

EFFECT OF PLANTING DISTANCE ON SUGARCANE YIELD¹

Sugarcane production in terms of tons of cane per acre can be increased by increasing plant population. This can be accomplished by narrowing the distance between rows and planting the seed more closely in the row. Obviously there must be a limit on the reduction of the inter-row spacing as well as of the number of plants, based on the natural requirements of the plants for nutrients, light and moisture.

Row spacing in sugarcane normally has been limited to the distance most suitable for the mechanical operations of planting, cultivation and harvesting. A spacing of 5 feet between the rows has been the standard distance in Puerto Rico, mainly because of the width of the tractors used in field operations. This width recently has been increased in many areas to 5 feet 6 inches to permit the use of some makes of harvesters to a better advantage.

Certain sugarcane varieties with a high sucrose content are not normally heavy tonnage producers. It was thought possible that an increase in tonnage per acre of these high-sucrose varieties might follow closer row spacing.

Closer row spacing, however, makes it difficult to ridge-up banks for proper furrow irrigation on irrigated sugarcane areas. The grower might then be forced to depend on overhead irrigation or surface irrigation by flooding.

Vicente-Chandler and Abruña² in 1969 harvested an experiment at Orocovis the results of which show a significant difference of slightly over 1 ton of sugar per acre for the 3-foot spacing as compared with the 5-foot.

Matherne³ in Louisiana obtained significantly greater cane yields with cane planted at 36- and 42-inch rows spacing.

In 1935 Richardson⁴ tried planting distances of 3½, 4 and 4½ feet between furrows in an experiment near Juncos. He observed that canes planted at 3½ feet yielded more cane and more sugar per unit area than the other two distances both in plant and the ratoon crops.

To determine the effect of inter-row planting distance on sugarcane production in terms of tons of cane, tons of sugar per acre and of sucrose per-

¹ Manuscript submitted to the Editorial Board June 6, 1974.

² Vicente-Chandler, J., and Abruña, F., Experimental data of an unpublished work on planting distance, USDA.

³ Matherne, R. J., Influence of Inter-row Spacing and Planting Rate on Stalk Population and Cane Yield in Louisiana, Proceedings 14th Congress Inter. Soc. of Sugar Cane Technol., pp. 640-645, Louisiana, Oct. 19, 1971.

⁴ Richardson Kuntz, P., in Ann. Rept. of the Sugarcane Specialist. Río Piedras Agr. Exp. Sta. Ann. Rept. 1935-36.

cent cane, three experiments were started on June 1970 on three locations: Gurabo Substation, Fortuna Substation and Central Mercedita. Planting distances of 5 and 3 feet were compared using the commercial varieties P.R. 980 at Gurabo, P.R. 62-258 at Fortuna, and P.R. 980 and C.P. 52-43 at Central Mercedita. The plant crop and a first ratoon were harvested in each experiment.

The plant cane experimental plot crop harvested at the Fortuna Substation showed no difference in yield between the 5- and 3-foot plantings

TABLE 1.—Results of a combined analysis of a plant cane and first ratoon crops for three spacing experiments

Location	Variety	Treatment	Yield per acre		
			Cane	Sucrose	Sugar
			Tons	Percent	Tons
Fortuna	P.R. 62-258	5 feet	55.01	12.61	6.96
		3 feet	59.85	12.06	7.20
		Difference	4.84 N.S. ¹	0.55 N.S.	0.24 N.S.
Gurabo	P.R. 980	5 feet	48.29	11.60	5.59
		3 feet	58.24	11.56	6.73
		Difference	9.95** ²	0.04 N.S.	1.14* ³
Central Mercedita	P.R. 980	5 feet	63.61	11.62	7.39
	P.R. 980	3 feet	74.44	11.37	8.53
		Difference	10.83**	0.25 N.S.	1.14 N.S.
	C.P. 52-43	5 feet	59.80	11.72	6.97
	C.P. 52-43	3 feet	70.76	11.36	8.01
		Difference	10.96**	0.36 N.S.	1.04**

¹ No significant difference.

² Significant difference at the 1-percent level.

³ Significant difference at the 5-percent level.

in terms of cane and sugar per acre. The plant cane experimental plot crop harvested at the Gurabo Substation yielded 13.62 more tons of cane and 1.478 more tons of sugar per acre when planted at 3 feet between rows than when planted at 5 feet. These differences were statistically significant.

At Central Mercedita significant differences of 11.94 tons of cane for P.R. 980 and 11.91 tons for C.P. 52-43 per acre were obtained in favor of the 3-foot spacing. Increased yield in tons of sugar per acre were 1.52 and 1.24 tons for P.R. 980 and C.P. 52-43, respectively, again in favor of the 3-foot spacing. These differences were statistically significant. Sucrose percentage was not affected by planting distance.

The ratoon crop harvested at Mercedita produced 9.92 more tons of cane per acre with P.R. 980 and 9.98 more tons per acre with C.P. 52-43 when planted at the 3-foot spacing. No significant difference in terms of tons of sugar per acre were found between treatments. Also, there were no significant differences between the varieties in terms of tons of cane and sugar per acre with respect to planting distances.

Results for the first ratoon crop on the experiments at Fortuna and Gurabo showed no differences in terms of any of the production values.

A combined analysis of the plant and ratoon crops for the three experiments showing yields of cane and sugar per acre reveals a highly significant difference of 9.95 tons of cane per acre in favor of the 3-foot plantings, as well as a significant difference of 1.14 tons of sugar per acre in the case of the 3-foot planting at the Gurabo Substation (table 1).

The tonnage of cane and sugar per acre at Central Mercedita was higher when the cane was planted in rows 3 feet apart.

Sugarcane tonnage production per acre evidently can be increased by planting the rows 3 feet apart as compared with the standard 5-foot spacing. However, taking into consideration our urgent need to fully mechanize all field operations, particularly the harvesting phase, and the need to grow erect medium-tonnage cane varieties for the same reason, it seems that planting at a 3-foot inter-row spacing can not be recommended at the present time for most of our sugarcane growing areas.

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