Strains of Sugar Beets Extremely Resistant to Bolting

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The development of seedstalks, known as bolting, is an undesirable character in sugar beets when the crop is grown for sugar production. In most parts of the country bolting is not a serious problem because the commercial varieties are sufficiently resistant when planted in the spring. However, in certain sections of California it is desirable to plant a portion of the crop in the early winter or fall months. Of the curly-top resistant varieties only U.S. 15 and U.S. 56 are sufficiently non-bolting for December plantings and even these varieties ordinarily bolt severely when planted in October and November.

Preliminary work in developing extremely non-bolting varieties has been in progress at Salt Lake City, Utah, and Riverside, California, during the past several years. Selections of individual non-bolting beets were made from open-pollinated populations. These individuals were then hybridized or selfed and further non-bolting selections made from the resulting progenies. Several of the more promising hybrids and inbreds were tested for non-bolting in strip plantings at Riverside, California, in 1946. The results are given in table 1.

Table 1. Percentage of bolters from a planting made August 20, 1946, at Riverside, California.

Strain	Plants observed	Plants bolting April 17*
	Number	Percent
U.S. 15	456	53.7
U.S. 56	446	30.9
R. & G. Old Type	458	57.0
S.L. 553	396	5.3
Inbred 4201	423	21.3
Inbred 4738	398	0.5
S.L. 453 x 4738	430	1.9
4109 MS x U.S. 56	430	30.5
5107 MS x U.S. 56	436	42.9

*Bolting as used here is the appearance of a seedstalk whether or not flowering is involved.

In this test the newly developed variety U.S. 56 bolted 30.9 percent and was superior to U.S. 15, which bolted 53.7 percent. Strain S.L. 553, a non-bolting selection from a hybrid between two individual beets, bolted only 5.3 percent. The seedstalks in S.L. 553 were short and vegetative in contrast to the tall, heavy seed-producing type found in the susceptible varieties. Inbred 4201, which was still heterozygous for bolting resistance, bolted 21.3 percent and inbred 4738 bolted 0.5 percent. A hybrid between S.L. 453, which was an earlier increase of S.L. 553 and inbred 4738, bolted

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1.9 percent. The data indicate that resistance to bolting is recessive and are in agreement with those of Abegg (1)[2] and Owen, et al. (2). Two male-sterile hybrids included in the test were similar in bolting behavior to U.S. 56 and U.S. 15. Male-sterile 4109 represented a group of male-sterile plants from U.S. 56. Male-sterile 5107 was from U.S. 56 x U.S. 15.

Yields or sugar percentages were not determined from the Riverside planting. Data from a November planting at Shafter, California, indicated that the yielding ability of a male-sterile hybrid between (U.S 56 x U.S. 15) MS and inbred 4201 was superior to either that of U.S. 56 or U.S. 15.

Figure 1.—Comparison of the bolting habit of inbred 4201 (left) and U.S. 15 (right) in an overwintered field planting at Salt Lake City, Utah. The planting was made August 17, 1946, and photographed June 12, 1947.

In addition to the strip plantings described above a large number of hybrids and inbreds were planted in small observational plots at Salt Lake City, Utah, and Riverside, California. Promising non-bolting types were selected for further testing and for use in the hybridization work. A comparison between a promising inbred and U.S. 15 is shown in figure 1. Included in these plantings were hybrids involving strains highly resistant to curly top.

Seed of these extremely non-bolting strains was successfully produced in overwintered field plantings at Salt Lake City. Plantings made in August were protected from cold injury by a light covering of either manure or soil during the winter months. All plants bolted the following spring and summer. Similar material planted in August at Medford, Oregon, failed to bolt completely.

Although it is unlikely that any of the non-bolting strains included in the above tests are satisfactory as commercial varieties, their value as breed-

[2]The numbers in parentheses refer to literature cited.

ing material was well demonstrated. Extremely non-bolting commercial varieties should be a possibility in the near future.

Literature Cited

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