

# Size of Seed ball in Relation to Yield of Sugar Beets

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Precision planting appears to be one of the most important factors in the mechanization of the beet crop. Since some form of sizing or grading of the seed is essential to uniform planting it is important to know whether or not any yield differences are to be expected from different sizes of seed.

The problem of securing adequate stands with small seed is important because of a recognized tendency toward lower germination and also in some part because of smaller germs in the small seed. A pertinent test conducted at this Station in 1912 included two European varieties, R & R "Normal" and Breustedt. Results are presented in table 1.

Table 1.—Relative size of seedballs and germs.

Germs per ball	R & G "Normal"			Breustedt		
	No. balls	Balls Ave. wt.	Germs Ave. wt.	No. balls	Balls Ave. wt.	Germs Ave. wt.
1	5	.0212	.00204	7	.0124	.00178
2	9	.0179	.00223	19	.0171	.00188
3	7	.0311	.00262	20	.0308	.00230
4	12	.0542	.00339	5	.0330	.00284
5	2	.0555	.00270	3	.0549	.00281
6	1	.0900	.00380	...	...	...

The number of comparisons is rather small as indicated by the number of seedballs in each class but there is a tendency for the germ size to increase with the larger seedballs.

Similar but more extensive work was conducted at this Station in 1920 using two lots of seed germinating 71 percent and 36 percent, respectively. The results for this study are presented as averages of 50 seedballs for each class in table 2.

The seedballs were classified as to number of germs by seed "caps", as well as number of sprouts produced. It is noted that with few exceptions the tendency toward larger germs in larger seedballs is in agreement with the results as recorded in table 1.

Studies conducted at this Station in 1910 and 1911 and again in 1940 furnish some data pertinent to the question of the yielding ability of beets growing from seed of different sizes. For each of

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Table 2.—Comparison of germ and seedball weights for 71 percent- and 36 percent-germination seed.

Kind of seedball	Ave. wt. per seedball		Ave. wt. per germ	
	71%	36%	71%	36%
	<b>Grams</b>	<b>Grains</b>	<b>Grams</b>	<b>Grains</b>
1 germ 1 sprout	.00593	.00574	.00213	.00184
2 germs 1 sprout	.01178	.01065	.00235	.00195
3 germs 1 sprout	.01360	.01458	.00258	.00207
4 germs 1 sprout	.01668	.02150	.00241	.00258
2 germs 2 sprouts	.01138	.01211	.00236	.00207
3 germs 2 sprouts	.01375	.01734	.00217	.00219
4 germs 2 sprouts	.02087	.02364	.00238	.00242
3 germs 3 sprouts	.01740	.01925	.00230	.00207
4 germs 3 sprouts	.02207	.02814	.00224	.00244
4 germs 4 sprouts	.02360	.02568	.00238	.00248

these tests sufficient seed was planted to assure a good thinned stand for each size of seedball.

The test in 1910 consisted of eight replicates of plots 50 feet in length in which "small", "medium", and "large" seed of the same variety was tested. The "small" seed passed through a 6-mesh (about 8/64 inch) (3.17 mm.), the "medium" passed through a 4-mesh (about 12/64 inch) (4.76 mm.) and remained on a 6-mesh, and the "large" remained on a 4-mesh sieve. The results for this test are presented in table 3.

Table 3.—Results for seed size test, 1910.

Seed size	Beets per A.	Sugar	Beets per 100 feet of row
	Tons	Percent	No.
Small	16.91	16.78	127
Medium	18.95	16.85	127
Large	15.81	16.66	109

It is doubtful if any significant differences exist between yields. The lower yield for "large" seed may possibly be attributed in part at least to the difference in stand.

In 1911 this test was repeated, except that only two replicates were planted. The results for this test are presented in table 4.

Table 4.—Results for seed size test, 1911.

Seed size	Beets per A.	Sugar	Beets per 100 feet of row
	Tons	Percent	No.
Small	17.60	18.01	124
Medium	17.80	18.02	138
Large	18.54	18.05	138

It is safe to assume a high random error for this test, so in all probability no significant differences exist. It may be noted, however, that the "large" seed produced the highest yield in direct contrast to the 1910 results (table 3).

The size-of-seed test in 1940 was combined with the regular variety test, which was an eight x eight triple-lattice design with nine replicates. Plots, as harvested, were four rows x 30 feet with the entire plot being taken for yield and the two center rows used for sugar analysis. The "large" seed remained on a 13/64" (5.16 mm.) screen and the "small" passed through a 9/64" (3.57 mm.) screen, with three different varieties being used. These results are presented in table 5.

Table 5.—Results for seed size test, 1940.

Variety	Seed size	Beets per A. Tons	Sugar Percent	Sugar per A. lbs.	Beets per 100 feet of row No.
A	Large	28.52	12.27	0503	100
	Small	28.34	12.38	0522	97
B	Large	25.53	12.58	0405	99
	Small	26.14	12.17	0402	96
C	Large	25.32	12.78	0472	100
	Small	25.33	12.66	0414	97
LSD 5 percent pt.		.63	.34	268	....

This test was well conducted and a very low standard error resulted. The "small" seed of Variety B produced just significantly more yield than the "large" seed of the same variety but in this case the sugar percentage was just significantly higher for the "large" seed, with the result that there was no difference in pounds sugar per acre. No difference existed between the seed sizes for either of the other two varieties.

It is quite evident from the data herein presented that no yield differences due to any inherent genetic reasons may be expected among various grades or sizes of seed but it is expected that more care must be exercised with smaller seed sizes in order to assure stands comparable to those from large seed.