

Evaluation and Acceptability of Cassava Cultivars¹

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ABSTRACT

On the basis of yield and organoleptic evaluation, out of 10 cassava (*Manihot esculenta* Crantz) cultivars, IAC-12-829, IAC-Mantequeira, Jamaica 18 and Trinidad 14-56 are the most promising in this preliminary evaluation. The 10 cassava cultivars were evaluated in the hilly humid East Central region of Puerto Rico. The highest yielders were IAC 12-829, IAC-Mantequeira, Jamaica 18, and SRT-59B-Sta. Catarina with 41.98, 39.24, 35.17 and 31.13 tons/ha, respectively. Hydrocyanic acid content among cultivars was well below the toxicity level (50-100 mg/kg). The mean values ranged from 0.0 up to 22.3 mg HCN/kg of fresh peeled root. Regarding overall acceptability by the tasting panel all except Sta. Catarina cultivar were acceptable.

INTRODUCTION

Cassava (*Manihot esculenta* Crantz) is a root crop extensively grown throughout the tropics, where it is an important source of carbohydrates (3, 6) for the population. It is generally grown as a subsistence crop (10), but also used as livestock, pig, and chicken feed (1, 7, 8, 9, 10, 11).

Local production in Puerto Rico is low, and demand has to be supplemented with imports from the Dominican Republic. During fiscal year 1977-78 (2) local production was reported as 18,451 cwt., with a cash value of approximately \$18,768. Imports from the Dominican Republic were reported as 20,562 cwt.

To increase our local production, local selections as well as new introduced cultivars, are being tested as to yield and other agronomic characteristics.

This paper presents the results obtained from a field trial in which the 10 best cultivars of our cassava collection were tested as to yielding ability and acceptance by a tasting panel.

MATERIALS AND METHODS

Ten of the highest yielder cassava cultivars in previous plantings were selected to be tested in an experiment: IAC-12-829 (P.I. 12901), Jamaica 18, Trinidad 14-56, Ceiba, Llanera, IAC Mantequeira (P.I. 12902), SRT-59-B-Sta. Catarina (P.I. 12903), Seda, Cubana and Jamaica 4-C. Table 1 includes a brief description of each cultivar. A partially balanced incom-

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plete block design was used. Each plot was 14.0 × 2.13 m with two rows of plants. In each row 10 plants were planted 0.91 m apart with 1.06 m between rows (9).

The experiment was conducted on a Corozal clay (Ultisol). An 8-8-12 fertilizer at the rate of 226.8 g per plant was applied at planting. The experiment was planted January 25, 1980, and harvested December 9, 1980. Total and marketable yields were recorded for each cultivar. A sample of 10 roots of each cultivar was measured for length and width.

Samples of each cultivar were analyzed for HCN and protein content, and sensory evaluated on the basis of a 6-point hedonic scale (12) ranging from "like very much" to "dislike." Samples were evaluated for uncooked and cooked appearance, flavor, mouth feel (texture) and overall acceptability.

TABLE 1.—Root description of 10 cassava (*Manihot esculenta*, Crantz) cultivars

Cultivar	P.R. P.I.	Root mean		Peel color		Texture	Pulp color
		Length	Width	External	Internal		
IAC-12-829	12901	35.10	7.21	Brown	Red	Rough	White
Jamaica 18		29.64	6.17	Brown	White	Rough	"
Trinidad 14-56		55.50	5.26	Brown	White	Rough	"
Ceiba		42.82	6.22	Light brown	Pink	Smooth	"
Llanera		26.04	6.35	Light brown	Red	Rough	"
IAC-Mantequeira	12902	37.21	7.47	Brown	Pink	Rough	"
SRT-59B-Sta. Catarina	12903	23.11	5.87	Cream	White	Smooth	"
Seda		27.25	4.65	Cream	White	Smooth	"
Cubana		29.85	5.97	Light brown	Cream	Smooth	"
Jamaica 4C		37.08	6.15	Brown	Cream	Rough	"

RESULTS AND DISCUSSION

Table 2 shows the performance of the 10 cassava cultivars. Highly significant differences were observed on mean yields among the cultivars. The total yield of cv. IAC-12-829 was significantly higher at the 1% level than the yields of cv. Seda, Jamaica 4C, Cubana, Llanera, Ceiba and Trinidad 14-56. There were no significant differences between the yields of IAC-12-829 (41.98 t/ha), IAC-Mantequeira (39.24 t/ha), Jamaica 18 (35.17 t/ha), and SRT-59B-Sta. Catarina (31.43 t/ha).

The yields obtained with these cultivars compare favorably with the average yields reported in Africa (7 t/ha), Asia (10 t/ha), South America (14 t/ha), and elsewhere (10 t/ha) (10).

In this experiment the yields obtained are in line with the yields suggested in the technological package for starchy crops (4), which is from 15 to 30 t/ha. The total yield obtained was from 16.4 to 42.1 t/ha.

Cultivar Llanera was the highest yielder of marketable roots (100%). It was followed by IAC-Mantequeira with 72%, SRT-59B-Sta. Catarina 68%; IAC-12-829, 68%; Jamaica 18, 64%; Jamaica 4C, 61%; Trinidad 14-56, 58%; and Seda, 45% (table 3).

Laboratory analysis showed that hydrocyanic acid content was well below the toxicity level (50 to 100 mg HCN/kg of fresh peeled roots) in all 10 cultivars (5), as shown in table 4.

Protein content ranged from 0.85 to 2.21%. This figure is in line with findings of Onweme (11), who reported that "protein content is not only low in quantity (1-2%), but it is also poor in quality."

Table 5 shows the result of the sensory evaluation. Regarding overall acceptability, all varieties were found acceptable except SRT-59B-Sta.

TABLE 2.—Mean yield of the 10 best performing cassava cultivars at Corozal, Puerto Rico

Cultivar	P.R. P.I. ¹	Yield	
		Total Yield per ha	Marketable Yield per ha
IAC-12-829	12901	38.17 a ²	32.46 a
IAC-Mantequeira	12902	35.66 a	31.14 a
Jamaica 18		31.96 ab	25.63 ab
SRT-59B-Sta. Catarina	12903	28.58 ab	24.28 ab
Trinidad 14-56		24.60 b	18.19 b
Ceiba		23.59 b	18.01 b
Llanera		22.89 b	16.87 b
Cubana		22.36 b	16.76 b
Jamaica 4C		15.30 c	11.38 c
Seda		14.94 c	9.30c

¹ University of Puerto Rico, Agricultural Experiment Station, plant introduction number.

² Means followed by one or more letters in common do not differ significantly at P = .05, according to Duncan's multiple range test.

TABLE 3.—Root production—average number of roots per cultivar

Cultivar	P.R. P.I.	Number of roots		
		Total	Marketable	% Marketable
IAC-12-829	12901	169.72	114.94	68
Jamaica		160.92	102.49	64
Trinidad 14-56		134.30	77.38	58
Ceiba		129.75	69.00	53
Llanera		106.65	106.65	100
IAC-Mantequeira	12902	139.05	100.05	72
SRT-59B-Sta. Catarina	12903	116.23	79.19	68
Seda		103.65	46.70	45
Cubana		111.29	59.72	54
Jamaica 4C		78.41	47.51	61

Catarina, which was rated "dislike moderately" by the taste panel. There was a highly significant difference between this cultivar and IAC-12-829, Jamaica 18, Trinidad 14-56, Ceiba and Llanera. The samples with highest acceptability were those of Jamaica 4C, IAC-Mantequeira, Trinidad 14-56 and Seda.

In relation to appearance, uncooked and cooked samples were found acceptable (between "like and like moderately"); SRT-59B-Sta. Catarina scored the lowest.

All were well accepted for flavor, except SRT-59B-Sta. Catarina ("dis-

TABLE 4.—*Hydrocyanic acid and protein content on 10 cassava cultivars planted at East Central Puerto Rico*

Cultivar	P.R. P.I.	Hydrocyanic acid ¹	Protein ²
		mg/kg	%
IAC-12-829	12901	0.00	1.08
IAC-Mantequeira	12902	0.00	1.42
Jamaica 18		15.6	2.21
SRT-59B-Sta. Catarina	12903	08.3	2.01
Trinidad 14-56		0.00	1.26
Ceiba		22.3	.85
Llanera		0.00	1.39
Cubana		04.7	1.29
Jamaica 4C		02.6	1.65
Seda		10.4	1.81

¹ 50-100 mg HCN/kg of fresh peeled root are moderately poisonous.

² 6.25 × percent N.

TABLE 5.—*Sensory evaluation of 10 cultivars of cassava (Manihot esculenta Crantz) by appearance, flavor, texture and overall acceptability*

Cultivar	PR. P.I.	Mean values ¹				
		Appearance		Flavor	Texture	Overall acceptability
		uncooked	cooked			
IAC-12-829	12901	4.96 a ²	4.45 a,b	4.18 a,b,c	3.97 a,b,c	4.30 a,b
Jamaica 18		4.76 a,b	4.35 a,b	4.48 a,b,c	4.07 a,b,c	4.20 a,b
Trinidad 14-56		5.16 a	4.95 a	4.78 a,b	4.17 a,b,c	4.40 a,b
Ceiba		4.87 a	4.73 a	3.86 c	4.09 a,b,c	4.02 a,b
Llanera		3.78 c	4.48 a,b	4.11 b,c	4.26 a,b	4.18 a,b
IAC-Mantequeira	12902	4.94 a	5.11 a	4.61 a,b,c	4.51 a,b	4.55 a,b
SRT-59B-Sta. Catarina	12903	3.96 b,c	3.55 b	2.78 d	3.07 c	2.60 c
Seda		4.50 a,b,c	4.56 a,b	4.83 a,b	4.18 a,b,c	4.32 a,b
Cubana		4.94 a	3.67 b	4.06 b,c	3.62 b,c	3.66 b
Jamaica 4C		5.03 a	4.90 a	5.02 a	4.84 a	4.93 a

¹ 6-point hedonic scale (6-like very much; 5-like; 4-like moderately; 3-neither like nor dislike; 2-dislike a bit; 1-dislike).

² Means followed by one or more letters in common do not differ significantly at $P = .05$, according to Duncan's multiple range test.

like moderately"). The average score of the other samples was between "like" (5 points) and "neither like nor dislike" (3 points).

Texture of all 10 samples was found acceptable, between "like moderately" (4 points) and "neither like nor dislike" (3 points).

On the basis of yield, overall acceptability and percentage of marketable roots, cultivars IAC-12-829, IAC-Mantequeira, Jamaica 18 and Trinidad 14-56 were the most promising in this preliminary evaluation. Further testing is recommended.

RESUMEN

En la Subestación de Corozal se sembró un experimento con 10 cultivares de yuca, IAC-12-829, Jamaica 18, Trinidad 14-56, Ceiba, Llanera, IAC-Mantequeira, SRT-59B-Sta. Catarina, Seda, Cubana y Jamaica 4C, para evaluar su rendimiento y aceptación por catadores. Las cultivares de mayor rendimiento fueron IAC-12-829, IAC-Mantequeira, Jamaica 18 y SRT-59B-Sta. Catarina, con una producción de 41.98, 39.24, 35.17 y 31.43 tons./ha, respectivamente. En cuanto a la aceptación general por los catadores, todas se juzgaron aceptables con la excepción de SRT-59B-Sta. Catarina, la cual no gustó. Las cultivares con el más alto grado de aceptabilidad fueron Jamaica 4C, IAC-Mantequeira, Trinidad 14-56 y Seda.

Tomando en consideración la producción, el porcentaje de raíces comerciales y la aceptación general, las cultivares IAC-12-829, IAC-Mantequeira, Jamaica 18 y Trinidad 14-56 fueron las más prometedoras en esta evaluación preliminar.

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