

Comparison of Yields From Two-Beet Hills Originating From One and Two Seeds

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There is considerable evidence in sugar beet literature to indicate that maximum beet yields are obtainable when beets are spaced as single plants in the beet fields. However, recent investigations on multiple-plant hills have shown that with appropriate acre populations, two-beet hills may yield as high as single-plant hills. Therefore it may not be necessary to produce segmented seed with as high a proportion of single-germ segments as has been done, provided two-beet hills arising from two-germ seed balls produce yields equal to those two-beet hills arising from two seed balls. A field test of two-beet hills originating from one seed and two seeds, was made at Rocky Ford, Colo., in 1945.

Experimental Procedure

American No. 1. 1942 crop seed was used in this experiment. A small amount of multiple-germ seed sized 7/64 to 10/64 inch and high in germination was obtained from the top spout of the gravity table. The seed was planted by hand on the Station farm in an eight-row strip 300 feet long. Spacing between the rows was 20 inches and between hills 15 inches. On each hill center three seeds were planted, spacing between seeds being 1 1/2 inches in the row.

Following planting, the field was irrigated to germinate the seed. A light rain fell 10 days later and some crusting occurred, making necessary a second irrigation.

At thinning time hills in four rows were thinned to two plants which came from one seed (strip A), and on the remaining four rows two plants originating from two seeds were left (strip B). In the case that plants had not emerged in the hill to allow this origin in one or the other four-row strip, the hill was thinned to a single plant.

At harvest each beet in each of the eight rows was dug, topped, cleaned, and weighed. Weights for each beet were recorded to hundredths of pounds.

Experimental Results

Prior to thinning, stand counts were made to determine field emergence. These results have been tabulated, along with laboratory germination results, in table 1.

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Table 1.—Comparison of laboratory and field germination, 1945.

Test location	No. seeds in test	Percentage germination	Sprout count per 100 seed balls			
			Singles	Doubles	Triples	Total
Germinator	200	98.5	20.0	68.5	4.0	176.0
Field	5,712	58.2	32.6	22.0	3.0	87.4

These results indicate that even with excellent quality seed and average field conditions in this area, percent of potential was 59.1 for seed units and 49.9 for total sprouts. It is further observed that if this planting had been made with a precision drill spacing seed 1 1/2 inches apart in the beet row, 100-inch counts of pre-thinned stands would have shown 38.8 beet-containing inches, of which number 21.7 would have been singles, 11.7 doubles, and 2.4 triples.

The stand that was obtained was not as satisfactory for this study as had been expected, and it was found necessary to thin many of the hills to singles in order to isolate such hills from the two-beet hills thinned according to the requirements of the test. At harvest it was found that in all eight rows there were only 432 two-beet hills surrounded by two-beet hills on four sides. Of these, 202 were from Strip A (two plants from one seed) and 230 from Strip B (two plants from two seeds). Since every one of the 1,904 hills harvested in the eight-row strip was numbered and the weight of each of the one or two beets in each hill obtained, it was possible to calculate the yield of all beets harvested by strip, thereby obtaining some evidence of uniformity of the of the test area. It was found that Strip A produced 14.89 tons and Strip B, 14.88 tons beets per acre. It was also possible to find in both strips a total of 132 single-beet hills in competition with single-beet hills, and yields of these were calculated on an acre basis. The yields obtained from the two-beet and one-beet hills are given in table 2. Sucrose percentage for two-beet hills was obtained from four 20-beet samples taken from each strip.

Table 2.—Yield data from competitive two-beet hills.

Field strip	Origin of plants	Total 2-beet or 1-beet competitive hills	Percentage marketable beets (a)	Tons beets per acre	Sucrose percent
A	1 seed	202	86.39	16.443	17.66
B	2 seeds	230	89.13	16.369	17.43
Sign. diff. (odds 19:1)				.64 (b)	
One-beet hills		132	98.51	14.831	

(a) All beets below .25 pounds were considered non-marketable.

(b) From 7 paired comparisons.

The data obtained indicate no significant difference between the yields of the two strips, although Strip A is slightly higher in yield rank. Because of the lower acre population, one-beet hills were much lower in yield per acre.

The root associations in the two-beet hills from the A and 33 strips were also studied. It was expected that much intertwining would take place, especially in the two-beet hills originating from a single seed. Accordingly, four classes of root association were arbitrarily set up as follows: 1, independent; 2, slight intertwining; 3, medium intertwining; 4, severe intertwining. The results are given in tables 3a and 3b.

Table 3a.—Root associations in two-beet hills.

Strip	Plant origin	Two-beet association classes				Total pairs	Beets checked
		1	2	3	4		
A	2 beets from 1 seed	201	1	202	404
B	2 beets from 2 seeds	206	15	5	2	230	460

Table 3b.—Non-marketable-beets in two-beet hills.

Strip	Plant origin	Two-beet association classes				Total beets checked	Percentage marketable
		1	2	3	4		
A	2 beets from 1 seed	54	1	404	80.39
B	2 beets from 2 seeds	46	1	2	1	400	89.13

The amount of intertwining (classes 2, 3, 4) was very low. In Strip A there were intertwining roots in less than .5 percent of the hills checked, and in Strip B, 9.6 percent, or an average of 5.1 percent for both strips. In all two-beet hills in classes 2, 3, and 4 in both strips, there were only five beets which were non-marketable. The percentage of all non-marketable beets found in the intertwining classes was 11.4 as compared to 12.5 in the independent class.

Conclusions

The data obtained in this test at Rocky Ford, Colo., in 1945 show that even the highest germinating seed is greatly reduced in germination under field conditions in this area. Under these conditions seed known to be over 70 percent in multiple sprouts produced more single sprouts than multiples in the field.

Two-beet hills from multiple-sprout seed did not differ in yield from those two-beet hills which originated from two seeds. Intertwining of roots was low in hills from both seed origins. Regardless of plant origin, 5.1 percent of the hills showed some intertwining. The percentage of non-marketable beets from this intertwining was no different than where the beets in the hill were independent in association.

The results obtained in this test suggest that, if thinning is made on a two-beet hill basis, leaving appropriate acre populations, multiple-germ seed will produce yields equal to single-germ seed.