

The Effect of Variations in Row Width and Plant Populations on Root Yields and Sucrose Percentage of Sugar Beets at Fort Collins, Colorado¹

G. W. DEMING²

IN A REPLICATED experiment sugar beets were grown in 12-, 20-, 22-, 24-, 30-, and alternate 20- and 40-inch rows. Plant populations were varied by spacing beets 12 inches apart in each row width. In addition, some plant populations were held constant by varying the spacing in certain of the row widths. Twenty-inch rows with plants spaced 12 inches in the row were used as the check treatment. The results of this experiment are summarized in table 1. In no case were there significantly different yields from

Table 1.—Acre yields of roots, sucrose percentage and gross sugar production as obtained in width of row and sugar beet population study. The inside 4 rows of 8-row plots were harvested. Fort Collins, Colorado, 1947. (Data given as 8-plot averages.)

No.	Treatment			Acre yields		
	Row width (inches)	Plant spacing in row (inches)	Population ¹ per acre (plants)	Roots (tons)	Gross sugar (pounds)	Sucrose (percentage)
1.	12	12	43,560	14.50	3706	12.78
2.	20	12	26,136	16.02	4035	12.60
3.	20	7.2	43,560	14.91	3769	12.62
4.	22	12	23,760	15.44	3843	12.48
5.	22	10.9	26,150	15.20	3649	11.99
6.	24	12	21,780	15.14	3541	11.75
7.	24	10	26,136	14.67	3529	12.02
8.	24	12	26,136 ²	14.60	3680	12.65
9.	30	12	17,424	13.82	3368	12.08
10.	30	8	26,136	13.82	3398	12.29
11.	Alt. 20 and 40	12	17,424	13.48	3146	11.71
12.	Alt. 20 and 40	12	20,500 ²	12.87	3012	11.76
General mean of test				14.55	3556	12.23
F value				5.61**	7.45**	2.23*
2 x the S. E. of a Diff. (Odds of 19:1)				1.07 tons	301 pounds	0.74%
S. E. of mean in percentage of general mean				2.59%	2.99%	2.14%

¹The actually attained populations in the thinned stands of these treatments were reasonably close approximations of the theoretical populations as given in this table.

²Populations per acre attained by 10 percent blank, 65 percent 1-plant, 20 percent 2-plant and 5 percent multiple-plant hills.

different populations grown in the same row width. An excessive plant population of 43,560 plants per acre (12- x 12-inch and 20- x 7.2-inch spacings) yielded less than the check; the differences in root yield being just significant at odds of 19:1. In general root yields, sucrose percentages, and gross sugar yields declined as row widths increased from 20 inches. Root yields from both the populations grown in 22-inch rows and from

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²Agronomist, Division of Sugar Plant Investigations, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, United States Department of Agriculture, Colorado Agricultural Experiment Station Scientific Series Paper No. 259.

one of the three populations grown in 24-inch rows were not significantly below the yield of the check. Root yields from both the populations grown in the alternate 20- and 40-inch rows were below the yields from populations grown in 30-inch rows; the larger of these differences being just short of significance. Sucrose percentages in the beets from the excessive populations were slightly, but not significantly, higher than sucrose percentage of the check. Under the conditions of this test, the lowest yield of gross sugar from any of the five populations grown in 22- or 24-inch rows was about 500 pounds per acre less than the yield of the check. It is possible that convenience of operation of machinery and actual savings in travel time for cultural operations would compensate for such reductions in yield.