

Yield potential of the false-horn “Huamoa” plantain^{1,2}

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ABSTRACT

An experiment was conducted to describe and determine the agronomic potential of the “Huamoa” plantain in comparison with that of the Common Dwarf. Cultivars were arranged in a randomized complete block design with four replications; each replication contained 16 experimental plants per treatment. The “Huamoa” cultivar produced bunches significantly earlier than the Common Dwarf. It completed the planting to bunch emergence cycle in 242 days and required only 63 days for fruit filling. The Common Dwarf needed 297 days to complete the cycle and required 92 days for fruit filling. The latter, however, produced significantly larger and heavier bunches, which on average contained eight hands, 39 fruits and weighed 14.0 kg. Individual fruits in the first and fourth uppermost hands of the “Huamoa” bunch, were significantly heavier, with a mean weight of 466 and 336 g, respectively. Regardless of hand position in the bunch, the “Huamoa” fruits were always significantly thicker and the Common Dwarf fruits substantially longer. However, on the basis of locally established market standards none of the fruits obtained from the sixth or lower hands of either cultivar were considered marketable.

Key words: False-horn, plantain, description, yield

RESUMEN

Potencial de rendimiento del plátano “Huamoa”

Se llevó a cabo un experimento para recopilar datos de rasgos morfológicos y determinar el potencial de rendimiento del plátano cuerno-falso “Huamoa”, conocido localmente como “Panaplátano”. Como testigo se utilizó el cultivar Enano Común. Ambos cultivares se distribuyeron en un diseño experimental de bloques completos al azar con cuatro replicaciones. Cada replicación contenía 16 plantas experimentales por tratamiento. El “Huamoa” se comportó como un plátano extremadamente precoz, completando el ciclo de siembra a la inducción del racimo en 242 días y requiriendo solamente 63 días para llenar la fruta. El Enano Común necesitó 297 días para completar el ciclo y 92 días adicionales para llenar la fruta. Sin embargo, este cultivar produjo racimos significativamente más grandes y pesados, conteniendo ocho manos, 39 frutas y 14 kg de peso. Las frutas individuales

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de la primera y cuarta manos del racimo de "Huamoa" alcanzaron un peso significativamente superior con 466 y 336 g, respectivamente. Irrespective de la posición numérica de las manos en el racimo, las frutas del "Huamoa" siempre fueron de un grosor significativamente mayor, mientras que las del Enano Común alcanzaron un largo superior. Sin embargo, a base de los criterios locales de mercadeo establecidos, en ambos cultivares ninguna de las frutas obtenidas de la sexta mano o manos inferiores del racimo llenaron los requisitos mínimos de peso y largo de frutas mercadeables.

INTRODUCTION

During 1997-1998, local plantain production was about 280 million marketable fruits with a farm gate value of \$45 million (Ortiz, 1999). Most of the production originated from two popular false-horn cultivars, the tall Maricongo and the Common Dwarf. These cultivars produce fruits which are widely accepted by consumers. However, depending on the propagating technique, many plants of these cultivars produce off-type or reverted bunches, all of which affects yield and fruit quality (Irizarry et al., 1985; Krikorian et al., 1993). A local plantain fruit is considered marketable if the mean weight surpasses 270 g, and it attains a superior grading if the length is 25.4 cm or more (Soto-Santiago, 1994).

Efforts have been made to select local or introduce new superior plantain clones possessing desirable bunch and fruit traits (Irizarry et al., 1985; Irizarry et al., 1998), and clones having resistance to soil-borne pathogens (Irizarry et al., 1988; Chavarría, 1998).

The plantain cultivar "Huamoa," which was introduced in 1991 from Hawaii by the USDA, Tropical Agriculture Research Station, has recently gained popularity among local growers and consumers. The plant produces a false-horn type bunch that contains short and thick (stout) fruits that command premium prices. The mature green fruit contains a soft pulp texture. When the peeled fruit is cut crosswise, slightly fried, pressed, and refried it produces oversized flattened slices, called "tostones," a delicacy in many restaurants that specialize in local food dishes. This plantain traces its origin to the "Pôpô'ulu" base clones of Hawaii and it is considered a distinctive cooking banana (Lebot et al., 1994). The clone is locally known as "Hawaiian Hybrid" or "Panaplátano".

This study was undertaken to document the plant, bunch and fruit traits of the "Huamoa" plantain and determine its agronomic potential in comparison with that of the Common Dwarf cultivar.

MATERIALS AND METHODS

The experiment was established July 1996 on a private farm of the Barinas Ward of Yauco, Puerto Rico. Mean historical annual rainfall is 990 mm, and Class A pan evaporation is 2,040 mm (Hadeen, 1990). The soil is a San Antón silty clay (fine-loamy, mixed, isohyperthermic, Cu-

mulic Haplustolls). In the top 25-cm layer the soil pH was 7.6 and contained 9.5 mg/kg of P (Olsen method). Soil exchangeable cation capacity was 31.4 cmol (+)/kg of soil.

Two plantain (*Musa* AAB) cultivars, "Huamoa" and Common Dwarf, were arranged in a randomized complete block design with four replications. Each replication consisted of a double row with 16 experimental plants per treatment. The plants were spaced 1.52 m apart in the row with 1.82 m between adjacent rows. Each double row was separated by a 3.35-m alley to accommodate about 2,540 plants per hectare. A double row of guard plants surrounded the experiment.

Medium size corms were used as propagating material. At planting, 11 g of P as triple superphosphate was placed under each corm. The experiment was drip irrigated at the weekly rate of about 50 L/plant. Five weeks after planting, N and K at the rate of 8 and 16 kg/ha, respectively, were applied weekly through the drip system. When the rainfall of the previous week exceeded 20 mm, the irrigation and fertilization practices were suspended until the following week.

Soil-borne pathogens and weeds were controlled by following recommended cultural practices (Agric. Exp. Sta., 1995). Since yellow Sigatoka is not a problem in plantain grown in the semiarid region of Puerto Rico, the plants were not sprayed against it.

Plant pseudostem height and diameter, and number of functional leaves were recorded at the time of bunch emergence. The plant height was taken from the base of the plant to the point of bunch emergence, and the diameter about 1 m above the ground level. Number of days required from planting to bunch emergence, and days needed for fruit filling were also recorded.

Bunches were harvested when the fruits reached the mature-green stage. At harvest, the number of hands and number of fruits per hand and bunch were recorded. The bunch was weighed and bunch mean fruit weight determined. Three fruits from the middle of the first, fourth and sixth uppermost hands were sampled to determine individual mean fruit weight, narrow and wide diameters, and outer length. These measurements were obtained in the middle of the fruit and from the fruit pedicel to the apex. Number of functional leaves and suckers per plant were also recorded at harvest. The data were submitted to a two-tailed "t" test of significance, and differences between the two means were accepted at $P \leq 0.01$ and $P \leq 0.05$ probability levels.

RESULTS AND DISCUSSION

Plant pseudostem height and diameter, number of functional leaves at bunch emergence, and number of suckers at harvest were significantly different between cultivars (Table 1). The Common Dwarf

cultivar developed a considerably shorter and thicker pseudostem, which averaged 2.6 m and 18.5 cm, respectively. This cultivar also had a significantly higher number of functional leaves at bunch emergence. However, the 15 leaves contained by "Huamoa" at bunch emergence was twice the minimum number of functional leaves required for fruit filling in banana (González, 1987). At harvest, however, both cultivars retained a similar number of leaves, which averaged 13. The Common Dwarf cultivar significantly outnumbered the "Huamoa" cultivar for propagating suckers (Table 1).

Number of days required from planting to bunch emergence, days needed for fruit filling, and bunch size and weight were significantly different between cultivars (Table 2). The Common Dwarf cultivar completed the planting to bunch emergence cycle in 297 days and its fruits reached the mature green stage in 92 days. It produced larger and heavier bunches, which averaged 8 hands, 39 marketable fruits and weighed 14 kg. The "Huamoa" cultivar completed the planting to bunch emergence cycle in just 242 days, and its fruits attained the mature green stage in a significantly shorter period, 63 days. Bunch mean fruit weight was about the same for both cultivars, an average of 362 g.

The Common Dwarf bunch contained significantly more fruits in the first, second and third uppermost hands than the same hands of the "Huamoa" bunch (Table 2). However, both cultivars had a similar number of fruits in the lower hands. The fourth and fifth hands averaged four fruits, the sixth hand three fruits, and the seventh and eight hands two fruits (data not shown).

Cultivars also had a significant effect on the individual fruit traits of the first, fourth and sixth uppermost hands of the bunch (Table 3). Fruits in the first and fourth hands of "Huamoa" were considerably

TABLE 1.—*Plant traits from two false-horn type plantain cultivars grown in the semiarid region of Puerto Rico.*

Cultivar	Pseudostem		Functional leaves at		Propagating suckers at harvest
	height	diameter	bunch emergence	harvest	
	m	cm	no.	no.	no.
"Huamoa"	2.8	16.0	14.7	12.4	5.5
Common Dwarf	2.6	18.5	16.8	12.9	11.7
T-test ¹	**	**	**	NS	**

¹Significant at the 1% (**) probability level or not significant (NS) according to a two-tailed t test.

TABLE 2.—*Bunch traits in two false-horn type plantain cultivars grown in the semiarid region of Puerto Rico.*

Cultivar	Days needed from		no.	Hands per bunch	Fruits per bunch	Bunch weight kg	Bunch mean fruit weight g	Fruits in		
	planting to bunch emergence	bunch emergence to harvest						first hand	second hand	third hand
"Huamoa"	241.8	63.3	6.6	28.2	10.3	368.5	5.2	5.5	4.7	
Common Dwarf	296.5	91.8	8.0	39.3	14.0	355.1	9.9	8.6	6.1	
T-test ¹	**	**	**	**	**	NS	**	**	**	

¹Significant at the 1% (**) probability level or not significant (NS) according to a two-tailed t test.

TABLE 3.—*Individual fruit traits obtained in the first, fourth and sixth uppermost hands of the bunch of two false-horn type plantain cultivars grown in the semiarid region of Puerto Rico.*

Cultivar	Fruit mean weight in			Fruit narrower diameter in			Fruit wider diameter in			Fruit outer length in		
	first hand	fourth hand	sixth hand	first hand	fourth hand	sixth hand	first hand	fourth hand	sixth hand	first hand	fourth hand	sixth hand
	-----g-----			-----mm-----			-----mm-----			-----cm-----		
"Huamoa"	465.5	336.0	225.1	60.9	58.5	54.0	68.0	63.0	57.5	24.4	20.7	17.0
Common Dwarf	355.2	310.4	260.8	45.9	44.8	42.8	50.4	48.2	46.7	29.5	27.4	24.3
T-test ¹	**	*	*	**	**	**	**	**	**	**	**	**

¹Significant at the 1% (***) or 5% (*) probability level according to a two-tailed t test.

heavier and thicker than those obtained from the same hands of the Common Dwarf. Regardless of the position of hands in the bunch, fruits in the Common Dwarf cultivar were significantly longer than those of "Huamoa" (Table 3). Fruits in the four uppermost hands of both cultivars surpassed the 270 g marketable weight criterion (Soto-Santiago, 1994); however, only fruits from the four uppermost hands of the Common Dwarf cultivar attained a superior grading based on fruit length. Fruits obtained from the sixth and lower hands of both cultivars were considered non marketable.

During the experiment, "bunch reversion" from false-horn type to French type occurred in the "Huamoa" cultivar at the low frequency of 3%. No bunch reversion was observed in the Common Dwarf. In addition, the "choke neck" condition appeared in some "Huamoa" plants at the bunch emergence stage. These plants were indexed for the presence of viruses but tested negative. The occurrence of these disorders affects fruit quality and consequently the price.

The "Huamoa" plantain completed the planting to harvest cycle 84 days earlier than the Common Dwarf. It produced heavier, thicker and shorter individual fruits that contain a softer pulp texture. Currently, these distinctive fruits command local premium prices that economically compensate for the low yielding ability of the cultivar.

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