

Research Note

EFFECT OF PLANTAIN CROPPING SYSTEMS ON SOME CHEMICAL PROPERTIES OF SOIL^{1,2}

Plantain cultivation is widespread in the Windward Islands (St. Lucia, St. Vincent, Grenada and Dominica) of the Eastern Caribbean. Plantains are grown mixed with a variety of short-term food crops such as maize, sweet potato, dasheen, tannia and beans and permanent fruit trees, such as mango, orange and grapefruit. However, sole plantain culture is also common on larger holdings.

Some crops affect the soil's chemical properties adversely and, thus depleting nutrients, cause an imbalance.^{3,4} On the other hand, crops improve soil fertility.⁵ The effect of a cropping system on the chemical properties of a soil thus depends upon the type of crops involved.⁶ A survey in the Windward Islands revealed that some farmers are reluctant to mix plantain with maize and sweet potato because they believe these intercrops compete with plantain for soil nutrients, thereby lowering soil fertility.

A field experiment, in split-plot design with four replications, which involved four plantain varieties as main-plots and three intercrops as sub-plots, was initiated on Soucis clay loam (Fluvaquentic Eutropepts) at the WINBAN Experimental Farm, Roseau, St. Lucia. Clean and uniform sword suckers of plantain varieties were planted April 28, 1982, spaced at 2.4 × 2.4 m. Each mat received 1.7 kg of 16:8:24 NPK mixed fertilizer in six applications in a calendar year; 7% at 30 days, 13% at 60 days and the remaining 80% in equal quantities at 90, 180, 270 and 360 days after planting. The intercrops, cowpeas at 50 × 50 cm, groundnuts at 30 × 10 cm, and dasheen at 50 × 50 cm, were planted about eight weeks after the plantains. No fertilizer was applied to these crops. The cowpeas, groundnuts and dasheen were harvested at 85, 120 and 208 days after planting, respectively. Before initiation of the experiment, the mean

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² These findings emanate from a cropping systems project funded by the International Development Research Centre of Canada.

³ Rao, M. M. and Sharma, K. C. 1976. Effect of upland multiple cropping systems and fertilizer constraints on some chemical properties of soil, *Indian J. Agric. Sci.* 46: 285-91.

⁴ Samuels, G., Beale, A. and Torres, S., 1978. Nutrient content of the plantain (*Musa*, AAB group) during growth and fruit production, *J. Agric. Univ. P. R.* 62: 178-85.

⁵ Subbaiah, K. K., Romachandra Boopathi, S. N. M. and Kolandaiswamy, S., 1980. Intercropping in Bananas, *Madras Agric. J.* 67: 712-15.

⁶ Karikari, S. K., 1980. Intercropping of plantains, cocoyams and cassava. *In* Tropical Root crops: Research Strategies for the 1980s Ottawa, Ont, IDRC, 1981, PP 120-123.

soil values to a depth of 30 cm were pH 4.6; electrical conductivity, 94 μ mhos/cm; and exchangeable K, 0.62 me/100g.

The differences in soil pH, electrical conductivity and exchangeable K due to plantain varieties were non-significant. However, the above mentioned soil chemical properties were significantly affected by the intercrops (table 1). Analyses of soil samples taken at 1, 2 and 3 months after harvesting of intercrops (except dasheen) revealed that the observed variations in soil pH and electrical conductivity were temporary. However, the exchangeable K was significantly lower under dasheen at all

TABLE 1.—*Effect of cropping systems on soil pH, electrical conductivity and exchangeable K*

Treatments	pH	E.C. <i>μmhos per cm</i>	Exchangeable K <i>me/100 g soil</i>
<i>Mainplot (plantain varieties) 9.12.82</i>			
Dwarf	4.88	62	0.55
Horn	4.85	51	0.42
Ordinary	4.82	59	0.40
Dominique	4.92	58	0.45
LSD (0.05)	NS	NS	NS
<i>Subplot (intercrops)</i>			
Cowpeas	4.92	60	0.46
Groundnuts	4.79	67	0.36
Dasheen	4.89	56	0.36
LSD (0.05)	0.07	9	0.08
<i>Mainplot (plantain varieties) 12.1.83</i>			
Dwarf	4.97	52	0.44
Horn	4.87	55	0.40
Ordinary	4.98	54	0.38
Dominique	4.92	55	0.37
LSD (0.05)	NS	NS	NS
<i>Subplot (intercrops)</i>			
Cowpeas	4.90	56	0.43
Groundnuts	4.93	54	0.44
Dasheen	4.97	51	0.33
LSD (0.05)	NS	NS	0.03
<i>Mainplot (plantain varieties) 11.2.83</i>			
Dwarf	4.75	85	0.58
Horn	4.64	90	0.46
Ordinary	4.72	74	0.40
Dominique	4.73	75	0.53
LSD (0.05)	NS	NS	NS
<i>Subplot (intercrops)</i>			
Cowpeas	4.77	84	0.50
Groundnuts	4.69	83	0.59
Dasheen	4.67	76	0.40
LSD (0.05)	NS	NS	0.11

sampling dates, indicating that this tuber crop removes large amounts of this monovalent cation from the soil. Nevertheless, with increase in time, the exchangeable K approached the initial value (0.62 me/100 g) in different treatments.

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