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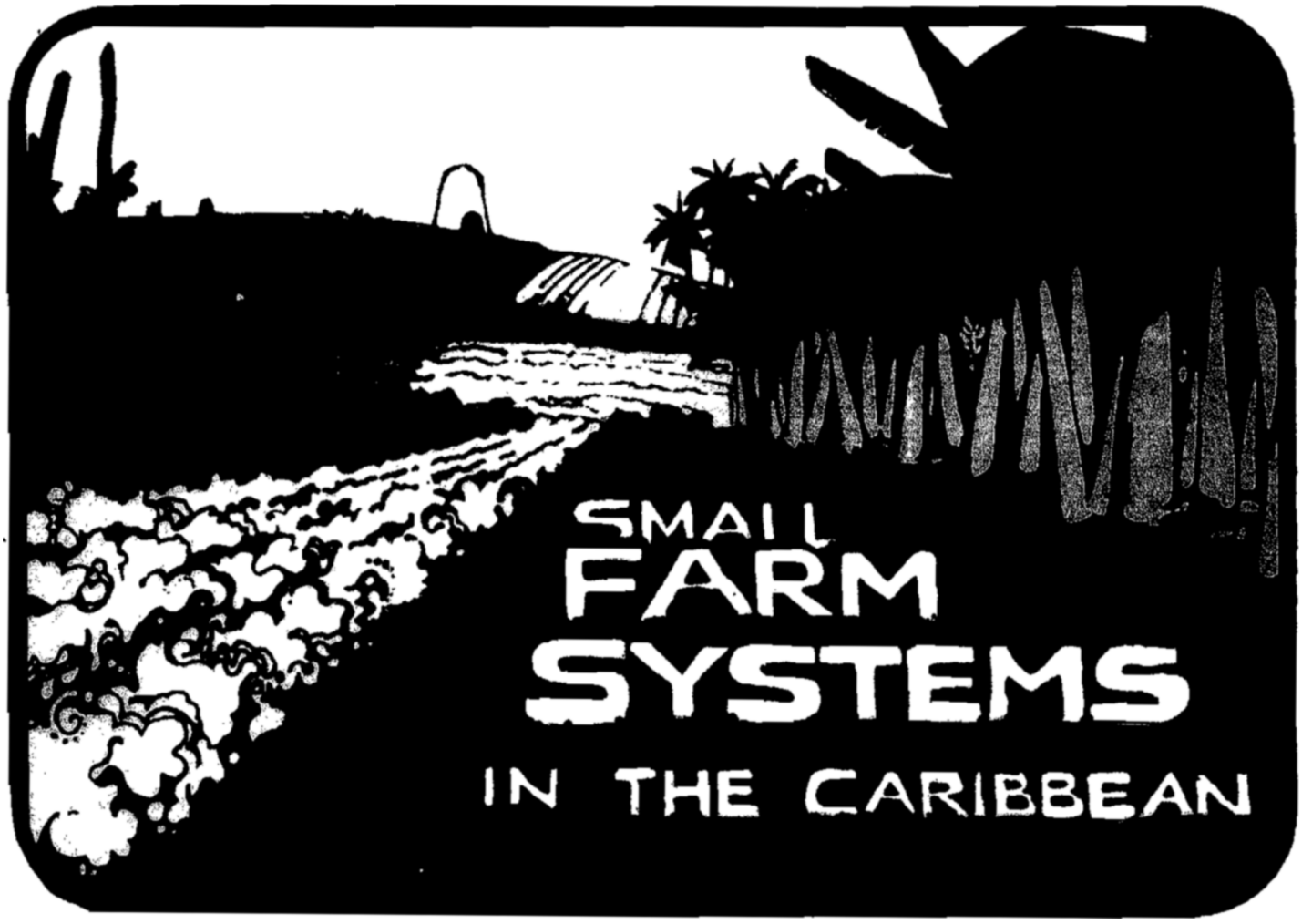

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Yield, Agronomic Characteristics and Variability of 'Regular Maricongo' and 'Dwarf Plaintains' (Musa AAB) Using Tissue-Cultured Plantlets in St. Croix, USVI

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Overall genetic reversion of 'Regular Maricongo' and 'Dwarf Plantain' using tissue-cultured plantlets was 29% both in the 1st ratoon and plant crop. Of this percentage the 'Regular Maricongo (Horn) Plantain' showed a 21% reversion to the 'Congo' or 'Tall French Plantain.' Variability in the dwarf clones was greater with 38% reversion to the 'Dwarf French'('Plátano congo enano'). The latter cultivar is unique to this area since there are no reports of its widespread occurrence in the Caribbean so far. The variant 'Dwarf French' type gave a yield of 46 tons/ha or 226,460 fruits/ha with an average of 130 fingers and 9 hands per fruit bunch. The 'Regular Maricongo' or 'Horn Plantain' yielded 14.4 tons/ha or about 61,841 fruits/ha. The Dwarf French types were the shortest plants (1.95 m) and had the thickest pseudostems (19.05 cm diam.). However, both French types, 'Tall' and 'Dwarf' apparently needed more days to flower and for maturity of bunch. The mutant 'Dwarf French Plantain,' an apparently new cultivar produced in this trial, seems to be well adapted to local conditions. Further ratoon crops are being closely monitored for yield, variability and agronomic characteristics.

Although plantains are grown in West Indian islands, substantial quantities are produced in the Dominican Republic, Haiti, Cuba and Puerto Rico (Ittyeipe, 1983). The demand for this fruit crop is high in the Virgin Islands, with almost all the local needs met by importation from neighboring islands. In an effort to boost local production, trials were initiated in St. Croix to increase acreages of plantains using tissue-cultured plantlets. Much of the published research on plantain in the Caribbean has been devoted to mineral nutrition requirements (Irizarry et al., 1981; Walmsley, 1974) and nematodes studies (Irizarry et al., 1979) with little on the feasibility of using tissue-cultured material (Berg and Bustamante, 1974).

Present research is being focused on evaluating clones under standard fertilizer and crop protection practices.

The purpose of this paper is to present an ongoing preliminary field evaluation of plantain varieties grown from cloned material.

MATERIALS AND METHODS

This study was conducted at the V.I. Agricultural Experiment Station on St. Croix, USVI. The climate is tropical, with an annual average maximum and minimum temperature of 30°C and 23°C, respectively. The average annual rainfall is 1092 mm. The soil is a Fredensborg clay loam, 25-38 cm thick with an underlying layer of limestone or marl. The soil pH ranges from 7.5 to 8.2.

The experiment was initiated in March 1982 using stage 3 plantlets of 'Maricongo' and 'Dwarf Plaintain,' two granular nematicides, and Diazinon 2E as a soil drench. Plantlets were shipped into St. Croix from Oglesby Nursery of Holiday, Florida. Field preparations consisted of ploughing, discing and incorporating 3.5 kg of well-rotted poultry manure in the planting holes. Experimental plots had six plants of each cultivar spaced at 1.8 m × 3.0 m to give an approximate density of 1742 plants/ha. Three nematicide treatments were replicated three times in a completely randomized design. The nematicides used were Temik (aldicarb) 10% G and Furadan (carbofuran) 5% G; Diazinon 2E was used as a soil drench to test its effectiveness for nematode control. These were incorporated at the time of planting and again ar 6, 4 and 2-month intervals respectively on the soil surface. Weeds were controlled with post-emergence application of Gramoxone at 473 cc/ha. Ammonium sulfate and muriate of potash fertilizers were applied every two months at the rate of 280 g/plant up until flowering. Six months after planting, 138 Fe Sequestrene at 9.3 g/plant was watered in around each plant, because a general foliar chlorosis had occurred. From the first ratoon appearance, a constant supply of Fe was injected through the drip irrigation system.

RESULTS AND DISCUSSIONS

Of major significance in this work, was the reversion of 'Regular Maricongo' and 'Dwarf Plantain' clones to the 'Tall French' and 'Dwarf French' plantain types respectively. A combined reversion of 29% occurred in the first two harvests. Of this, the 'Regular Maricongo (Horn) Plantain' showed a 21% reversion to the 'Congo' or 'Tall French Plantain' (Table 1). Variability in the 'Dwarf' clone was greater, with 38% reversion to the 'Dwarf French.' Variability therefore did not differ much between plant crop and first ratoon. This would indicate that further ratoon crops might be stable and true to type. As a result of reversion, four varieties of plantain were eventually evaluated instead of the two originally planted.

TABLE 1. Percent reversion of 'Horn' and 'Dwarf Plantains' in plant and first ratoon crop.

Initial Cultivar	% Reversion Plant Crop 1983	% Reversion in 1st Ratoon 1984	Average Reversion for Two Crops
'Horn Plantain' to 'Tall French'	21.5	19	21.2
'Dwarf Plantain' to 'Dwarf French'	31.2	44	37.6

TABLE 2. Yield and growth characteristics of four clonal plantains.

CHARACTERISTIC	HORN PLANTAIN 1ST HARVEST	HORN PLANTAIN 2ND HARVEST	DWARF PLANTAIN 1ST HARVEST	DWARF PLANTAIN 2ND HARVEST	TALL FRENCH 2ND HARVEST	DWARF FRENCH 2ND HARVEST
Yield (tons/ha)*	16.1	14.4	20.3	23.9	31.5	46.0
Average wt. bunch (Kg.)	9.2	8.25	11.6	13.7	18.04	26.3
Fruits/bunch	31	35.5	34.8	57	92	130
Fruits/ha	54,002	61,841	60,621	99,294	160,264	226,460
Height at shooting (m)	2.5	3.2	2.1	2.44	3.35	1.95
Stem width (cm)	15	14.2	19.6	20.83	17.8	19.05
Days to shooting	326.2	349	338.5	341.5	388	379
Days from shooting to harvest	71.4	76.4	78.2	77	84.7	99
Number of leaves at harvest	11.6	11.12	13.5	14.3	13	11.8

TABLE 3. Nutrient deficiency and disease ratings[1] of four clonal plantain varieties.

VARIETIES	IRON DEFICIENCIES[2]	K DEFICIENCIES[2]	WET ROT[3]
'Horn Plantain'	4	4	4
'Tall French'	3	2	0
'Dwarf Plantain'	2	1	0
'Dwarf French'	2	1	0

1. Visual symptoms on a scale of 1 (no deficiencies or disease) to 5 (severe deficiencies or disease).

2. Iron deficiency—chlorosis of leaf, mainly younger leaves.
Potassium deficiency—marginal chlorosis gradually moving to mid-rib, occurring mainly on older and middle leaves.

3. Pseudostem wet rot (*Erwinia* sp.)—blackening, and gradual rotting and collapse of mid-pseudostem leading to collapse of plant.

Mean yield and growth characteristics of the first two harvests of the four varieties are represented in Table 2. The French varieties are represented by only one harvest, the first ratoon, since, although reversion started in the plant crop, it was not quite distinct at that time.

Table 2 also indicates that the two French types produced relatively higher yields and more fruits per bunch than the original two varieties. The variant 'Dwarf French' outyielded the other

TABLE 4. Mean number of major nematodes extracted from 100 cc of soil from rhizosphere of plantains grown from explants and treated with nematicides.

TREATMENTS[Z]	ROOT KNOT	SPIRAL	REINIFORM	TOTAL POPULATION
FURADAN 5ZG	6	107	164	277
TEMIK 10ZG	0	82	181	263
DIAZINON 2E	3	79	192	274
CONTROL	19	108	133	260

[Z] Furadan applied at 4 month, Temik at 6 month and Diazinon at 2 month intervals. Furadan and Temik not applied during flowering and fruiting.

Nematode assays taken at 2 intervals in crop life.

Laboratory diagnosis done in cooperation with the Univ. of Georgia, Athens.

varieties, averaging 46.0 rons/ha ot 226,460 fruits/ha. It produced 130 fruits/bunch compared with 31 for the 'Horn Plantain.'

On the other hand, the 'Horn' and 'Dwarf Plantains' took less days to shooting and less days from shooting to harvest. The 'Tall French' was the tallest at shooting at 3.35 m and the 'Dwarf French' the shortest at 1.95 m. The dwarf types also had thicker pseudostems, so were more sturdy, wind resistant and required less staking.

Table 3 gives a visual rating of symptoms of nutrient deficiencies and diseases observed among the four varieties. It indicates that the 'Horn Plantain' was severely affected by iron and potassium deficiencies and pseudostem wet rot disease (*Erwinia* sp.). On the other hand, the two dwarf varieties were more resistant to these nutrient deficiencies and wet rot disease. The tolerance to a high pH soil and resistance to disease or nutrient-induced disease shown by the French types is a good indicator of their adaptability to local soil and climatic conditions.

Table 4 presents the total population and distribution of major nematodes found in soil assays. Of major significance is the total absence of the burrowing nematode (*Radopholus similis*), since this pest has always been recovered from banana and plantain soil assays (Ayala and Roman, 1963). The use of tissue cultured plants may be partly responsible for this notable lack of *Radopholus*. Nematicides and Diazinon 2E apparently effectively controlled root knot nematodes with major effects on reniform and spiral types. Since the occurrence of nematodes apparently did not reduce yields and plant growth, further trials with clonal material may not necessitate use of these pesticides.

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