BARBADOS HYBRID 10 (12)

The Journal of the Department of Agriculture

OF PORTO RICO

Published Quarterly; January, April, July and October of each year.

VOL. IX JULY 1925 No. 3

THE BH 10(12) AND SC 12(4) CANES [1]

SOME OBSERVATIONS ON THESE TWO PROMISING VARIETIES IN THE WEST INDIES

By ARTHUR H. ROSENFELD,
Special Technologist for Cane, Insular Experiment Station

Without any question of doubt, the *Barbados Hybrid 10(12)* and *St. Croix 12(4)* varieties [2] of sugar cane are today by far the two most popular canes on the Island of Porto Rico, where they are rapidly replacing even the standard *Cristalina* in the parts of the Island where it has been most strongly entrenched for generations. The Insular Experiment Station receives weekly so many requests for information about and seed of these two varieties that it has appeared advisable to the writer to publish, in easily available form, descriptions of these canes, something of their history in their place of origin and other countries in the West Indies to which they have been imported and a survey of their behavior to date and future possibilities in various parts of Porto Rico.

BH 10(12) IN THE BRITISH WEST INDIES

Mr. F. S. Earle, to whom Porto Rico and the sugar world is indebted for detailed technical descriptions of so many cane varieties, gives in his monumental "Sugar Cane Varieties of Porto Rico" (8)[3] the following very accurate description of this variety:

"Erect, or at length somewhat declined, vigorous, a strong stooler, seldom arrows. Stalks long, medium to medium slender, greenish but soon flushing to a uniform dull pink, marked with lines, often blotched, considerable bloom. Internodes medium length, staggered, somewhat compressed, larger below and

[1] Paper read at the meeting of the "Association of Sugar Technologists of Porto Rico", held July 5, 1925, at San Juan, P. R.

[2] Many cane breeders indicate year of production, as in case of these two seedlings, by the final figures of the year, without century indication, and the serial number of the seedling produced in that year by a number in parenthesis.

[3] Numbers in parentheses refer to list of literature consulted.

shouldered on side opposite bud. Nodes constricted, oblique; growth ring rather broad but indistinct, enlarged on the shoulder behind; root band oblique 6 to 10 mm., concolorous but paler, tapering downward, rudimentary roots small, purplish, in 3 or 4 rows; leaf scar glabrous, appressed behind; glaucous band slightly constricted, about 8 mm., somewhat obscured by the bloom of the internode. Buds nearly orbicular, 10 to 11 × 10 to 11 mm., only slightly exceeding growth ring, margin narrow, uniform, often purplish, germination subapical, basal plaes, and sparse marginal and apical vestiture. Leaf sheaths with a sparse vestiture of short appressed hairs, green or a little tinted, somewhat glaucous; throat narrow, lannate with a sparse marginal vestiture of long hairs; collar narrow, scarcely reaching the midrib, glaucous; ligule, about 3 mm., margin undulate, not fimbriate; ligular processes small and poorly developed or none. Leaf blades, suberect, the tips declined, flat, about 6 cm., widest above the middle, light green, minutely serrulate, the base even, not ciliate."

This is one of the series of artificial hybrids produced from the same parent as was *SC 12/4—B 6835*—in 1910 in the Island of Barbados, B. W. I., by Mr. Jno. R. Bovell, one of the "grand old men" of sugar-cane breeding and one of the three original discoverers of the fertility of cane seed. Two hundred and sixteen artificial hybrids were produced by Bovell in that year and the carefulness and rigor with which these new canes are selected is shown by the fact that in 1916 Bovell (1) reports that only eleven were under experimental cultivation and by 1919 these had been reduced to two. "Of these eleven, one, the BH 10(12), is a very promising variety, and one likely, judging from results so far obtained, to surpass the B–6450 in yield of saccharose per acre. The other ten, altho giving better results than the White Transparent, are exceeded in yield by the B–6450."

In Table I are summarized results from various tests of the *BH 10(12)* in comparison with other varieties obtained from 1914–16 by Bovell and d'Albuquerque in Barbados (1). Comparisons have been selected with the *White Transparent* of Barbados, which corresponds to our *Cristalina*, which may be regarded as the standard of the Island in most of the experiments with other varieties carried on to date. Any variety which can give more favorable results than the old reliable *Cristalina* under the desirable conditions required by this cane must be a splendid cane of high agricultural and manufacturing yield, good germinating, stooling and ratooning qualities and an excellent keeper.

TABLE I

Condensed Comparative Results in Barbados

Variety	Tons cane per acre	Normal Juice					Lbs. Suc. per acre
		Suc.	Gluc.	S. N. S.	Purity	Glucose Ratio	
I. Plant Canes on Coverly Plantation: Meriba Field							
W. Transparent	30.67	2.09	.086	.174	88.92	4.13	8,829
B. H. 10 (12)	36.83	2.36	.060	.180	90.77	2.57	11,539
II. Plant Canes on Waterfold Plantation: Tennant Field							
W. Transparent	43.08	2.01	.058	.128	91.55	2.88	11,417
B. H. 10 (12)	52.54	2.25	.052	.131	92.38	2.30	15,534
III. Plant Canes on Dodds Plantation—Upper Chapel Field							
W. Transparent	26.44	1.94	.086	.204	87.00	4.43	6,852
B. H. 10 (12)	47.57	2.37	.046	.151	92.22	1.94	14,879
IV. Mean Results for Three Seasons on Dodds Plantation—Upper Chapel, Cat Hole Fields							
W. Transparent	25.08	2.03	.074	.....	88.86	3.70	6,843
B. H. 10 (12)	39.31	2.33	.073	.....	91.17	3.13	12,265
V. Duplicate Fields on Coverly and Waterford Plantations—Four Experiments							
W. Transparent	36.87	2.05	.072	.....	90.23	3.50	10,123
B. H. 10 (12)	41.68	2.30	.056	.....	91.58	2.44	13,536

These results show us that in five distinct sets of experiments on as many types of soil the *BH 10(12)* has uniformly led the *Cristalina* in tons of cane and sugar produced per acre and was uniformly lower in number of rotten canes per acre at harvest. All chemical analyses showed a higher sucrose in the juice and lower glucose and, hence, superior purities in every case for the *BH 10(12)*.

These results are but typical of the hundreds that have been obtained of late years in Barbados and which have made the *BH 10(12)* the standard variety of that island and of the neighboring island of Trinidad (19).

In this connection the writer wishes to call the attention of the Porto Rican planters to the reports on comparative experiments made with varieties of which the figures given in Table I are an example for Barbados. By obtaining reports from various districts of tests made with new canes in comparison with some such standard cane as the *Cristalina* year after year, it becomes a comparatively

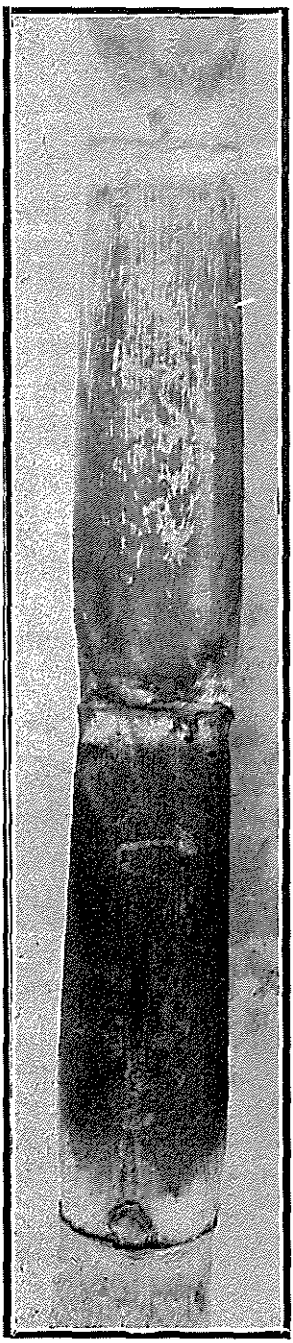


FIG. 1.—BH 10(12)

simple thing for the Experiment Station to accumulate data to strengthen and widen out its proper observations in the main Station and substations. Each planter, therefore, making such reports, helps not only his own particular district with his observations, but furnishes information of value—either positive or negative—to other districts as well. Were our Porto Rican planters in various sections of the Island to try out the new varieties furnished them in some such way as is done in Barbados, furnishing the Insular Experiment Station with some such concise and valuable figures as are obtained in our little British neighbor, the task of passing an opinion on the many varieties of cane under trial here at the Station would be very much simplified and be made, also, of much more general application. It must be remembered that the conditions at the Station are those of but a very reduced part of this extremely varied Island and that carefully controlled experiments from many districts are worth far more than a few trials under one single set of conditions.

Despite the large amount of *BH 10(12)* and *SC 12(4)* today cultivated in Porto Rico, it was an extremely difficult task to obtain even the meagre amount of information on comparative experiments over the Island which we are publishing in this paper, whereas, were a system followed of reporting results of varietal experiments from every district, such as is absolutely general amongst the planters of Java or Hawaii, the Experiment Station could serve as a clearing house for definite information of untold value to all of our planters. The Experiment Station will be more than pleased to arrange such trial plats with the most promising canes in various districts with any planters

desiring to do so. It is our policy to try out in such plats only those varieties which have already proven to be of promise here at the Station and, as the planter receives all the cane produced, merely furnishing us—and his brother planters—with the information obtained therein, there is no expense or loss to him through conducting such trials.

The *BH 10(12)*, on the strength of its splendid results in Barbados, was early introduced into the British Colony of Demerara and has given very good results there, but the planters of that colony seem wedded to the cultivation of *D–625*, which in 1924 was grown on 37,108 British acres, or 70.4 per cent of the cane area of the Colony, against 295 acres, or *six-tenths of one percent* of the cane area, for the *BH 10(12)* (10). This is rather difficult for the outsider to understand in view of the following figures on the crop of 1923, representing the average yields in tons of commercial sugar per acre of the *D–625* and *BH 10(12)*, as deduced from the returns supplied by the Managers:

TABLE II

Comparative Results from General Plantings of D–625 and BH 10(12) in British Guiana from Returns Supplied by Managers

	D-625	B. H. 10 (12)
Mean of all plantations	1.80	2.06
Maximum reported	2.85	3.04
Minimum reported	0.28	1.24

Experiments with BH 10(12) appear to have commenced in the British Island of Antigua about 1918 and comparisons with their *White Transparent* (our *Cristalina*) seem to have shown up uniformly in favor of the Barbados hybrid. Table III is a summary of these comparative results for 1919–20 with both plants and ratoon canes (26).

TABLE III

Average Results for Plant and Stubble Crops in Antigua, B. W. I.

Age	Variety	Tons cane per acre	Gallons juice per acre	Lbs. Sucrose in juice per acre
Plant	White Transparent	14.73	1460	3000
Plant	B. H. 10 (12)	17.32	1640	3800
Ratoons	White Transparent	10.83	1040	2280
Ratoons	B. H. 10 (12)	11.43	1210	2910

Experiments were started in the neighboring British island of St. Kitts at more or less the same time as in Antigua and in 1921

Collens wrote (26): "BH 10(12) is noted for the high sucrose content of its juice, the average for the present year being 2.31 pounds per gallon. It has headed the list this year in the St. Kitts experiments." Table IV gives in similar form to Table III a summary of the comparative results with plant in 1919–20 and with stubble in figures of means for all seasons:

TABLE IV

Average Results for Plant and Stubble Crops on St. Kitts, B. W. I.

Age	Variety	Tons cane per acre	Gallons juice per acre	Lbs. sucrose in juice per acre
Plant	White Transparent	21.0	2560	5350
Plant	B. H. 10 (12)	26.9	2950	6600
Ratoons	White Transparent			4910
Ratoons	B. H. 10 (12)			9170

The average ratoon showing of the *BH 10(12)* is particularly remarkable, Watts and Collens (26) remarking:

"The first place in the list of ratoons is taken by BH 10(12) with the high tonnage of 35.9 tons canes and 9,600 pounds sucrose per acre. . . . . This cane seems likely to prove a good ratooner with a high sucrose content, and especially in the wet districts."

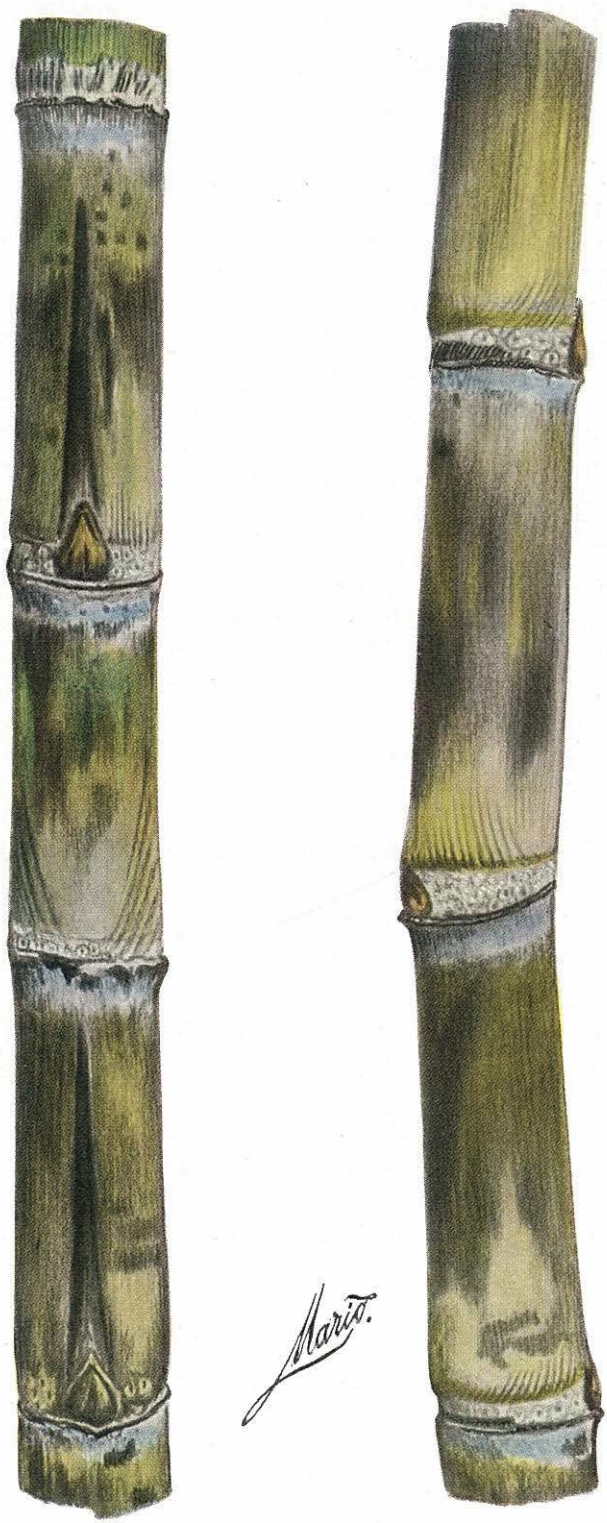
Just off of St. Kitts lies the little island of Nevis, on which the same varieties were tried out as those on St. Kitts. Table V gives a summary of these results in terms of means for each variety grown in 1919–20 as plant canes and as means for all seasons as plant canes, as regards the *BH 10(12)* and *White Transparent*. The weather conditions were against these experiments as a whole.

TABLE V

Average Results for Plant Cane in 1919–20 and as Mean for All Seasons on Island of Nevis, B. W. I.

Season	Variety	Tons cane per acre	Gallons juice per acre	Lbs. sucrose in juice per acre
1919-20	White Transparent	19.0	1810	3570
	B. H. 10 (12)	21.0	2110	4490
Mean of all	White Transparent			4000
	B. H. 10 (12)			5360

There is still one of these small British islands where interesting results have been secured with *BH 10(12)*—Montserrat. Very little cane had been grown on this island for many years until the high prices during and just after the Great War brought about a revival



SAINT CROIX 12/4

of the industry. Sugar-cane experiments were then inaugurated by the Imperial Department of Agriculture for the West Indies on similar lines to those conducted in St. Kitts, Nevis and Antigua already discussed above. A series of experiments, consisting of 22 varieties, was planted in 1919 at Farrells Estate, the mill juices from these canes at crop being analyzed at the Government Laboratory, Antigua. The soil on which the experiments were made is a medium clay one, the canes were planted on 6th January, 1919, and the harvest of the plant cane made on 31st March, 1920, being almost fifteen months old at time of harvest. The ratoon plats, which had been previously reaped as plant canes on 28th March, 1919, were now cut as ratoons on 1st April, 1920. No manure was applied to any of these plats, but the land did carry a green dressing of *gandules* during 1918. The rainfall for the period April, 1919, to March, 1920, was of the most favorable the Island has had for many years, reaching a total of fifty-seven inches, with a minimum of 1½ inches in August and a maximum of 13¼ in November. Table VI gives the data for these experiments (26) relating to *BH 10(12)* compared with *White Transparent*.

TABLE VI

Farrell's Experiment Plats, Montserrat, British West Indies

Age	Variety	Tons per acre	Data on juice				
			Extr.	Gals. per acre	Sucrose per gallon	Purity	Lbs. sucrose per acre
Plant	White Transparent	21.8	60.50	2750	1.849	92.1	5090
	B. H. 10 (12)	34.2	61.25	4350	1.997	92 6	8690
Ratoons	White Transparent	9.3					
	B. H. 10 (12)	18.1					

Here, as in St. Kitts, the *BH 10(12)* ranks first of all varieties tried as both plant and ratoons in tons of cane and sugar produced per acre and in quality of juice. Tables I to VI show us that without exception in the British West Indies it has been far superior to their erstwhile standard variety, *White Transparent* (our *Cristalina*).

SC 12(4) IN ITS SUPPOSED COUNTRY OF ORIGIN

Earle (8) describes this variety as follows:

"Erect, good vigor, fair stooler. Stalks long, medium diameter, green with reddish flush, light bloom. Internodes medium to long, cylindrical or a little compressed, staggered, furrow slight or none. Nodes somewhat constricted, slightly oblique; growth ring broad but rather poorly defined, even or somewhat elevated,

yellowish; root band strongly oblique, 5 to 10 mm., concolorous or paler; rudimentary roots crowded, in about 4 rows; leaf scar glabrous, broad and prominent in front, appressed behind; glaucous band constricted, poorly defined. Buds large, lanceolate, about 12 × 16 mm., exceeding the growth ring by one-third to one-half, margin broad, uniform, germination apical, heavy basal plaes, abundant marginal vestiture ending in a conspicuous apical tuft. Leaf sheaths with dense vestiture along the back, the sides glabrate, greenish or slightly tinted, somewhat glaucous, the base slightly stained purple within; throat lannate and with an abundant vestiture of hairs; collar medium width, reaching the midrib, glaucous, the margins slightly lannate; ligule about 4 mm., minutely fimbriate; ligular processes none.[4] Leaf blades erect, usually even to the tips, flat, 7 cm. or more wide, dull green, minutely and sparsely serrulate, the bases even, not ciliate.''

Earle's description of the color of the leaf as dull green is rather more appropriate than Dr. Longfield Smith's (24) statement that ''The leaves are darker than those of either Ribbon or Crystallina.'' It is true that during the characteristic dry periods of the Virgin Islands the *SC 12(4)* seems to maintain a much more vigorous growth than the *Rayada* or *Cristalina*, the leaves of the latter taking on the light appearance due to lack of water much more quickly than the *SC 12(4)*. Nevertheless, under normal conditions of growth, the *SC 12(4)* may be said to show characteristically lighter color than healthy *Cristalina*, the color of the leaves being somewhat comparable to that of *D 433 (Ceniza de Fajardo)* and decidedly darker than the normal color of *B–67* or *Ba 6032*.

It will doubtless be a surprise to many planters interested in this remarkable cane variety to learn that it is in no sense a St. Croix seedling, having been, like *BH 10(12)*, produced in Barbados by Mr. Jno. R. Bovell and from the same parent cane—*B 6835*. An interesting parallel is the case of the two well-known varieties *D–74* and *D–95* which have done so much for the sugar industries of Louisiana and Mauritius. These are not really Demerara varieties at all, having figured amongst the first seedling canes produced by Harrison and Bovell in Barbados when these two well-known cane breeders workt cooperatively in Barbados, and happening to be amongst a number of unnamed seedlings which Sir John Harrison carried with him to Demerara when he was transferred to that colony shortly after the production of these first seedlings.

When Mr. Bovell in 1912 paid a visit to the Experiment Station in St. Croix, then under the administration of the Danish authorities, he carried with him and presented to the Director of the Station several seedlings recently produced by himself in Barbados, this particular variety being a seedling of *B 6835*. Amongst these seed-

[4] The writer finds an occasional inconspicuous ligular process in this variety.

lings figured the one that, after long trial by Dr. Longfield Smith, then Director of the St. Croix Station, came to be known as St. Croix's most valuable cane—the *SC 12(4)*. Hence it would seem that, aside from the famous *Hawaii 109*, most of the seedlings which have gained great reputations for themselves and contributed very materially to the advancement of the sugar industries of countries widely scattered over the face of the globe have really originated in that little speck in the West Indies—Barbados.

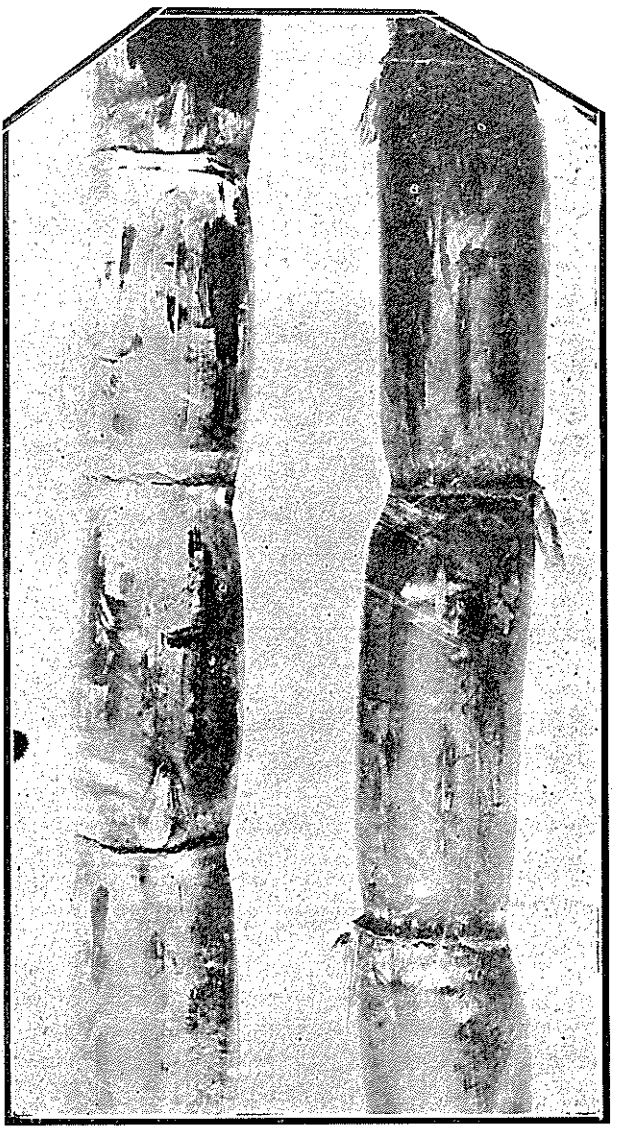


FIG. 2.—B-6835, the Parent Cane of both BH 10(12) and SC 12/4

In 1921 Dr. Longfield Smith, in his excellent article on "Sugar Cane in St. Croix" (23) wrote as follows:

"*Seedling SC 12/4.*—This cane has given an average increase per acre over the Ribbon cane of 3.4 tons of cane and 1,197 pounds of sucrose extracted by the small mill The tonnage represents an increase of approximately 12 per cent, and the sucrose an increase of approximately 20 per cent. . . . . Over 100 acres of it are now under cultivation in St. Croix. The Mount Pleasant plantation reported an increase of 30 per cent in tons of cane per acre for first ratoons. Definite results from other plantations

were not obtained, but it is known that this cane has shown its superiority everywhere, and that the exceptional richness and purity of the juice are important points in its favor.

"When subjected to severe drought, the mature cane of this variety has been observed to dry up more rapidly than the Ribbon cane. For this reason it should be cut earlier in the season than Ribbon cane, when there is dry weather. This year some of the plantations delayed cutting cane *SC. 12(4)* in order that the top pieces might be used for planting at the time of the spring rains. These rains did not occur, and consequently the canes became overripe. . . . . "

Table VII gives the data from plat tests at the St. Croix Experiment Station in comparison with their *Ribbon* (our *Rayada*) cane.

TABLE VII

Comparison of Yields Obtained from SC 12(4) and Ribbon Canes, St. Croix Agricultural Experiment Station

Plant No.	Santa Cruz (12) 4		Ribbon	
	Tons cane per acre	Lbs. sucrose per acre	Tons cane per acre	Lbs. sucrose per acre
1	34.0	8873	27.3	5797
2	38.4	8790	32.0	6521
3	29.4	6322	31.2	6360
4	30.7	5756	18.3	3524
5	25 0	5107	32.0	6659
Average	31.5	6969	28.1	5772

IN SANTO DOMINGO AND CUBA

In very recent years both *BH 10(12)* and *SC 12(4)* have been introduced into *Santo Domingo* and *Cuba*, as well as Jamaica, and Menéndez (14) states that "their behavior in those countries is corroborating our experience in Porto Rico." He goes on to say:

"Whether their peculiar characteristics will make them adaptable to those countries remains as yet to be seen; but from personal experience of the writer it seems that their trial on a large scale is worth being taken into consideration by the cane growers of the sister islands. It is the personal opinion of the writer that because of its stronger stooling and ratooning power and general hardiness as a growing plant, the Barbados Hybrid has a chance at supplanting Cristalina for many sections of Cuba, Santo Domingo and Jamaica."

Chardón (5), on a visit to Ingenio San Luis in Santo Domingo, found that *BH 10(12)* and *SC 12(4)* have the same preponderance there as in Porto Rico and Cuba, stating that at the time of his visit—August, 1924—the development of these canes was truly admirable, and gave promise of magnificent results in the *vega* lands.

Rivera (16), in one of the very few available articles on sugar

cane varietal studies in Cuba, gives an account of his visit to a large experimental planting of 52 selected varieties, secured from the Insular Experiment Station and several *Centrales* of Porto Rico, in the "Finca El Palomar" of Aponte & Co. in the Province of Havana. The soil of this plantation is of the loose red clay characteristic of the level lands of this district. At the time of his visit the plantings were seven months old and well developed. He found *BH 10(12)* and *SC 12(4)* far ahead of all other varieties, it being difficult to decide which of these two was superior. "The vegetation of both is superb; the Santa Cruz has the most elegant appearance

FIG. 3.—Sta. Cruz 12(4) in Cuba, 8 months old
Photo by Mr. P. Richardson Kuntz

on account of its robustness, but the Barbados Hybrid has by far the larger number of stalks per row. These two varieties appear particularly promising and there is no doubt whatsoever that they will be extensively propagated in Cuba."

In a letter recently received from Mr. Jas. L. Rogers, Jr., secretary of the Cuba Sugar Club, he amply confirms Mr. Rivera's observations on these varieties at "El Palomar," calling attention, however, to the necessity of further observations under distinct conditions to those of this planting. As emphasizing just such a necessity, it might be mentioned that Mr. F. S. Earle, of the Tropical

Plant Research Foundation, wrote the author on 28th January last, as follows:

"In Chaparra, on their black-coco subsoil lands, BH 10(12) is not quite at home."

The Guantánamo Sugar Company is to be credited with having introduced *SC 12(4)* from Porto Rico into Cuba since December, 1922, and has multiplied and distributed it so rapidly that there are at present many acres of it in "The Pearl of the Antilles." This seed came from Mercedita de Ponce and is probably from the original introduction of this variety made direct from St. Croix by the

FIG. 5.—SC 12/4 8 months after planting in Central Palma, Cuba

engineer of that central, Mr. Edward K. Junghans. The following results were obtained from the harvesting of one of their experimental fields on 2nd February of this year, the field representing a trial of *SC 12(4)* in comparison with the standard cane of Cuba, *Cristalina* (2). The cane was eighteen months old when harvested.

TABLE VIII

Comparative Yields from SC 12(4) and BH 10(12) in Guantánamo, Cuba

Variety	Tons cane per acre	Brix	Purity
S. C. 12 (4)	60	17.90	82.45
Cristalina	37	17.43	82.13

Shortly after this cane was harvested, Calvino, after a visit to these plantations, writes (2):

"But the best fields of the SC 12(4) at the time of this writing have not yet been cut, and by their general appearance we can foretell that this will yield more and give canes richer in sugar."

In regard to the resistance of this variety to wind, Calvino goes on to say:

"Early in March, 1925, while I was in Guantánamo, there was a heavy rainfall, the rain gauge registering over two inches. These showers came in company with a strong wind which laid flat the Purple Striped and the Cristalina canes, while the SC 12(4) . . . . remained standing, as Mr. David Herrero informed us."

FIG. 4.—SC 12/4. This cane is 9 months old and yielded about 40 tons per acre at Central Palma, Cuba

Dr. Calvino, in the same article quoted above, gives a rather remarkable explanation of why the *SC 12(4)* is at present an erect cane, whereas Dr. Longfield Smith described it originally as inclined, as follows:

"When Dr. Smith distributed these seedlings by pieces, he selected the superior parts of them, that is, the soundest, most vigorous and best canes of each one of them. *Thus the SC 12(4) was improved and has kept its superiority ever since.*[5]"

It is hardly likely that, when Dr. Smith was propagating this seed, altho, like every plant breeder, he would select his best plants

[5] The italics are the writer's.

for seed, he would have been able to distribute seed only from the erect canes of a variety which he describes as "inclined," nor is there any indication in Dr. Smith's reports that such an attempt was made, hence we can hardly attribute much importance to the conclusions here drawn by Dr. Calvino in regard to vegetative selection inducing erect canes, even tho the selection be not made with that character in view.

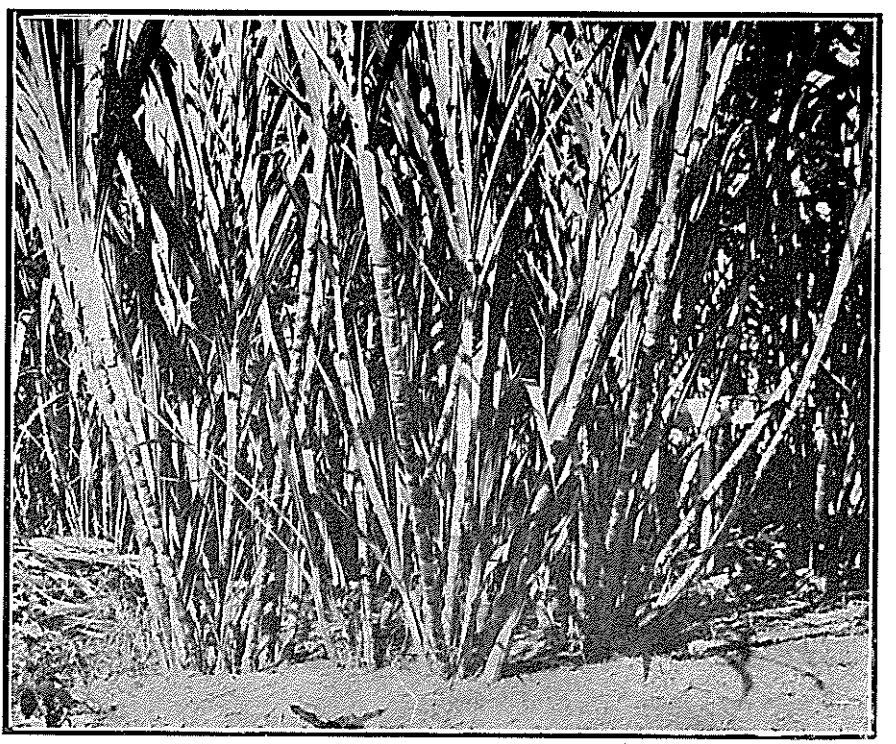


FIG. 6.—Typical stools of BH 10(12)

THE BH 10(12) AND SC 12(4) IN PORTO RICO

Earle (8) states that the *BH 10(12)* was originally imported into Porto Rico by Guánica Centrale in the fall of 1919, part of this seed being sent to the Insular Station, while *SC 12(4)* was imported by the Federal Experiment Station at Mayagüez, some of this seed being planted at the Station in the spring of 1919. In 1921 he stated:

"This famous Barbados hybrid is making a very favorable showing. It seems to be adapted to a wide range of conditions but is doing especially well

on the red shale hills. It is a good germinator and ripens sufficiently early to be used either for fall or spring planting. So far it is ratooning very strong. It has every promise of being an unusually good general-purpose cane. Its resistance to root disease is evidently good. . . . .''

FIG. 7.—A fine field of gran cultura of SC 12/4 at Central Aguirre, August 1925
Photo by Harold Box

Of *SC 12(4)* Earle (8) wrote at the same time:

''Seems very promising. It is said to resist drouth unusually well and it matures early, making it available for spring planting. . . . At Mayagüez it is resisting Mosaic decidedly better than most kinds. Its sucrose quality seems very good.''

In his annual report for 1922–23, Director Menéndez of the Insular Experiment Station (12) states that ''BH 10(12) and Saint Croix 12(4) continue at the head of the list of the most promising varieties, both canes giving heavy tonnage and high sugar yields harvested as 'primavera'. . . . . Both canes have resisted drought well.''

FIG. 8.—SC 12/4 and Cristalina in the same field and planted at same time at Esperanza Estate, Aguirre. SC 12/4 to left of man, Cristalina to right. August, 1925

Matz (11) in 1922 at the Insular Station demonstrated high resistance for gumming disease *(Bacterium vascularum)* for the *BH 10(12)* and by the same time both varieties had proven to be highly

resistant to Mosaic Disease. Menéndez concluded that "all factors taken into consideration, the Barbados hybrid should be considered as the most valuable cane for most types of soil of the Island," and the following year reported (14) that "BH 10(12) continues to top the list of our most promising varieties. As the cane gives considerable tonnage in plant cane and is a good stooler and ratooner, in addition to its high sucrose content and early maturity, it is safe to predict that BH 10(12) will long be a favorite with the farmers." He reported *Santa Cruz 12(4)* as a close second to the popular Barbados seedling and that "it is being preferred to that in some districts of the Caguas valley, where it certainly grows wonderfully well." As showing the popularity today of the *BH 10(12)* all over the Island, it might be of interest to mention that for the season of 1924–25 over 20 per cent of the seed distributed from the Insular Experiment Station in response to solicitudes from planters was of that variety.

FIG. 9.—A field of BH 10(12) gran cultura on Florida estate of Central Aguirre. August, 1925. Photo by Harold Box

FIG. 10.—Another gran cultura field of BH 10(12) at Aguirre. August, 1925

At the end of 1921 Prof. F. S. Earle planted out a large variety

plat at Central Aguirre, in which *BH 10(12)* showed up far superior on every count to every one of the great number of varieties tried. Analyses of each variety were made in January, February, March and April, 1923, the *BH 10(12)* showing up in each case first of the lot in Brix, Sucrose and Purity. Below are given the comparative analyses of the *BH 10(12)* and *Cristalina,* made the third weeks of February and March, 1923, when the cane was 14½ and 15½ months old respectively.

Month	B. H. 10 (12)			Cristalina		
	Brix	Sucrose	Purity	Brix	Sucrose	Purity
February	23 50	21.63	92.00	21.75	19.06	87.60
March	24.00	22.04	91.80	21.30	19.23	90.40

Of the *BH 10(12)* showing in these experiments, Mr. Earle said:

"A remarkable record. Is best variety we have from all points of view. Splendid germinator, quick grower, very heavy tonnage, matures early and keeps remarkably in the field after full maturity. Has averaged 2 to 3 points better sucrose and purity than Cristalina and will give decidedly more tonnage on a great variety of soils. Stands drought well."

While, naturally, giving far better industrial yields if cut fairly late in the season, both *BH 10(12)* and *SC 12(4)* give really remarkable sugar contents as early as January and February, generally showing up as superior to *Cristalina*, one of the best canes for early cutting. In January, 1924, the writer remarked in Central Aguirre and other south coast centrals that both *BH 10(12)* and *SC 12(4)* were showing purities in the factory of above 90—several points ahead of the *Cristalina* being generally ground at that time.

Mr. C. L. Carpenter, vice-president and general manager of Central Aguirre has kindly furnished us with the following comparative yields and analyses of two fields of *Gran Cultura,* one of *SC 12(4)* and the other of *Cristalina*, the two fields being side by side. These fields were located in Hacienda Esperanza and were planted and cut at the same time, hence the figures for the two varieties are rigorously comparative.

SANTA CRUZ 12(4) AND CRISTALINA CANES

Gran Cultura—17 Months

Variety	Acres	Tons cane per acre	Brix	Sucrose	Purity	Tons sugar per acre
S. C. 12 (4)	6.15	77.56	18.42	16.30	88.5	9.49
Cristalina	7.57	59.30	19.92	17.83	89.5	7.95

As *Cristalina* is at its best on the south coast, this may be considered as a very fair comparison. Mr. Carpenter had the following to say in regard to this experiment:

"We think that the SC 12–4 should not have been harvested so early. It was very green when cut and was still growing, and we feel very sure that if we had let this cane grow a few weeks longer it would have given considerably better results."

Another central on the south coast has been trying out these canes since 1919, having made direct importations of them from Barbados and St. Croix, and much valuable comparative data is available at this point. In 1920 a field of *primavera* of just three acres in extent of *BH 10(12)* yielded the surprising result of 42.70 tons of cane and 6.18 tons of sugar per acre and in 1921 another *primavera* field of the same variety, covering 48 acres, yielded 47.76 tons of cane and 6.80 tons of sugar per acre. A number of comparative tests at this central for *primavera* and *gran cultura* for the past five crops are summarized in the following table. This data is very complete and has been extremely carefully kept, hence the table should give a pretty fair idea of the comparative value of the various varieties under south coast conditions.

TABLE IX

Comparative Yields on the South Coast for the Crops 1921–25 Inclusive

Variety	Acres	Age	Tons per acre		Observations
			Cane	96 sugar	
		I. Crop of 1921			
B. H. 10 (12)	4.75	Prim.	53.38	7.27	
Cristalina	30.00	G. C.	52.50	6.31	
B. H. 10 (12)	29.00	Prim.	47.24	6.75	
Cristalina	36.00	G. C.	48.88	6.28	
S. C. 12 (4)	11.50	G. C.	62.33	8.30	
Cristalina	36.00	G. C.	47.88	6.05	
		II. Crop of 1921			
S. C. 12 (4)	17.00	Prim.	37.52	5.18	
B. H. 10 (12)	75.00	Prim.	28.19	4.25	
B. H. 10 (12)	4.00	G. C.	45.69	6.34	
B-208	1.75	G. C.	57.10	6.06	
B. H. 10 (12)	4.25	G. C.	82.85	10.91	Planted after cowpeas
D-109	6.50	G. C.	74.86	8.71	

III. Crop of 1923

S. C. 12 (4)	32.00	Prim.	26.33	3.57	
B. H. 10 (12)	283.00	Prim.	21.99	3.03	
S. C. 12 (4)	101.00	G. C.	45.11	3.57	
B. H. 10 (12)	156 00	G. C.	45.46	5.82	
S. C. 12 (4)	6.00	G. C.	60.01	7 12	Planted after cowpeas
B. H. 10 (12)	12.00	G. C.	61.70	7.65	
S. C. 12 (4)	3.50	G. C.	50.48	6.36	
B. H. 10 (12)	31 00	G. C.	50.25	6.06	
S. C. 12 (4)	11.00	G. C.	56.14	6.82	
B. H. 10 (12)	11.50	G. C.	52.17	6.50	
S. C. 12 (4)	10 00	G. C	70.57	8.88	
B. H. 10 (12)	8.50	G. C.	80.76	10.46	

IV. Crop of 1924

S. C 12 (4)	58.00	Prim.	31.34	4.25	
B. H 10 (12)	476.00	Prim.	29.73	4.08	
S. C 12 (4)	116.00	G. C.	34.97	3.98	
B. H. 10 (12)	399.00		37.90	4.78	
S. C. 12 (4)	2.75	G. C.	80.21	8.62	
B. H. 10 (12)	7.00	G. C.	69.54	8.45	

V. Crop of 1925

S. C. 12 (4)	23.00	G. C.	70.11	9.02	
B. H 10 (12)	21.50	G. C.	92.49	11.58	
S. C. 12 (4)	11.25	Ratoon	38.32	5.03	
B. H. 10 (12)	17.75	Ratoon	30.28	4.25	

Considering the large areas of the distinct varieties cultivated and the rigidity of the comparisons, Table IX probably represents the most complete data ever obtained on the comparative values of two canes. The 1921 figures demonstrate very clearly the superiority of the *BH 10(12)* and *SC 12(4)* over the *Cristalina* and explains the increasing areas of the *BH 10(12)* and *SC 12(4)* in the later years. Even the *primavera* of the *BH 10(12)* produced more sugar per acre than the *gran cultura* of *Cristalina*—and the yields for *Cristalina* are very good indeed and representative of about the optimum to be expected under ideal south-coast conditions—and the test of *gran cultura* of the *SC 12(4)* and *Cristalina* canes on large areas shows that the former produced an average of *fifteen tons cane and 2¼ tons more sugar per acre* than the *Cristalina*.

The comparison of *BH 10(12)* and *B–208* is particularly interesting, as *B–208* is a cane of early maturity and very high sugar content—a fit competitor for *BH 10(12)*. Yet, altho the *B–208* gave over eleven tons more cane per acre in this test, the *BH 10(12)* produced more sugar. The bad ratooning qualities of the *B–208*, other conditions being anything like equal, and its inferior drought resistance to that of the *BH 10(12)* would of themselves have con-

tributed very largely to the replacement of this variety by the *Barbados Hybrid* which has taken place in the past three or four years, very large areas of the *B–208* having at one time been cultivated on the south coast.

In the comparison of *BH 10(12)* with *D–109,* we note that the latter has given an enormous yield after cowpeas had been turned under the land on which this experiment was made, yet the *BH 10(12)* has produced over eight tons more cane and 2¼ tons of sugar more than the *D–109.* Again there is no doubt of the superiority of the *BH 10(12),* altho, were the figures for *D–109* published without comparison with those for the *BH 10(12),* we might arrive at a very different conclusion. One more argument of the necessity always of COMPARATIVE data.

As to the comparison between the *BH 10(12)* and *SC 12(4)* there is very little to chose between them, altho the results obtained represent crops covering five years from an area of around 2,000 acres and a product of almost 70,000 tons of cane and 9,000 sugar. As *primavera* and as ratoons there is a slight difference in favor of the *SC 12(4),* but this difference is always very small, whereas in *gran cultura* the three enormous yields of over 10 tons of sugar per acre are each time given by the *BH 10(12).* In 1923 there were three slight gains for the *SC 12(4)* and an equal number of gains for the *BH 10(12),* in 1924 *SC 12(4)* was ahead of *BH 10(12)* by less than a fifth of a ton of sugar twice, whereas in the third experiment *BH 10(12)* gave four-fifths of a ton more sugar than the *Santa Cruz,* while the 1925 tests showed honors about even, except for the striking yield for the *BH 10(12)* in one test of 92½ tons of cane and 11½ tons of sugar per acre—figures which, for the length of the growing season, will rival some of the famous yields obtained at Ewa, Hawaii, from their *H–109.*

On the extreme western end of the south coast we have been fortunate enough to obtain, thru the kidness of Mr. R. L. Page, Chief of Cultivation for Russell & Co., at Santa Rita, an interesting comparison of the two canes we have been studying with *D–117,* widely known on the south coast as "Caña Guánica," due to the large acreage of this heavy cane formerly cultivated by that company. In this experiment there were two plats of each variety, running about 1¼ acres each in size, and the harvest of all of them was made on 3rd January, 1925.

TABLE X

Santa Rita Experiments with D–117, BH 10(12) and SC 12(4)

Variety	Plat	Tons cane per acre	Per acre 96 sugar	Sucrose	Purity
D–117	1	67.63	4.89	9.82	72.38
B. H. 10 (12)	2	66.44	6.16	11.95	78.71
S. C 12 (4)	3	76.51	6.74	11.52	76.82

While *D–117* gave about the same tonnage of cane per acre as the *BH 10(12)*, the far better sugar content of the latter resulted in its yielding 1¼ ton of sugar more per acre, while *SC 12(4)*, altho giving an agricultural yield per acre ten tons in excess of that of *BH 10(12)*, shows a gain in sugar per acre of just a little over one-half ton. So here again we do not find a great deal to choose between these varieties.

While this cane was *gran cultura*, it was evidently cut far too early in the season for it to have attained anything like maturity. In regard to this point Mr. Page writes us on 10th March, 1925:

"You will see by this purity that it was a mistake to have harvested this cane at this time. We are now obtaining from these varieties, and even younger cane than this, as high as 19 per cent sucrose with 88 per cent purity, which would have given 50 per cent more sugar per acre than that shown on above plots."

Along the west coast, due to the ravages of Mosaic Disease a few years ago and the more or less general adaptation of the *Kavangire (Uba)* and *Java POJ* canes, very little data is as yet obtainable on these two varieties, altho both are now beginning to be planted in rather extensive areas on that coast. Agricultural Agent William Montalvo wrote us from Cabo Rojo on 13th October last that the *SC 12(4)* under equal conditions of soil and treatment seems to germinate better and give better yields than either *Cristalina* or *Yellow Caledonia*.

The Arecibo district, on the north coast, was also badly scourged by Mosaic Disease and at Central Los Caños, under the progressive administration of Mr. Antonio Fraticelli, large areas of *Kavangire* and *POJ* canes have been cultivated and given very good results. Some *BH 10(12)* has been cultivated at this central in recent years and Mr. Fraticelli has kindly furnished us with the following comparisons between this cane and *Rayada* during the past two crops.

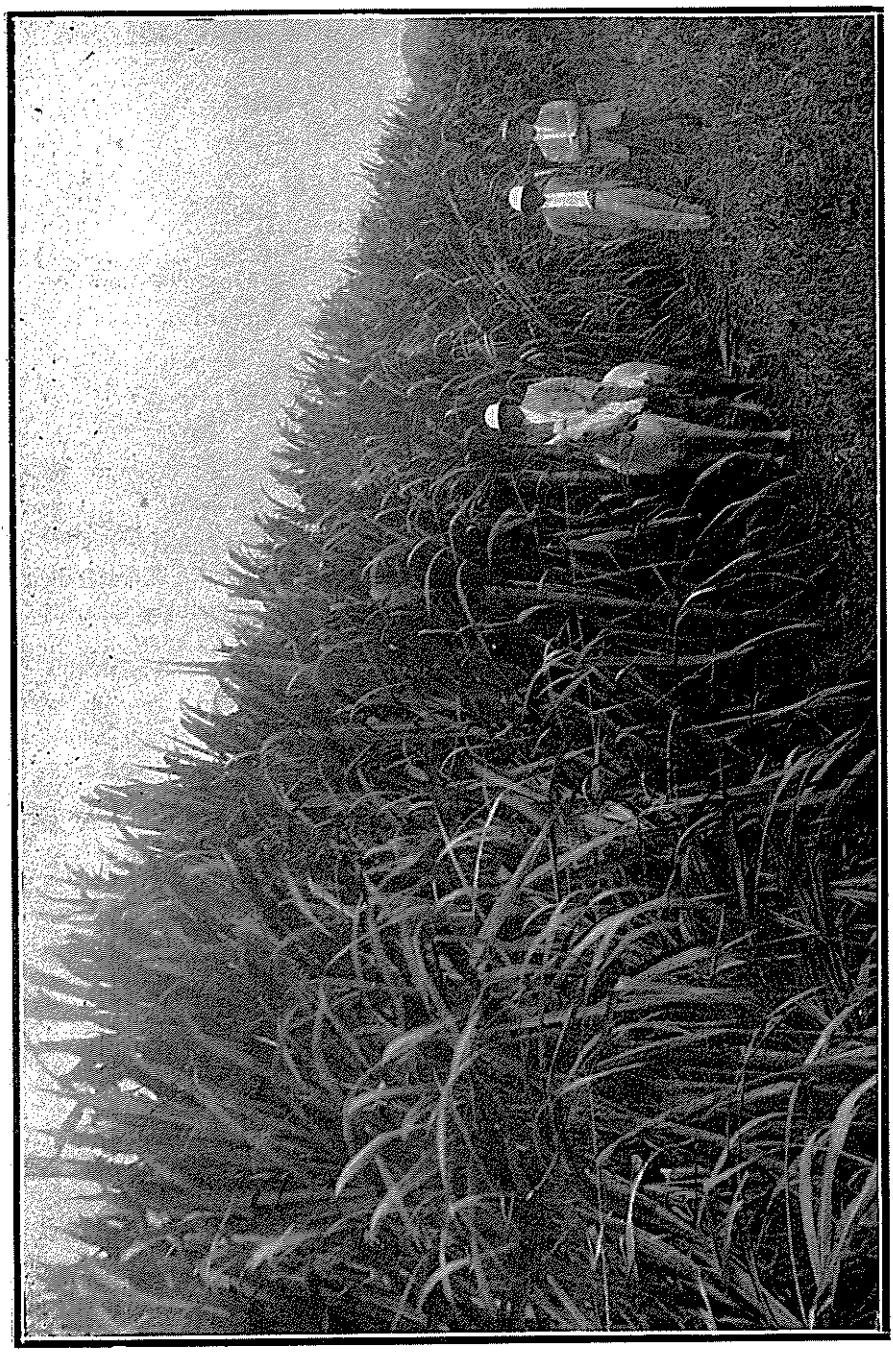


PLATE III.—BH 10(12) at Central "Los Caños". Gran cultura at 10 months. Manager Fraticelli on horseback. There are 50 acres in this field

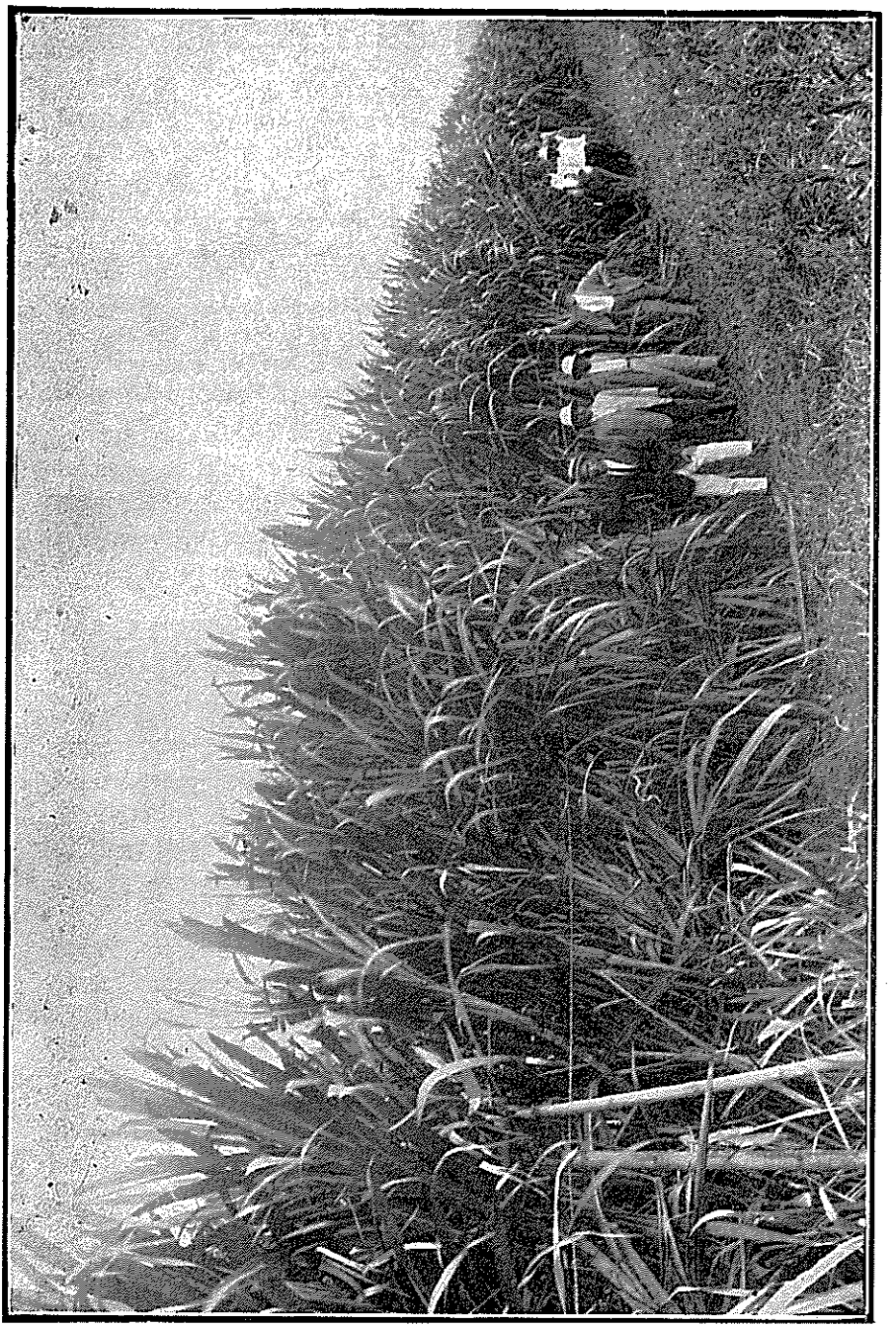


PLATE IV.—BH 10(12) at ''Los Caños''. Gran cultura at 10 months. There are 45 acres in this field

TABLE XI

BH 10(12) Compared with Rayada at Central "Los Caños"

Date	B. H. 10 (12) Gran cultura		Rayada Ratoons	
	Sucrose	Purity	Sucrose	Purity
III-29-24	14.45	83.50	16.50	86.01
31-24	14.60	84.19	16.58	89.22

Of this latter field test Mr. Fraticelli writes:

"In sucrose and purity both varieties turned out about alike, giving an average sugar content of 17 per cent and purities of 87 per cent. We also cut a piece of *primavera* containing 28 acres, which gave 48 tons of cane per acre, with an average of 15½ per cent sugar and 86 per cent purity, this being cut when it was just a little under one year old."

Mr. Fraticelli also sent us the following data on two cars of *BH 10(12)* and two of *Rayada* from his finca at Rincón, on the west coast, which were ground at Central Coloso the end of January, 1924: (Both lots were *gran cultura* under equal conditions.)

Date	BH 10 (12)		Rayada	
	Sucrose	Purity	Sucrose	Purity
29th January	14.31	84.32	15.71	85.31
31st January	12.91	84.08	15.31	82.09

The writer's observation on both the north and west coast would indicate that, while *BH 10(12)* is not likely to prove superior to *Rayada* in sugar content and purity where it does fairly well, it does as a rule give far superior agricultural yields and will generally work out as showing more sugar per acre.

Mr. C. E. Chardón (3), in an address last year before the Porto Rican Association of Sugar Technologists, furnished us some most interesting information on the behavior of *BH 10(12)* and *SC 12(4)* at Central "Cambalache," quite near "Los Caños." He stated therein that—

"The sugar yield of these two varieties . . . . at Cambalache surpasses all previous records and they have been propagated extensively in the Arecibo valley, covering at the present time about 700 acres. In the next two years they will cover practically all of the alluvial lands in the Cambalache fields. . . . . *BH 10(12)* and *SC 12(4)* do not thrive under the conditions of the interior districts of the north coast."

Mr. Chardón made two interesting field tests in this district. The first one comprised over half an acre of the *Arecibo loam* type

of soil a few hundred yards from the shore of Caño Tiburones. It was a black loam with high organic content and excellent for cane growing. The field was planted to 8 standard varieties of cane from the Insular Experiment Station on 14th March, 1923, and harvested on 31st December, 1923, when the cane was only a little over nine months old. The standard variety of that region being *Caledonia,* alternating rows of this variety were planted with the other varieties in the experiment. Four plants of each variety were left standing to obtain sucrose mill tests at end of a year, these analyses being carried out by the chemist of Central Cambalache, Mr. Román Benítez, with the laboratory hand mill, on 23rd March 1924. The results for *Rayada, D–117, Cristalina, SC 12(4)* and Caledonia are given in Table XII.

TABLE XII

Caño Tiburones Experiment

Variety	Tons cane per acre	Sucrose	Purity
Rayada	24.24	15.03	90.81
D–117	32.40	13.15	81.67
Cristalina	36.00	15.48	89.22
Caledonia	39.73	13.01	81.42
S. C 12 (4)	42.85	15.94	90.10

In this test *SC 12(4)* led the other varieties in both tonnage and sugar content, altho both *Cristalina* and *Rayada* gave characteristically good analyses. *D–117* and *Caledonia* have given typically low sugar contents and purities, *Caledonia* also giving the good agricultural tonnage characteristic of this variety on this type of soil.

Chardón's second experiment was located on one and a quarter acres on the east bank of the Arecibo River, which had been dedicated to pasture land for many years and approached the conditions of virgin land. The soil was a good type of the well-known *vega* lands of that district, coming under the classification of *Arecibo silt loam.* The field was well prepared in the usual *banco carril* system, altho drainage ditches were not found necessary. Twenty-one varieties were brought from the Insular Experiment Station and planted the middle of March, 1923. They were harvested at various intervals from 21st November to 15th December of the same year, when barely nine months old. No sucrose tests were made with the varieties, but all plants infected with Mosaic Diseases were systematically rogued. Table XIII gives the yields in tons per acre of *D–109, SC 12(4), BH 10(12), B–208,* and *D–117.*

TABLE XIII

Arecibo River Experiment

Variety	Tons per acre
D–109	48.33
D–117	43.75
B–208	43.33
SC 12(4)	50.95
BH 10(12)	50.00

Here again the *SC 12(4)* and *BH 10(12)* head the list of varieties, with almost identical yields per acre, thus again making our choice between the two varieties difficult.

Some ten miles east of Cambalache and under very similar north-coast conditions lies Barceloneta, near which is Central Plazuela, the capable agricultural superintendent of which is Mr. E. D. Colón, formerly Director of the Insular Experiment Station. Mr. Colón has kindly furnished us the following data on *BH 10(12)* at Plazuela:

"On account of a lack of available land at the proper planting time we have not propagated the BH 10(12) variety to the extent that would have been justified by the good qualities it has shown here both in field and factory. In January, 1924, we cut and ground a plat of around one acre in extent of this variety. It yielded at the rate of 800 *quintales* per acre on *poyal* land with only a few months of rest between plantings. I give you below the average analysis of this cane compared with other varieties close by and grown under the same conditions, cut and ground at the same time. The figures given are for normal juice in the *Plazuela* factory.

Variety	Brix	Sucrose	Purity
BH 10 (12)	17.83	15.27	85.66
Rayada	16.80	14.48	86.20
D-433 (Ceniza)	15.60	12.27	77.30

From the Vega Baja district, some eight to ten miles east of Plazuela, we have very little data on these canes, except the ocular observation of the writer that both are doing extremely well in this zone and the statement in a letter from Agricultural Sub-Inspector Elías Hernández to the effect that there is "great enthusiasm" for these varieties over his entire district.

Central Victoria, located near the town of Carolina, some seven to eight miles from Río Piedras, has been cultivating these two canes to some extent since 1921 and in this past crop *BH 10(12)* broke all records in that Central for high yields in the factory. Mr. José F. Cordero, the capable Inspector of Colonies at Victoria, has been trying out and observing these canes for the past four years, not

only in the Victoria fields, but over the entire district. He states in a letter to the writer under date of 29th May, 1925:

"I have tried out both of these canes under distinct cultural conditions and on various classes of soil, planting in holes and *en chorro* on both *vega* and semi-high lands, always in comparison with the *D–109* and *D–433* varieties and, both as regards general development and tonnage, I can assure you that they are superior to any other variety tried."

Mr. Cordero considers the *BH 10(12)* a slightly better germinater than the *Santa Cruz,* in which observation the author agrees entirely. It has also been the writer's observation on both the north and south coasts that the *Barbados Hybrid* seems to resist protracted drought longer than the *SC 12(4),* altho the latter is drought resistant, once it has gotten a good start, in very high degree.

Mr. R. Myohl, the very capable manager at Central Victoria, has been kind enough to furnish us with the following comparative data of *SC 12(4)* and *Rayada* obtained from grindings at that Central during the past crop:

TABLE XIV

Comparative Factory Yields of SC 12(4) and Rayada at Central Victoria

Variety	Kind of cane	Age (Months)	Class of soil	Month cut	Factory yield
S. C. 12 (4)	Primav.	11	High and dry	End Feb.	11.97
Rayada	Primav.	10	High and dry	Early Apr.	13.16
S. C. 12 (4)	Primav.	12	High and dry	End Feb.	13.61
Rayada	Primav.	13	High and dry	End Feb.	13.16
S. C. 12 (4)	Gr. Cul.	15-16	Low and wet	January	11.24
Rayada	Gr. Cul.	15 16	Low and wet	January	10.91
S. C. 12 (4)	Gr. Cul.	15 16	Low and wet	January	10.82
Rayada	Gr. Cul.	15-16	Low and wet	January	10.66

It will be seen from this table that the *SC 12(4)* has in all cases given slightly better factory yields than the very high sucrose content *Rayada,* all yields being a bit low for these canes, as the cane was cropped quite early in the season. In the first *primavera* comparison the *SC 12(4)* has the advantage of one more month's growth than the *Rayada,* but this should be somewhat compensated by the later cutting of the *Rayada.* However, in the second *primavera* comparison, it will be noted that 12-month-old *Santa Cruz* has given a slightly better recovery factor than 13-month-old *Rayada* cut and ground at the same time.

In regard to the *BH 10(12),* Mr. Myohl advised that they had no comparative figures as yet, but concluded:

"We, however, did grind some *Primavera* canes of this variety belonging to one of our *colonos* in the Trujillo Alto district. Those canes we ground in May

when about 11 months old and their average yield in the factory was about 14.48 per cent, some analyses running as high as 15.46 and 15.30 per cent."

These are, indeed, very promising factory yields for 11-month-old cane. The writer saw these fields of *BH 10(12)* and they certainly showed very good tonnage for the soils of the Trujillo Alto district.

From Victoria to Central Fajardo, on the northeast extremity of the Island, conditions are fairly similar, hence we may next turn our attention to the experience in this most progressive central with these two varieties. As is well known, Central Fajardo maintains its own experiment station, under the competent direction of Mr. R. A. Veve, and it is due largely to the practical investigations carried on by this station that the *D–433* practically replaced all other varieties in that section and is now in turn beginning to be replaced by varieties developed at the Fajardo Station—amongst the most promising of these being *F. C. 306*, *214* and *140* in the order named. Mr. Veve wrote us in August, 1924, that their data on the *BH 10(12)* and *SC 12(4)* were quite limited, as they had started work with them only the previous year, but added that "We are propagating very heavily the BH 10(12), which seems to be the one best adapted to our conditions." From the 1923–24 Annual Report of this Station we obtain the following information:

Variety	Age	Acres	Tons per acre		Brix	Purity	Factory Yield
			Cane	Sugar			
SC 12 (4).....	Gran Cult....	3.57	37.63	4.10	18.1	84.4	10.9
BH 10 (12)...	Primavera ..	4 63	36.79	3.78	16.8	83.9	10.3

while from the monthly report for May, 1925, we compile the following interesting comparisons.

BH 10 (12)...	Primavera..	1.75	41.33	5.25	19.6	88.2	12.7
D-433	Primavera..	6.22	46.69	4.86	18.1	81.9	10.4
BH 10 (12)...	1st Ratoon..	.89	28.19	4.23	21.8	91.7	15.0
R. S. Caled ..	1st Ratoon.	1.06	39.06	4.10	18.6	80.9	10.5

The fact that *gran cultura* of the *SC 12(4)* gave very little more cane and sugar per acre than the *primavera* of the *BH 10(12)* would seem to bear out Mr. Veve's opinion that the *Barbados Hybrid* seems the better adapted of the two to their conditions, but more extensive trials of the two canes will be necessary before this point can be settled. As regards the comparison with the *D–433*, the results are all in favor of the *BH 10(12)*, while as ratoons the Bar-

bados cane seems far superior in general to the *Red Striped Caledonia* developed by Fajardo. This cane is a sport of Yellow Caledonia, known in Hawaii as "Big Ribbon."

Central Ejemplo, located near Humacao, about the center of the east coast, has, thru the courtesy of Agricultural Sub-Inspector E. Molinary Salés, furnished us with the analysis of one lot of *SC 12(4)* cut during the first part of January of this year. This field gave 57 tons of cane per acre, and the juice showed 17.8 Brix, 15.46 Sucrose and 86.85 Purity—very striking figures indeed for that early cutting.

Central Mercedita de Yabucoa, located on the southeastern extreme of the Island, of whose agronomical laboratory Mr. F. Colón Moret, formerly of the Insular Experiment Station, is chief, has only this past year started extensive plantings of these two canes, altho one seven-tenths acre nursery of *BH 10(12)* at the age of ten months yielded the very satisfactory figure of 47.37 tons of seed cane per acre. An interesting feature in regard to *BH 10(12)* at this central is that this company recently imported from Barbados a number of barrels of seed of the strain of this cane which Mr. Jno. R. Bovell, Director of Agriculture in Barbados, thought might be immune to Mosaic Disease. This cane has been planted at Mercedita de Yabucoa, Pasto Viejo, near Humacao, and at Coloso, on the west coast, and we understand that in no case has it proven immune to *Matizado.*

We have now covered the entire coastal plain of Porto Rico, there remaining one very important and valuable cane district—that represented in the hill section extending from Humacao, on the east coast, to Caguas, some fifteen miles south of Río Piedras, most of this district being located at an elevation above sea level of from 150 to 350 feet. Both *SC 12(4)* and *BH 10(12)* have been considerably cultivated in this district in recent years, Central Juncos having made a direct importation of the former from St. Croix. Mr. Juan Pujadas, Chief of Cultivation at Juncos has been kind enough to furnish us with the following comparative tonnages of cane per acre from an experiment with *SC 12(4)*, *D–117* and *Rayada* planted as *Gran Cultura* in a field of apparently very even composition thruout, the canes having been recently harvested at the age of eighteen months:

D–117, 57.50 tons; *SC 12(4)*, 57.30 tons; *Rayada*, 53.30 tons.

Mr. Pujadas also advises that they have records of tonnages from *SC 12(4)* at Central Juncos of 45.48, 49.54, 56.45 and 64.12 tons per acre. He considers it rather a slow germinater, but a fast grower once its root system is established, altho not a quick closer on account of its very erect type of growth.

As *BH 10(12)* has been mostly cut for seed at Central Juncos, no comparative tonnage data are available here, but it is the author's observation that over this entire district *SC 12(4)* seems to give a more luxuriant growth and rather higher tonnage than *BH 10(12)*.

We may terminate our reconnaissance of the Island by citing two sets of extremely interesting and pertinent figures taken from circulars issued by Central Santa Juana, near Caguas, under date of 13th and 19th May, 1925. Table XV gives the analyses made at that central of four carloads of *BH 10(12)* from a field which yielded 35 tons of cane per acre, the crop and analyses being made on the 6th, 7th and 8th May last:

TABLE XV

BH 10(12) at Central Santa Juana

Car No.	Brix	Sucrose	Purity	Factory yield
1	23.4	22.16	91.7	16.70
2	22.0	20.97	95.3	15.90
3	22.9	21.46	93.7	16.15
4	22.6	21.32	94.3	15.13

On the basis of liquidation to the *colono* at 65 per cent of the sugar recovery, this cane paid the grower at the remarkable average rate of 10.55 per cent, or a higher figure than that of the *total yield* of the majority of our centrals, his proceeds, calculating the value of sugar at but 4 cents per pound, amounting to almost $300 per acre.

Our last table gives in detail the results from the grinding in Central Santa Juana the latter part of this crop of 17 carloads of *SC 12(4)* cane from a field of a little over 6 acres belonging to Mr. José Ramírez, of Caguas. This cane was *primavera* planted in April–May of last year, so that it was just one year old when harvested. It yielded at the rate of 44 tons of cane per acre.

TABLE XVI

SC 12(4) at Central Santa Juana

Date	Net weight of car lbs.	Crusher juice		Factory yield		Sugar to Colono lbs.
		Sucrose	Purity	Total	Colono	
IV-29	30,000	18.01	91.8	13.34	8.67	2601
IV-29	22,400	18.18	91.8	13.44	8.74	1958
IV-30	27,940	19.68	93.7	14.72	9.57	2674
IV-30	34,520	19.64	93.0	14.68	9.54	3293
V-1	28,640	20.19	93.4	15.20	9.88	2830
V-1	29,020	19.49	92.8	14.59	9.48	2751
V-2	31,100	18.11	91.4	13.40	8.71	2709
V-2	27,180	19.9	95.2	15.04	9.78	2661
V-4	30,120	19.97	94.1	15.05	9.78	2946
V-5	31,040	20.16	95.9	15.23	9.90	3073
V-5	34,980	20.48	94.5	15.37	9.99	3495
V-5	32,380	20.12	94.4	15.18	9.87	3196
V-7	36,700	19.78	91.1	14.86	9.66	3545
V-7	29,300	19.36	93.9	14.57	9.47	2775
V-7	35,200	20.07	93.3	15.10	9.82	3457
V-7	31,880	19.66	92.7	14.65	9.52	3035
V-9	36,040	19.06	92.6	14.18	9.22	3323
Totals	528,410					50322

These are indeed remarkable figures for *primavera* of *any* variety *anywhere*, showing an average return to the *colono* of 9.52 per cent, or 4–1/5 tons of sugar per acre, which, with sugar at only $4 per hundred, would be worth $336 per acre.

CONCLUSIONS

1. The Barbados *Hybrid 10(12)* and *St. Croix 12(4)*, both of which were bred by Mr. Jno. R. Bovell in Barbados from *B 6835*, are undoubtedly the two most popular varieties on the Island of Porto Rico today and are rapidly replacing older standard varieties all over the Island, particularly on the south coast, where optimum conditions are found for them and where probably 50 per cent of the cane area is occupied by these two varieties.

2. In the British West Indies experiments for many years have demonstrated the superiority of the *BH 10(12)* to the standard cane usually grown in those islands, their *White Transparent*, corresponding to our *Cristalina*.

3. *SC 12(4)* has consistently given the best results of any variety employed on the Island of St. Croix.

4. These canes have of late years been taken to Cuba and Santo Domingo and are giving much promise on both islands, the St. Croix cane having probably aroused more enthusiasm than the *BH 10(12)* and there being a considerably larger area of the former in Cuba than the *Barbados Hybrid*.

5. All around the coastal plains of Porto Rico it is difficult to choose between these two varieties, which have shown uniformly superior results to all other canes with which they have been in competition, including the *Cristalina, Rayada, D–109* and *B–208,* while in the hills between Humacao and Caguas the preponderance of evidence obtainable would indicate that the *SC 12(4)* is slightly more at home under the conditions of this section than the *BH 10(12),* altho very promising results have been obtained with the latter thru this entire district.

6. Our Porto Rican planters who have not given these two varieties careful trials under the conditions of their particular plantations would indeed do well to do so, as they give every promise of becoming the standard canes of our Island for the better lands.

LITERATURE CONSULTED

(1) Bovell, Jno. R., & D'Albuquerque, J. R.—Rept. on the Sugar Cane Expts. for the Season 1914–16, pp. 15–80. 1916. (Also later reports.)

(2) Calvino, Mario.—Una Buena Caña para Cuba. Chaparra Agrícola, II–1 & 2, pp. 1–8. Mayo–Junio, 1925. Translated in La. Planter.

(3) Chardón, Carlos E.—Mosaic Investigations at Central Cambalache. Journal of the Dept. of Agr. of Porto Rico, VIII–2, pp. 27–39. April, 1924.

(4) Idem.—Experimentos Sobre Matizado en la Central Cambalache.—Revista de Agricultura de Puerto Rico, XIII–4, pp. 205–18. October, 1924.

(5) Idem.—Mis Impresiones de una Visita al Ingenio "San Luis" en Santo Domingo. Revista de Agr. de Puerto Rico, pp. 251–4. Oct., 1924.

(6) Cross, W. E.—Informe Anual del Año 1919. Revista Industrial y Agrícola de Tucumán, XI, p. 10. 1920.

(7) Idem.—Estudios con Variedades de Cañas Importadas. Rev. Ind. y Agr. de Tucumán, XII, p. 86. 1921.

(8) Earle, F. S.—Sugar Cane Varieties of Porto Rico, II. Journal of the Dept. of Agr. of Porto Rico, V–3, pp. 1–141. July, 1921.

(9) Idem.—Urge la Extinción del Matizado. Facts about Sugar, XIX–11. 1924.

(10) Harrison, Jno. B., & Bourne, C. L. C.—The Principal Varieties of Sugar Cane under Cultivation in British Guiana, During 1922, 1923 and 1924. Journal of the Board of Agriculture of British Guiana, XVII–2, pp. 95–9. April, 1924.

(11) Matz, Julius.—Gumming Disease of Sugar Cane. Jour. Dept. Agr. of Porto Rico, VI–3, pp. 1–22. July, 1922.

(12) MENÉNDEZ RAMOS, R.—Sugar Cane Varieties. Annl. Rept. of the Ins. Expt. Station of Porto Rico, 1922–23, p. 15. April, 1924.

(13) IDEM.—La Caña Hawaii 109. Rev. de Agricultura de Puerto Rico, XIII–4, pp. 255–63. Oct., 1924.

(14) IDEM.—Variedades de Caña. Rev. de Agr. de P. R., XIII–4, pp. 273–6. Oct., 1924.

(15) RICHARDSON KUNTZ, PEDRO.—Annual Report of the Division of Agronomy for the Fiscal Year of 1923–24. Annl. Rept. of the P. R. Insular Expt. Station, Fiscal Year 1923–24, pp. 41–50. 1924.

(16) RIVERA, EUGENIO M.—Informe Preliminar sobre Algunas Variedades de Caña en la Isla de Cuba. Rev. de Agr. de P. Rico, XIII–4, pp. 227–35. Oct., 1924.

(17) ROSENFELD, ARTHUR H.—A Beneficial Aspect of the Sugar Cane Mosaic Disease. International Sugar Journal, XXVI, p. 5. Jan., 1924.

(18) IDEM.—Aspecto Beneficioso del Matizado de la Caña de Azúcar. La Crónica Comercial y Financiera de Cuba, (I–5, pp. 7–9. 10 May, 1924).

(19) IDEM.—Beneficial Aspects of Misfortunes. International Sugar Journal, XXVI, p. 381. July, 1924.

(20) IDEM.—Annual Report of the Special Technologist for Cane for the Year 1923–24. Annl. Rept. of the Ins. Expt. Station of Porto Rico, Fiscal Year 1923–4, pp. 62–8. 1924.

(21) IDEM.—"Light and Air" in Cane Cultivation. Sugar, p. 591. December, 1924.

(22) SMITH, LONGFIELD.—Report of Virgin Islands Expt. Station for 1912.

(23) IDEM.—Sugar Cane in St. Croix, Virgin Islands Agr. Expt. Sta., Bull. 2, pp. 3–23. Sept., 1921.

(24) IDEM.—Report of the Virgin Islands Experiment Station for 1921, pp. 3–4. October, 1922.

(25) VEVE, R. A.—Fajardo Experiment Station Repts., Annual for 1923, Monthly for May, 1925. Mss.

(26) WATTS, FRANCIS, & COLLENS, A. E.—Sugar-Cane Experiments in the Leeward Islands. 1921.

o–O–o