Recent Experimental Results of Row Spacings and Field Population Of Sugar Beets

R. J. TINGLEY[1]

DURING THE 1947 season two separate, but practically identical, tests were conducted in Kern County, California, to determine the variation in yield and sugar content that would result from three different "in-the-row" spacings of beets planted in rows 30 inches apart. The planting was made with decorticated seed at a little over 3 pounds per acre, and the beets were thinned on March 25 and 26.

Test 1 consisted of 15 replications, of two rows each, at three different spacings in the row. Rows were approximately 1,250 feet long. Treatment (a) was thinned to leave single beets 6 inches apart, treatment (b) 8 inches apart and treatment (c) 10 inches apart. Actual counts after thinning resulted in the following average numbers of beets per 100 feet of row: Treatment (a) — 198; (b) — 153; (c) — 127. Test 2 consisted of 15 replications of three rows each, approximately 800 feet long. With the same spacing used for test 1 the actual counts after thinning showed average stands for treatment (a) — 197, (b) — 148, and (c) — 118. The field work was very carefully done and there were practically no doubles in any of the plots.

All plots received 400 pounds of 17-7-0 fertilizer as a side dressing after thinning and also about 175 pounds of anhydrous ammonia in two applications of irrigation water. All cultural operations on both tests were timely and exceptionally well done, but were the same as the balance of the commercial plantings in the field. The entire crop made very good growth and the plots were harvested with a Marbeet Junior harvester during the second week of September.

Stand counts were taken at harvest time which indicated the following average numbers of marketable beets per 100 feet of row:

Test 1, treatment (a) — 160, (b) — 155, and (c) — 126;

Test 2, treatment (a) — 136, (b) — 126, and (c) — 111.

On the basis of the above counts of marketable beets, the actual harvest populations per acre averaged 25,787 beets for treatment (a), 24,394 beets for treatment (b) and 20,560 beets for treatment (c).

As compared with the original desired spacings at thinning of 6 inches, 8 inches and 10 inches, the beets in test 1 at harvest averaged 7.50 inches, 7.74 inches and 9.52 inches apart; in test 2, the averages were 8.82

inches, 9.52 inches and 10.81 inches apart in the row at harvest. The reduction in field populations in the close spacings was undoubtedly due to the greater competition between plants, as well as some greater mortality from hoeing operations and disease (Rhizoctonia).

Tables 1, 2 and 3 show the relative sucrose percentage, yield per acre and gross sugar per acre for test 1, test 2 and the combined results of both tests.

Table 1. Relative sucrose percentage, yield per acre and gross sugar per acre for test 1.

Treatment	Sucrose		Yield per acre		Gross sugar per acre	
	Percent	Rank	Tons	Rank	Pounds	Rank
6-inch spacing	13.05	3	42.576	1	11,116	3
8-inch spacing	13.86	1	42.491	2	11,777	1
10-inch spacing	13.34	2	42.363	3	11,294	2
General Mean	13.42		42.477		11,396	
F Value	3.6942		26.3095*		2.3842*	
5% point	3.34		19.45		3.34	
1% point	5.45		99.46		5.45	
S. E. Mean	.2143		.5516		221.3514	
Difference required for significance	.62		1.598		641	

8-inch spacing is significantly above 6-inch spacing in percentage sucrose.

*No significant differences.

Table 2. Relative sucrose percentage, yield per acre and gross sugar per acre for test 2.

Treatment	Sucrose		Yield per acre		Gross sugar per acre	
	Percent	Rank	Tons	Rank	Pounds	Rank
6-inch spacing	13.30	1	43.991	3	11,702	2
8-inch spacing	12.37	3	44.658	2	11,043	3
10-inch spacing	12.89	2	46.385	1	11,959	1
General Mean	12.85		45.011		11,568	
F Value	2.9425*		9.2153		3.2692*	
5% point	3.34		3.34		3.34	
1% point	5.45		5.45		5.45	
S. E. Mean	.2706		.4070		261.3413	
Difference required for significance	.78		1.179		757	

10-inch spacing is significantly above 6-inch and 8-inch spacing on tons per acre.

*No significant difference.

Table 3.—Relative sucrose percentage, yield per acre and gross sugar per acre for tests 1 and 2 combined.

Treatment	Sucrose		Yield per acre		Gross sugar per acre	
	Percent	Rank	Tons	Rank	Pounds	Rank
6-inch spacing	13.17	1	43.284	3	11,409	3
8-inch spacing	13.12	2	43.575	2	11,410	2
10-inch spacing	13.11	3	44.374	1	11,626	1
General Mean	13.13		43.744		11,482	
F Value	31.1144*		2.4705*		2.1486*	
5% point	19.45		3.15		19.45	
1% point	99.46		4.98		99.46	
S. E. Mean	.1881		.3591		183.4047	
Difference required for significance	.53		1.020		521	

*No significant difference.

These results show that yields per acre were uniformly very high and the sugar content was uniform, but low. The plots were located in a 400-acre field which produced an average of 38.06 tons per acre with 13.55 percent sucrose content, so it is apparent that the tests were typical of the entire field.

Since there was little, if any, significant difference in the yields or gross sugar per acre between the highest and lowest field populations, we would conclude that, on fields of high fertility level, we would not expect an increase in production with beets spaced closer than 10 inches in rows 30 inches apart.