

Sugar-Beet Root Aphid Resistance in Sugar Beet¹

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The sugar-beet root aphid (*Pemphigus* sp., probably *betae* Doane) has been widely distributed in sugar beet-growing areas in western United States and western Canada for many years. When conditions are favorable for its development, it is capable of causing serious injury to the sugar beet crop (1,2)³. Insofar as the writers are aware, the existence of differences among sugar beet strains or varieties, in resistance to this pest, has not been previously reported.

In exploratory studies at Fort Collins, Colorado, in 1961, on control of the sugar-beet root aphid with insecticides, a striking contrast was observed between two sugar beet strains in degree of infestation. Four pairs of phorate-treated and untreated plots occurred in a part of a sugar beet field on the Hospital Farm in which a vigorous, leaf spot-susceptible inbred, SP 471001-0 (Strain A), was growing. A similar set of 4 pairs of plots, occurring in a neighboring area in the same field, contained the leaf spot-resistant commercial variety, GW 674 (Strain B), growing under comparable conditions. On July 27, granular phorate was applied to the center of the foliar rosette of each plant in the plots designated for treatment. The roots of 3 plants in each plot were examined for aphids on August 15, and the results are presented in Table 1. These data show similar differences between strains for both the treated and untreated plots, with strain B averaging only about 2 percent as many aphids per plant as strain A.

In order to study further the question of root aphid resistance, 4 pairs of plots were set up in border areas of the above

Table 1.—Numbers of sugar-beet root aphids per plant, on two sugar beet strains, 19 days after application of phorate granules; results given as 6-plant averages.

Pounds phorate per acre	Strain A (SP 471001-0)	Strain B (GW 674)
0	4.0	0.2
1	5.4	.0
0	10.6	.3
2	1.0	.0

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³ Numbers in parentheses refer to literature cited.

field where phorate was not applied. The plots were 6 rows wide and 12 feet long, and each pair consisted of contiguous plots of strains A and B. Counts were made of aphids occurring on the roots of 3 plants in each plot on August 21 and September 22, 1961. The plants were dug with approximately 3 inches of soil around the taproot. The soil was carefully removed in the laboratory and the aphids were counted under magnification.

On August 21, aphids were found on all but 1 of the 12 plants of strain A examined, and on only 2 of 12 plants of strain B. On September 22, aphids were found on all 12 plants of strain A and on 6 of strain B. As shown in Table 2, the number of aphids per plant was slightly higher on both strains, at the second count, with a proportionately larger increase on strain B. The average number of aphids per plant, for strain B, was approximately 6 percent of the average for strain A.

Table 2.—Numbers of sugar-beet root aphids per plant on two sugar beet strains; results given as 12-plant averages.

Date	Strain A (SP 471001-0)	Strain B (GW 674)
Aug. 21	8.8	0.3
Sept. 21	9.7	.8

Although the results presented in this report were based on limited observations, the contrasts were sufficiently striking to justify the conclusion that the 2 strains differ substantially in root aphid resistance. It is not known whether the type of resistance carried by strain B actually inhibits root aphid development under commercial field conditions. The observations made in this study showed that the aphids were attracted to strain B in small numbers and were able to multiply on it. If the strain contrasts observed were merely the results of aphid preference, it is conceivable that, in commercial fields where preferred varieties are not available, the resistance of strain B would be of little, if any, practical value.

Because of the preliminary nature of this study, it would not be safe to conclude, on the basis of these results, that breeding for resistance to the sugar-beet root aphid is a potentially valuable tool. However, in view of the importance of that pest in sugar beet production, and since sugar beet strains apparently differ in resistance, investigation of the nature and practical value of such resistance appears to be highly desirable.

Literature Cited

- (1) MAXSON, ASA C. 1948. Insects and diseases of the sugar beet. The Beet Sugar Development Foundation, Fort Collins, Colorado. 425 p.
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