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Sugarcane Variety Trials in Puerto Rico, 1952-57

*F. Méndez-Roig, G. Samuels, and A. Colón*¹

INTRODUCTION²

The testing of new sugarcane varieties is a never-ending process because the goal is always on the distant horizon. Every year about 100,000 sugarcane seedlings are produced by hybridization from which, after at least 3 years of continuous selection for good agronomic characteristics, high sucrose content, and mosaic resistance, only a small number are ultimately chosen to be included in the variety trials. The perfect sugarcane variety by definition is one which gives unlimited cane tonnage of almost pure sucrose entirely recoverable in the factory with the minimum of effort, and which has 100-percent germination in the field, closes in without weeding, is erect, does not flower, trashes clean, and is resistant to all disease and insect attack. To be sure, this is but a dream, yet it is the sugarcane breeder's and agronomist's task to move closer and closer to this goal.

Sometimes the definition of perfect variety may change along the way as man's methods of working with sugarcane change. This is evident at present where mechanical methods of harvesting are modifying the agronomic characteristics desired of the new varieties being developed. The Agricultural Experiment Station of the University of Puerto Rico is cognizant of the need for sugarcane varieties suitable for mechanical harvesting, which is coming into use, as well as for hand-harvesting which is being used at present. In fact, several new varieties tested and reported in this paper are well suited for both mechanical harvesting and for hand-cutting.

PROCEDURE

The sugarcane variety trials planted and harvested during the period 1952-57 were included in 24 separate experiments totalling 51 crops (fig.

¹ Agronomist, Agronomist, and Research Assistant in Agronomy II, Agricultural Experiment Station, University of Puerto Rico, Río Piedras, P.R.

² The authors wish to acknowledge the cooperation of P. González-Ríos, Agronomist, Head of the Department of Agronomy and Horticulture, who produced by breeding the different P.R. varieties used in the trials and helped in evaluating their agronomic characteristics, and of those members of the Agronomy and Horticulture Department, past or present, and other cooperators who assisted in carrying out the field work, and the sugar and statistical analyses.

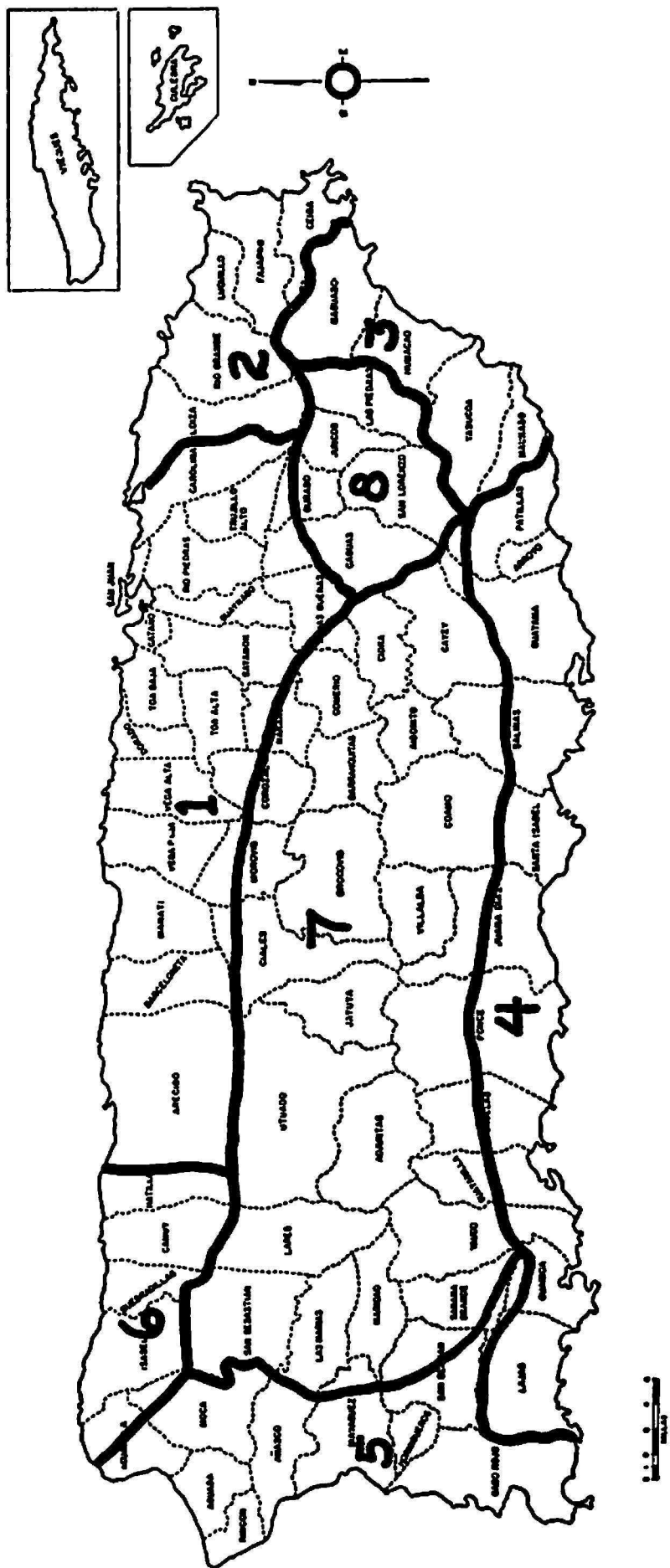


FIG. 1.—A map of Puerto Rico showing the eight sugarcane areas where the variety experiments were conducted.

1) located at various sites of the Island. For convenience of presentation, as well as for the reader's convenience, these experiments have been grouped arbitrarily into geographic areas (table 1 and fig. 1). For 10 of the experiments a plant crop and 2 ratoons were harvested; 7 experiments included a plant cane and 1 ratoon; and 7 experiments were on plant canes only. These 7 plant-cane experiments will be continued for 2 ratoons. The new data will be reported in forthcoming variety-trial reports.

All experiments were laid out in the field in lattice designs with from six to eight replications. Twenty-five or thirty-six varieties were used in each experiment. Most of the varieties used were developed by the Agricultural Experiment Station at Río Piedras. Some imported Barbados and Hawaiian varieties were also included in every experiment, as well as checks of from one to three commercial varieties commonly grown in the area where the field trials were conducted. The commercial varieties used for comparison were M. 336, B. 37161, P.O.J. 2878, P.R. 902, and M. 275. The size of the cane plot for a replication consisted normally of four rows of cane 24 feet in length and $4\frac{1}{2}$ feet apart, comprising an area of 18 by 24 feet or approximately one one-hundredth of an acre.

The agronomic management of the cane in each experiment was similar to the current commercial practices used in the area where it was located. The harvested cane from each plot was weighed using a special portable crane. Ten whole canes, minus tops, were selected at random from each plot; they were properly tagged and sent to the hydraulic mill of the Station at Río Piedras for determination of their available sucrose content. All cane samples were milled not later than 24 hours after cutting.

A hydraulic Squier mill was used which had two rollers, each measuring 12 by 16 inches. These rollers averaged 6.4 revolutions per minute, using a 10-horsepower electric motor (2)³. The rollers exerted a pressure of 29 tons per square inch for the extraction of the juice from the cane passing through them. Each cane sample was milled once and the bagasse also passed through once.

All yield results were analyzed statistically. For the sake of brevity and clarity only the leading four varieties at each experimental site, plus the commercial variety used in the experiment, were then arranged in tabular form. The ranking given to the varieties in each experiment in the tables applies to the rank held when all varieties were compared. Thus, if M. 336 has a rank number of 16, this means that it ranked sixteenth when compared with all varieties tested in that particular trial.

³ Italic numbers in parentheses refer to Literature Cited, p. 18.

TABLE 1.—Area, location, number of crops, soil type, and date of variety field trials with 51 crops of sugarcane in different areas of Puerto Rico

Area No.	Area and location ¹	Number of crops		Soil type	Years
		Plant cane	Ratoon		
<i>North Central</i>					
1	A. Fraticelli Farm, Arecibo	1	2	Coloso silty clay	1953-57
	Colonia Monte Grande, L.A. of P.R., Arecibo	1	1	Coloso clay loam	1954-57
	Colonia Luisa, L.A. of P.R., Barceloneta	1	0	Toa silty clay loam	1955-57
	Colonia Doña Inés, L.A. of P.R., Vega Baja	1	2	Coloso silty clay loam	1953-57
	Caño Tiburones, L.A. of P.R., Barceloneta	1	1	Tiburones muck	1954-57
<i>Northeast</i>					
2	Colonia Miñi Miñi, L.A. of P.R., Lofza	1	0	Aguadilla sandy loam	1955-57
	Colonia Margarita, L.A. of P.R., Fajardo	1	1	Coloso silty clay	1954-57
<i>East</i>					
3	Colonia Laura, Central Roig, Yabucoa	1	2	Talante sandy loam	1953-57
	Colonia Lucía, Central Roig, Yabucoa	1	0	Talante clay loam	1955-57
	Colonia Mandry, E.S.A., Humacao	1	2	Piñones clay	1953-57
<i>South</i>					
4	Colonia Esperanza, Luce & Co., Aguirre	1	2	Santa Isabel silty clay	1953-57
	Colonia Florida, Luce & Co., Santa Isabel	1	0	Santa Isabel silty loam	1955-57
	Hacienda Fortuna, L.A. of P.R., Ponce	1	1	San Antón loam	1954-57
	Colonia Boca Chica, Central Mercedes, Ponce	1	2	San Antón silty clay loam	1953-57
	Colonia Rufina, Central Rufina, Guayanilla	1	2	Santa Isabel silty clay loam	1952-56
	Hacienda Santa Rita, L.A. of P.R., Guánica	1	2	San Antón clay loam	1953-57
	Lajas Substation, Lajas	1	1	Santa Isabel clay	1954-57

¹ L. A. of P. R. stands for Land Authority of Puerto Rico. E. S. A. stands for Eastern Sugar Associates. The same holds for tables 2, 3, and 4.

TABLE 1.—Continued

Area No.	Area and location	Number of crops		Soil type	Years
		Plant cane	Ra-toon		
<i>West</i>					
5	Colonia Librada, García Méndez, Añasco	1	1	Fortuna clay loam	1953-56
	Central Eureka, Hormigueros	1	1	Coloso silty clay	1954-57
<i>Northwest</i>					
6	Isabela Seed Farm, Isabela	1	2	Coto clay	1954-57
	F. Juliá Farm, Isabela	1	2	Coto clay	1953-56
<i>Interior</i>					
7	Corozal Substation, Corozal	1	0	Lares clay	1955-57
	Colonia Factoría, E.S.A., Cayey	1	2	Juncos clay	1953-57
<i>Caguas Valley</i>					
8	Gurabo Substation, Gurabo	1	0	Mabí clay	1955-57

RESULTS

AVAILABLE 96° SUGAR

In the North Central Area, P.R. 980 and B. 37161 were the leading varieties occupying equally two first and one second place in the five experiments in this area (table 2). The commercial check variety M. 336 ranked poorly.

In the two experiments in the Northeastern Area, Barbados varieties B. 37161 and B. 41227 shared first place. P.R. 980 was in third place for the Loíza experiment and dropped to eleventh place in the Fajardo experiment. It appears that P.R. 980 is not well adapted to the Northeastern Area. Commercial checks P.R. 905 and M. 336 ranked very low in eighteenth place (table 2).

B. 37161 held first place in the Eastern Area, both in Yabucoa and Humacao (table 2). P.R. 981, used for the first time in a plant cane at Colonia Lucía, Yabucoa, placed first. It was not included in the other two experiments in this area. B. 40105, P.R. 980, and P.R. 1013 each placed

TABLE 2.—*Ranking of varieties and their yields of available 96° sugar per acre (tons) for sugarcane-varieties trials in Puerto Rico, 1952-57*

Area No	Area and location	First		Second		Third		Fourth		Commercial check		
		Variety	Sugar	Variety	Sugar	Variety	Sugar	Variety	Sugar	Variety	Sugar	Rank
1	North Central:											
	A. Fraticelli Farm, Arecibo, P.R.	P.R. 980	10.90	B. 40105	10.10	B. 37172	9.80	H. 328560	9.70	M. 336	6.15	16
	Col. Monte Grande, L.A., Arecibo	B. 37161	10.15	P.R. 1013	8.90	P.R. 988	8.60	P.R. 1008	8.45	M. 336	7.90	7
	Col. Luisa, L.A., Barceloneta	P.R. 1028	8.90	P.R. 980	8.65	B. 47179 ¹	7.75	P.R. 1020	7.65	M. 336	6.45	13
	Col. Doña Inés, L.A., Vega Baja	P.R. 980	9.95	B. 37161	9.20	P.R. 1000	8.55	P.R. 968	7.85	M. 336	6.70	15
2	Caño Tiburones	B. 37161	5.00	P.R. 1014	4.90	P.R. 1008	4.85	P.R. 990	4.55	M. 336	3.60	21
	Northeast:											
	Col. Miñi Miñi, L.A., Loíza	B. 37161	10.35	P.R. 1016	9.80	P.R. 980	9.55	P.R. 1027	9.00	P.R. 905	6.40	18
	Col. Margarita, L.A., Fajardo	B. 41227	7.60	P.R. 981	7.35	P.R. 1013	7.15	P.R. 984	7.05	M. 336	5.75	18
	East:											
3	Col. Laura, Central Roig, Yabucoa	B. 37161	11.40	P.R. 980	9.75	B. 37172	9.65	P.R. 975	9.40	M. 336	7.90	10
	Col. Lucía, Central Roig, Yabucoa	P.R. 981	13.50	P.R. 1013	11.50	P.R. 984	11.20	P.R. 988	10.85	M. 336	8.85	10
	Col. Mandry, E.S.A., Humacao	B. 37161	7.90	B. 40105	7.35	B. 37172	7.20	P.R. 980	7.10	M. 336	4.45	18
	South:											

4	Col. Esperanza, Luce & Co., Aguirre	P.R. 1013	10.75	P.R. 1000	10.70	P.R. 1004	10.65	H. 328560	10.10	B. 37161	6.70	17
	Col. Florida, Luce & Co., San Isabel	P.R. 980	12.80	P.R. 1028	11.65	P.R. 1016	11.55	B. 37161	11.30	C.A. 52300	10.20	8
	Hacienda Fortuna, A.T., Ponce	B. 41227	9.65	P.R. 1013	9.50	P.R. 988	9.05	P.R. 1002	8.85	M. 336	6.70	19
	Col. Boca Chica, Ponce	P.R. 980	12.05	P.R. 975	11.35	B. 41227	10.90	B. 4362	10.70	M. 336	8.30	16
	Central Rufina, Guayanilla	P.R. 980	10.00	B. 34104 ¹	9.20	B. 41227	9.05	B. 41211	8.60	M. 336	6.60	21
	Hacienda Santa Rita, L.A., Guayanilla	B. 37161	10.50	P.R. 980	10.20	P.R. 975	9.80	B. 40105	9.65	M. 336	6.20	16
	Lajas Substation, Lajas	P.R. 980	11.80	P.R. 996	10.60	P.R. 1013	10.55	P.R. 1004	10.55	B. 37161	9.60	9
5	West: Col. Librada-García Méndez, Añasco	P.R. 980	9.00	P.R. 975	7.85	P.R. 968	7.65	B. 37172	7.55	P.O.J. 2878	5.30	18
	Central Eureka, Hormi- gueros	B. 41227	8.65	P.R. 1002	8.40	P.R. 1013	8.25	P.R. 996	8.00	M. 336	7.45	7
6	Northwest: Isabela Seed Farm, Isabela	P.R. 980	7.05	P.R. 975	6.90	H. 371933	6.35	B. 41227	6.15	P.R. 902	5.45	11
	Juliá Farm, Bo. Arenales, Isabela	P.R. 980	7.45	H. 328560	6.45	P.R. 963	6.05	P.R. 975	5.95	P.R. 902	4.40	18
7	Interior: Corozal Substation, Corozal	P.R. 980	9.00	B. 47179 ¹	8.70	P.R. 1024	8.55	H. 328560	8.50	P.O.J. 2878	5.70	20
	Col. Factoría, E.S.A., Cayey	P.R. 980	9.25	P.R. 975	9.05	B. 37161	8.45	H. 328560	8.30	P.O.J. 2878	6.50	17
8	Caguas Valley: Gurabo Substation, Gurabo	B. 37161	9.40	B. 47179 ¹	9.20	P.R. 1020	8.75	P.R. 1028	8.65	M. 336	7.35	7

¹ Not recommended because of its high cane mosaic susceptibility.

second in an experiment. M.336, the commercial check, ranked tenth and eighteenth.

In the Southern Area with seven experiments P.R. 980 was the leading sugarcane variety in tons of sugar per acre. It was first in four experiments, second in one, and was not included in two. P.R. 1013, a new variety with promise, appeared first in the trial at Colonia Esperanza, Aguirre, and second at Hacienda Fortuna, Ponce. B. 37161 did better as the commercial check than M. 336, but failed to rank among the leading three in any trial.

P.R. 980 shared first place with B. 41227 in the West (table 2) with P.R. 975 and P.R. 1002 in second place. P.O.J. 2878 was eighteenth as a commercial check and M. 336 seventh.

In the Northwest area P.R. 980 was the leading variety with P.R. 975 and H. 328560 sharing second place. Commercial check variety P.R. 902 showed low yields of sugar per acre as compared to P.R. 980.

In the Interior also, P.R. 980 was first with P. R. 975 in second place. P.O.J. 2878, used as the check, ranked poorly.

B. 37161 gave the highest yields in the Caguas valley with P. R. 1024 second, P.R. 1028 third, and M. 336 in seventh place.

TONS OF CANE

The results of the variety trials are summarized for tons of cane per acre in table 3.

The highest yielding variety in tonnage of sugar per acre was P.R. 980. It was first in the North Central, West, and Northwest Areas. In the East, B. 37161 was first. P.R. 980 was first in 11 of the 24 experimental sites and B. 37161 first in 6. Variety B. 47179 was first in the Interior Area and Caguas Valley (table 3), but it is not recommended because of its high susceptibility to sugarcane mosaic.

All commercial check varieties produced considerably less tonnage of cane per acre than the above-mentioned leading varieties.

SUCROSE-PERCENT-CANE

There has always been a demand by the Puerto Rican farmer for a sugarcane variety high in sucrose. This preference for a "sweet" cane has at times made certain varieties commercially acceptable even though their tonnage-of-cane performance was not outstanding. However, this desire for a higher sucrose-percent-cane has prevented the ready acceptance by certain outstanding producers of tons of sugar per acre, simply because these varieties may not be as high in sucrose as some older ones with lower cane yields.

In table 4 the varieties are ranked according to their content of sucrose-

percent-cane. M. 336 ranked first in 7 out of the 24 experimental sites. In the North Central Area it was first in three out of the five experiments and it was first also in the Caguas Valley Area. P.R. 1016 made a good showing in the North Central Area and P.P.Q.K. in the Southern Area. P.R. 975 ranked first twice—once in the Interior and once in the Northwest Area.

Sucrose-percent-cane values ran high and were 16.02 for P.R. 1007 at Añasco and 15.35 for P.R. 975 at Cayey.

TONS OF SUGAR PER ACRE PER MONTH (TSAM)

A comparison of any two experiments on a ton-of-cane or sugar basis may be misleading, because varietal experiments usually have different times of planting and harvesting. A more suitable comparison can be made of variety experiments in any area on the basis of the tonnage of sugar produced per acre per month.

The different varieties used in the experiments were ranked according to their production in tons of sugar per acre per month after correcting for variations due to experiment location. The results are given in table 5.

P.R. 980 ranked first with an average yield of 0.645 ton of sugar per acre per month for the 18 trials in which it was used out of a total of 51 trials performed. P.R. 1013 was second, having been used in 8 trials. P.R. 981 and B. 47179 (of high mosaic susceptibility) were tied for third. P.R. 975 came fifth, ahead of B. 37161 which was sixth; B. 37161 made a better showing in the 1951-55 trials where it stood second (2). Of the commercial varieties, B. 37161 ranked sixth, P.R. 902 and P.R. 905 twenty-ninth and thirtieth, M. 336 thirty-first, and P.O.J. 2878 last, in thirty-third position.

Only the first two varieties, P.R. 980 and P.R. 1013, produced 0.600 ton and over of sugar per acre per month, but the first 26 varieties produced 0.500 ton or over. All commercial check varieties except B. 37161 produced less than 0.500 ton of sugar per acre per month.

Excluding B. 47179, which is highly susceptible to mosaic, the four leaders were P.R. varieties produced by the University of Puerto Rico Agricultural Experiment Station. The Barbados canes came next as sugarcane varieties having a high sugar-per-acre-per-month capacity of production. The Hawaiian varieties tested, H. 328560 and H. 371933, ranked rather low as compared to the P.R. and Barbados varieties.

AGRONOMIC PERFORMANCE

Aside from the need by the grower for sugarcane varieties high in sucrose production per acre, the sugarcane breeder must also take into consideration certain agronomic characteristics. The agronomic characteristics desired in a cane variety will vary according to the needs of the area in which

TABLE 3.—Ranking of varieties and their yields of tons of cane per acre for sugarcane-variety trials in Puerto Rico, 1952-57

Area No.	Area and location		First		Second		Third		Fourth		Commercial check		
			Variety	Cane	Variety	Cane	Variety	Cane	Variety	Cane	Variety	Cane	Rank
1	North Central: A. Fraticelli Farm, Arecibo Col. Monte Grande, L.A., Arecibo Col. Luisa, L.A., Barceloneta Col. Doña Inés, L.A., Vega Baja Caño Tiburones, L.A., Barcelo- neta		P.R. 980	95	B. 40105	92	H. 371933	86	B. 37161	84	M. 336	46	16
			B. 37161	90	P.R. 988	76	P.R. 1013	72	P.R. 996	69	M. 336	61	7
			P.R. 980	80	B. 47179 ¹	76	P.R. 1019	76	P.R. 1028	72	M. 336	52	13
			P.R. 980	84	B. 37161	74	P.R. 1000	70	P.R. 970	66	M. 336	46	15
			B. 37161	49	P.R. 1005	44	P.R. 1004	41	P.R. 981	41	M. 336	31	21
2	Northeast: Col. Miñi-Miñi, L.A., Loíza Col. Margarita, L.A., Fajardo		B. 37161	82	B. 47179 ¹	79	P.R. 980	78	P.R. 1019	76	P.R. 905	51	18
			P.R. 988	70	B. 41227	65	P.R. 981	65	P.R. 1013	60	M. 336	44	18
			B. 37161	83	P.R. 980	77	B. 37172	76	P.R. 975	69	M. 336	53	11
3	East: Col. Laura, Central Roig, Yabu- coa		P.R. 981	115	P.R. 1013	93	P.R. 984	89	P.R. 988	89	M. 336	70	10
			B. 37161	62	B. 40105	57	P.R. 980	56	B. 41227	56	M. 336	32	18
			P.R. 1001	91	H. 328560	87	P.R. 1013	86	P.R. 996	82	B. 37161	74	17
4	South: Col. Esperanza, Luce & Co., Aguirre Col. Florida, Luce & Co., Santa Isabel		P.R. 980	126	H. 47179 ¹	107	P.R. 1028	104	B. 37161	104	C.A. 52300	104	8

	Hacienda Fortuna, L.A., Ponce	77	73	72	M. 336	51	19
	Col. Boca Chica, Ponce	87	86	84	M. 336	58	16
	Central Rufina, Guayanilla	76	76	72	M. 336	49	21
	Hacienda Santa Rita, L.A., Guánica	79	78	73	M. 336	43	16
	Lajas Substation, Lajas	98	94	86	P.O.J. 2878	64	23
5	West: Col. Librada, García Méndez, Añasco	57	52	50	P.O.J. 2878	35	18
	Central Eureka, Hormigueros	77	68	66	M. 336	54	7
6	Northwest: Isabela Seed Farm, Isabela	53	53	52	P.R. 902	44	11
	Mr. F. Juliá Farm, Bo. Arenales, Isabela	46	45	41	P.R. 902	37	18
7	Interior: Corozal Substation, Corozal	75	67	66	P.O.J. 2878	48	20
	Col. Factoría, E.S.A., Cayey	59	59	58	P.O.J. 2878	48	17
8	Caguas Valley: Gurabo Substation, Gurabo	71	68	66	M. 336	50	7

¹ Not recommended because of its high susceptibility to sugarcane mosaic.

TABLE 4.—*Ranking of varieties and their yields of sucrose-percent-cane for sugarcane-variety trials in Puerto Rico, 1952-57*

Area No	Area and location	First		Second		Third		Fourth		Commercial check		
		Variety	Su-crose	Variety	Su-crose	Variety	Su-crose	Variety	Su-crose	Variety	Su-crose	Rank
1	North Central: A. Fraticelli Farm, Arecibo	M. 336	13.08	B. 4362	13.06	P.R. 975	12.37	H. 328560	12.31	M. 336	13.08	1
1	Col. Monte Grande, L.A., Arecibo	M. 336	13.06	P.R. 1008	13.03	P.R. 983	12.70	P.R. 1001	12.61	M. 336	13.06	1
1	Col. Luisa, L.A., Barcelo- neta	P.R. 1016	12.67	M. 336	12.50	P.R. 1028	12.33	P.R. 1032	12.08	M. 336	12.50	2
1	Col. Doña Inés, L.A., Vega	M. 336	13.24	B. 4362	12.91	P.R. 975	12.81	P.O.J. 3016	12.77	M. 336	13.66	2
1	Baja Caño Tiburones, L.A., Barceloneta	P.R. 1014	13.26	P.R. 1008	12.52	P.R. 992	12.07	P.R. 990	11.96	M. 336	11.61	10
2	Northeast: Col. Miñi-Miñi, L.A., Loíza	P.R. 1016	13.81	P.R. 1032	13.68	P.R. 1027	13.62	P.R. 1025	13.34	P.R. 905	12.62	10
2	Col. Margarita, L.A., Fajardo	P.R. 1009	13.36	M. 336	12.93	B. 4362	12.85	P.R. 997	12.85	M. 336	12.93	2
3	East: Col. Laura, Central Roig, Yabucoa	B. 4362	14.24	M. 336	14.07	P.O.J. 3016	13.83	B. 37116	13.69	M. 336	14.07	2
3	Col. Lucía, Central Roig, Yabucoa	P.R. 997	13.66	P.R. 1008	12.80	M. 336	12.62	P.R. 984	12.57	M. 336	12.62	3
3	Col. Mandry-E.S.A., Hu- macao South:	M. 336	13.87	P.R. 975	13.85	B. 4362	13.81	H. 328560	13.67	M. 336	13.76	1

4	Col. Esperanza-Luce & Co., Aguirre	P.P.Q.K.	13.18	P.R. 1000	13.13	P.R. 1013	12.56	P.R. 1012	12.56	B. 37161	9.03	35
4	Col. Florida-Luce & Co., San Isabel	P.R. 1024	12.09	P.R. 1015	12.06	P.R. 1032	12.05	P.R. 1016	11.62	B. 37161	10.83	6
4	Hacienda Fortuna, L.A., Ponce	P.P.Q.K.	13.79	P.R. 983	13.58	P.R. 981	13.56	P.R. 1013	13.45	M. 336	13.34	5
4	Col. Boca Chica, Ponce	M. 336	14.14	B. 4362	13.89	P.R. 975	13.88	P.O.J. 3016	13.61	M. 336	14.14	1
4	Central Rufina, Guayanilla	P.R. 929	14.97	P.R. 907	14.26	M. 336	13.89	P.R. 951	13.47	M. 336	13.89	3
4	Hacienda Santa Rita, Guánica	M. 336	14.51	P.R. 975	14.26	P.R. 1007	14.12	B. 4362	14.04	M. 336	14.51	1
4	Lajas Substation, Lajas West:	P.R. 997	14.04	P.P.Q.K.	13.64	P.R. 983	13.42	P.R. 1004	13.37	P.O.J. 2878	10.97	30
5	Col. Librada-García Méndez, Añasco	P.R. 1007	16.02	P.R. 975	15.95	H. 328560	15.74	P.R. 968	15.63	P.O.J. 2878	14.37	14
5	Central Eureka, Hormigueros	P.R. 997	14.86	M. 336	14.46	P.R. 992	14.19	P.R. 1008	13.75	M. 336	14.46	2
6	Northwest: Isabela Seed Farm, Isabel	P.O.J. 3016	13.63	H. 328560	13.18	P.R. 1007	13.18	P.R. 999	12.99	P.R. 902	12.34	9
6	F. Juliá Farm, Bo. Arenales, Isabela	P.R. 975	14.49	P.O.J. 3016	14.45	P.R. 965	14.30	H. 328560	13.97	P.R. 902	13.24	12
7	Interior: Corozal Substation, Corozal	P.R. 1024	13.20	P.R. 1016	13.06	H. 328560	12.75	P.R. 1032	12.59	P.O.J. 2878	11.77	11
7	Col. Factoría, E.S.A.-Cayey:	P.R. 975	15.35	B. 37161	14.96	H. 328560	14.51	B. 4362	14.46	P.O.J. 2878	13.80	12
8	Caguas Valley: Gurabo Substation, Gurabo	M. 336	14.59	P.R. 1032	14.48	P.R. 1016	13.89	P.R. 1024	13.80	M. 336	14.59	1

it is grown. In Puerto Rico germination, stooling, ratooning habit, girth, erectness, flowering, trashiness, and disease resistance are desirable agronomic characteristics in new sugarcane varieties.

The desired germination of the seed piece is 100 percent. Even fair germination requiring 25-percent replanting is not acceptable. The need for a strong germinating cane is even more desirable at present when we consider that the hot-water treatment of seed for disease control may reduce germination, and labor costs for replanting are high.

TABLE 5.—*Ranking of sugarcane varieties planted in Puerto Rico according to sugar per acre produced per month, in tons*

Rank	Variety	Number of crops	Sugar per acre per month	Rank	Variety	Number of crops	Sugar per acre per month
1	P.R. 980	18	0.645	18	P.R. 1020	5	0.540
2	P.R. 1013	8	.615	19	B. 40105	11	.530
3	P.R. 981	8	.595	20	P.R. 1000	12	.530
4	B. 47179 ¹	3	.595	21	H. 328560	12	.525
5	P.R. 975	11	.590	22	P.R. 1024	3	.520
6	B. 37161	22	.585	23	P.R. 968	9	.520
7	B. 41227	16	.575	24	B. 4362	10	.510
8	P.R. 963	1	.575	25	P.R. 1027	5	.500
9	P.R. 1028	4	.565	26	P.R. 1019	4	.500
10	P.R. 965	1	.560	27	P.R. 1016	5	.485
11	B. 41211	1	.560	28	M. 338	2	.475
12	P.R. 988	8	.560	29	P.R. 902	4	.475
13	P.R. 1002	8	.560	30	P.R. 905	3	.470
14	P.R. 1012	8	.555	31	M. 336	15	.460
15	B. 37172	12	.555	32	H. 371933	10	.455
16	P.R. 1008	8	.550	33	P.O.J. 2878	4	.425
17	P.R. 1004	8	.545				

¹ Not recommended because of its very high mosaic susceptibility.

A vigorous stooling habit has always been desired by our growers as it means a quick closing in of the plantation, reducing weeding costs and erosion.

In the past much emphasis has been placed by the growers on ratooning habit. Many old growers still boast of their P.O.J. 2878 fields which continue ratooning after 25 years. Such cases are rare today, and a ratooning ability of up to 5 is considered good for any variety not under irrigation.

There are divergences of opinion as to the real influence on costs of production of the girth of the cane. Most growers favor a thick cane, 1½ inches or over in girth, and consider a cane with a girth of slightly under 1 inch as too thin. However, there are reports that the cost of harvesting

TABLE 6.—The evaluation of agronomic characteristics of various sugarcane varieties grown in Puerto Rico¹

Variety	Germination	Stooling	Ratooning habit	Girth	Erectness (1-year cane)	Flowering	Trashiness	Disease resistance to—		Average for all agronomic characteristics
								Mosaic	Chlorotic Streak	
P.R. 975	2	2	1	3	2	1	2	1	—	1.6
P.R. 980	1	1	1	3	1	2	1	1	—	1.4
P.R. 1013	2	2	2	1	2	2	2	1	—	1.8
B. 37161	3	3 ²	2	1	4	1	5	3	—	2.8
B. 37172	1	2	2	3	3	1	2	1	—	1.9
B. 40105	1	2	2	3	3	1	2	1	—	1.9
B. 41227	2	2	2	2	2	1	3	1	—	1.9
B. 4362	2	2	2	1	2	1	2	1	—	1.5
H. 328560	2 ³	3	2	1	2	2	2	2	3	2.1
M. 336	3	3	3	1	1	4	2	2	3	2.4
P.O.J. 2878	2	2	1	1	2	3	2	1	3	1.8

¹ The agronomic characteristics were evaluated by number as follows:

1. Excellent 2. Good 3. Fair 4. Poor—re-planting more than 50 percent	1. Excellent 2. Good 3. Fair 4. Poor	1. Thick; over 1½ inches 2. Medium; 1½ inches 3. Thin; less than 1 inch	1. Erect 2. Less than 45° 3. Majority leaning at 45° but not prostrate 4. Majority of the stalks on the ground	1. No flowering 2. Only under certain conditions 3. Partially abundant	1. Entire stalk trashes clean 2. Half of stalk trashes clean 3. Trashes attached firmly, can be removed from only part 5. Trash attached firmly to stalk	1. High resistance 2. Tolerant—resistant under field conditions 3. Highly susceptible	1.0 Excellent 1.1-2.0 good 2.1-3.0 fair 3.1-and over, poor
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² Makes suckers.

³ Very susceptible to pineapple disease.

high-yielding thin canes are lower per ton than the cost of harvesting low-yielding thicker canes.

Erectness has come more into prominence with rising labor costs and the imminent introduction of mechanical cane harvesting and loading. Varieties such as B. 37161, which can be harvested by hand regardless of a prostrate habit, become almost impossible to handle economically under mechanical cutting. As mechanical harvesting is more fully used in Puerto Rico erectness will become more and more important in cane varietal work.

Flowering is one characteristic which most growers try to avoid in choosing a variety, on the assumption that flowering stops the production of sugar per acre. This Station has tried to determine the usefulness of preventing the flowering of the sugarcane plant both by extending the photoperiods and by spraying with maleic hydrazide. The information available tends to demonstrate that a sugarcane field that has arrowed does not necessarily yield less cane or sugar per acre than if it has not.

The fear of a disease-susceptible cane has always influenced the choice of variety. In Puerto Rico, all varieties developed by the breeding program of the Station or introduced from abroad are tested for mosaic. The discovery of various strains of the sugarcane mosaic has made this testing program even more vigorous and important. Even varieties listed as tolerant or resistant under field conditions must be looked upon with suspicion because of the latent damage they may cause. A classical example of this is variety B. 34104 and its subsequent damage to B. 37161 (1). The Station is also working on the development of procedures for testing for chlorotic streak and ratoon stunting.

The various leading newly tested and commercial varieties of Puerto Rico have been evaluated for many of the agronomic characteristics discussed above. This evaluation has been summarized in table 6. An arithmetical average of the evaluations are given in the final column of this table. It is quite true that this index of evaluation is far from perfect. Certain agronomic characteristics must carry more weight than others to develop a more exacting and useful evaluation of a variety. Furthermore, cane tonnage and sucrose production should also receive prime attention in any such index.

SUMMARY

The sugarcane variety trials performed by the Agricultural Experiment Station of the University of Puerto Rico, Río Piedras, P.R., during the period 1952-57, involved 24 separate experiments and 51 crops. The following results are significant:

1. In the production of available 96° sugar per acre P.R. 980 was the

outstanding variety of the Southern, Western, Northwestern, and Interior Areas of the Island. B. 37161 was first in the Eastern Area and in Caguas Valley, and it tied P.R. 980 in the North Central and B. 41227 in the North-eastern Areas of Puerto Rico.

2. P.R. 980 was first in 10 and B. 37161 in 6 of the 24 experimental sites in terms of tons of cane produced per acre.

3. The check varieties, M. 336, P.O.J. 2878, and P.R. 902 and 905, produced low yields in both tons of cane and of sugar per acre as compared with the leading varieties.

4. M. 336, P.R. 1016, M. 975, and P.P.Q.K. were the leading varieties in sucrose-percent-cane.

5. P.R. 980 and P.R. 1013 ranked first in tons of sugar produced per acre per month.

6. For agronomic evaluation, the leading varieties were ranked in a table in which consideration was given to such factors as germination, stooling, ratooning habit, girth, erectness, flowering, trashiness, and disease resistance.

RESUMEN

Dentro de su programa de estudio de las variedades de caña de azúcar, la Estación Experimental Agrícola de la Universidad de Puerto Rico llevó a cabo, durante el período 1952-57, 24 experimentos de campo que comprendieron 51 cosechas. Tuvieron significación los siguientes resultados:

1. En cuanto a la producción de azúcar 96° por acre, la variedad P.R. 980 fué la mejor en las áreas del sur, oeste, noroeste e interior de la Isla. La variedad B. 37161 fué mejor en este aspecto en la parte oriental y en el Valle de Caguas. Estuvo a la par con la P.R. 980 en el área norte central y con la variedad B. 41227 en el área noroeste.

2. En cuanto a la producción en toneladas de caña por acre en los 24 experimentos, la P.R. 980 fué primera en 10 de éstos y la B. 37161 en 6.

3. Las variedades testigos, M. 336, P.O.J. 2878, P.R. 902, y 905 produjeron rendimientos bajos, tanto en toneladas de caña como de azúcar por acre, cuando se compararon con las mejores variedades.

4. En razón por ciento de sacarosa por caña, las variedades M. 336, P.R. 1016, M. 975, y P.P.Q.K. fueron las mejores.

5. Finalmente, las variedades se evaluaron de acuerdo con su producción de toneladas de azúcar por acre por mes, y en cuyo caso la P.R. 980 y la P.R. 1013 resultaron mejores.

6. Se presenta en este trabajo una evaluación de las variedades mejores, tomando en consideración los siguientes factores: Germinación, número de cañas por cepa, habilidad para retoñar, grosor, crecimiento en forma erecta, florecida, cantidad de paja, y resistencia a enfermedades.

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