capillary porosity of red sandy loam soils (Table, 2 and 5).

TABLE 2. Hydraulic conductivity (cm/hour) — at post harvest stage

Amendment	Tillage				Mean
	T_1	T_2	T_3	T_4	
A_1	4.2	5.8	5.6	4.4	5.0
A_2	7.4	7.9	6.8	3.8	6.5
A_3	5.9	5.6	5.4	2.8	4.9
A_4	7.7	6.3	4.7	3.0	5.4
Mean	6.3	6.4	5.6	3.5	

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