

# Resistance of Sugar Beets to Sugar Beet Root Aphids, *Pemphigus populivenerae* Fitch<sup>1, 2</sup>

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The sugar beet root aphid, *Pemphigus populivenerae* Fitch, has been a pest of sugar beets for many years in the western United States, the Great Lakes area, and in Canada and causes serious injury to the crop when conditions are favorable for its development. (1, 2)<sup>4</sup> In 1963, Wallis and Gaskill (3), working in Colorado, reported striking differences in infestations of the aphid on 2 strains of sugar beets. A commercial variety, GW 674, that is resistant to leaf spot was infested with only 6% as many aphids as an inbred that was susceptible to leaf spot, SP 471001-0. In Canada, Harper (4) found that GW 674 and GW 359 were resistant to the sugar beet root aphid and 9 other varieties were susceptible.

Thirty one varieties of sugar beets were planted at Yakima, Washington, in 1966 in field plots subject to natural infestations of the aphid. (Unfortunately, the varieties GW 674 and GW 359 were not available.) Plots were a single row 30 feet long, replicated 3 times. No commercial fertilizers were applied. During the week of August 22-29, 1966, 3 beets were dug from each plot; about 3 inches of soil were left around the taproots. In the laboratory, the soil was removed carefully from all rootlets, and the number of aphids on each beet was counted. The data were transformed to the log of X+1 and analyzed statistically.

Seeds of the 31 varieties were obtained through Mr. O. A. Hills from the Western Seed Production Corporation, Phoenix, Arizona.

Variety	Characteristics
GW 823 (Arizona)	Leaf spot resistant.
GW 839	Leaf spot resistant.
GW 831 MS	No information available.
GW 806	Derived from leaf-spot-resistant material.
GW 821 (Pollinator)	No information available.
GW 840	No information available.

<sup>1</sup> Hemiptera: Aphididae.

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<sup>4</sup> Numbers in parentheses refer to literature cited.

UI 122 (male)	No information - a selection from US 22.
HC 4	Multigerm variety with some leaf spot resistance.
H 56-58	Multigerm variety with some leaf spot resistance.
GW 823 (Longmont)	Leaf-spot resistant.
US 401	A multigerm with some resistance to black root and leaf spot.
Klein E 742 R + G	Old type - curly-top-susceptible.
AM 3 S	Monogerm with resistance to <i>Aphanomyces</i> and some resistance to leaf spot. A good sugar type.
US 75	Curly-top-resistant variety.
GW H2 Stock A	No information available.
AI 10 × 12	Curly-top resistant.
AI 1 × 2	Curly-top resistant.
CT 9 MS × CT 9 MM	An inbred with curly top resistance.
7112-02	No information available.
GW 828	Northern European in origin. No resistance to leaf spot or curly top.
HH 8	No information available.
AM 3 N	Monogerm of high yield but with no particular resistance to disease.
AM 2	Monogerm of high sugar and good tonnage. Some resistance to curly top and leaf spot.
H-65-02-63	No information available.
US 22/3	Curly-top resistant.
60-806-0	Monogerm with resistance to leaf spot.
UI 112 (female)	A selection from US 22.
AI 1 × CT 9	Curly-top resistant.
UI 112 × UI 112	A selection from US 22.
SL 122 CMS × CT 9	SL 122 a monogerm curly-top resistant and CT 9 is a multigerm, curly-top resistant, self-fertile pollinator.
HH 12	Monogerm male sterile hybrid with intermediate resistance to curly top and leaf spot.

Aphids were found on all varieties (Table 1), but they were present in varying numbers. Variety GW 823 (Arizona) had significantly fewer aphids than 15 varieties; also, GW 839 and GW 821 MS were more resistant to aphids than 15 varieties.

Variety HH 12 was significantly more susceptible to infestation than 22 varieties and had 3 times more aphids than the next most susceptible beet. Six varieties had fewer aphids (were significantly more resistant to aphid attack) than SL 122 CMS × CT 9 which is a commercial variety grown throughout a large part of the Pacific Northwest.

These results and the findings of Wallis and Gaskill (3) in Colorado and Harper (4) in Canada suggest that breeding for greater resistance to the sugar beet root aphid is feasible.

Table 1.—Total numbers of sugar beet root aphids on 9 plants each of 31 varieties of sugar beets.

Variety	Total no. aphids	Statistically significant difference <sup>1</sup>
GW 823 (Arizona)	4	a
GW 839	7	ab
GW 821 MS	8	ab
GW 806	12	abc
GW 821 (Pollinator)	23	abcdef
GW 840 (Longmont)	23	abcdefg
UI 112 (male)	27	abcd
HC 4	39	abcdefg
H 56-58	40	abcdef
GW 823 (Longmont)	54	abcde
US 401	62	abcdefgh
Klein E 742	66	abcdefgh
AM 3 S	68	abcdefgh
US 75	97	bcdefgh
GW H 2 Stock A	98	cdefgh
AI 10 x 12	109	cdefgh
AI 1 x 2	115	cdefgh
CT 9 MS x CT 9 MM	123	cdefgh
7112 - 02	125	defgh
GW 828	138	abcdefgh
HH 8	160	efghi
AM 3 N	161	efghi
AM 2	181	abcdefgh
H-65-02-63	188	defgh
US 22/3	191	fghi
60-806-0	205	efghi
UI 112 (female)	290	ghi
AI 1 x CT 9	363	hi
UI 112 x UI 112	474	defghi
SL 122 CMS x CT 9	522	ghi
HH 12	1827	i

<sup>1</sup> Totals followed by the same letter are not significantly different at the 5% level of error based on Duncan's multiple range test and log of X + 1 transformation.

#### Literature Cited

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