SUGAR BEET (*Beta vulgaris* ssp. v*ulgaris* 'B-57')
Beet curly top; Beet curly top virus

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Foliar and seed treatment insecticides for the control of beet curly top in Idaho sugar beet, 2022.

Four insecticide foliar treatments, three insecticide seed treatments, and three check treatments were evaluated for the control of beet curly top on the commercial sugar beet (*Beta vulgaris* L.) cultivar B-57 (low level of resistance to Beet curly top virus [BCTV]). The three control treatments included a non-treated check, a Poncho Beta seed treatment check, and an Asana foliar treatment check. The trial was conducted at the USDA-ARS North Farm in Kimberly, ID which has Portneuf silt loam soil and was used to grow barley in 2021. The field was plowed and fertilized (110 lb N and 160 lb P_2O_5/A) and then roller harrowed on 6 Apr. The plots were planted (density of 51,840 seeds/A) on 2 May. Plots were four rows wide with 22-in row spacing and 34-ft long. Treatments were arranged in a randomized complete block design with eight replications. Fertility and weed management followed recommendations from the 2022 Sugar Beet Grower's Guide Book (Amalgamated Sugar Co. LLC, Boise, ID). The foliar treatments were applied on 8 Jun in a volume of 18.48 gal/A with a CO_2 powered sprayer at 30 PSI using a boom with a 8002VS spray nozzle (Teejet Technologies, Wheaton, IL) centered over each row (4 nozzles spaced 22 in. apart). Plants were inoculated at the eight-leaf growth stage on 15 Jun with approximately six beet leafhoppers (*Circulifer tenellus* Baker) per plant from a colony that tested positive for the following BCTV strains: California/Logan and Severe. Plots were rated for foliar symptom development on 20 Jul and 15 Aug using a scale of 0 to 9 (0 = healthy and 9 = dead; Plant Dis. 90:1539-1544). The center two rows were mechanically topped on 26 Sep and harvested with a small plot harvester. During harvest two eight-beet samples per plot were collected and submitted to the Amalgamated Sugar Co. Tare Lab in Paul, ID for sucrose analysis. Percent sucrose and estimated recoverable sucrose (ERS) were determined as described previously (Plant Dis. 98:1075-1080). Except for the foliar ratings, data were analyzed in SAS (Ver. 9.4) using the general linear model procedure (Proc GLM), and Fisher's protected least significant difference (LSD; $\alpha = 0.05$) was used for mean comparisons. For the foliar ratings, the data were analyzed in a nonparametric analysis as described by Shah and Madden (Phytopathology 94:33-43).

Beet curly top symptom development was uniform and no other disease or pest problems were evident in the plot area. The non-treated check was severely infected based on foliar ratings and yield variables even though a commercial sugar beet cultivar approved for production was utilized for the study. The Poncho Beta seed treatment provided better control than the other treatments based on foliar ratings, root yield, and ERS. The Actara, Asana, Transform, and Violacein treatments all reduced foliar ratings compared to the non-treated check, but control was not adequate to avoid serious reductions in root yield and ERS. Additional evaluations with other insecticides will be needed if alternatives to the neonicotinoid (Poncho Beta) chemical class for BCTV control are to be identified.

	Beet curly top ratings[y]				
Treatment and amount/A[z]	20 Jul	15 Aug	Sucrose (%)	Root yield (t/A)	ERS (lb/A)[x]
Poncho Beta seed trt check (no foliar trt)	3.6 e	5.1 d	15.59 ab	17.46 a	4,525 a
Actara (3 oz)	5.5 d	7.8 c	15.51 ab	3.80 b	952 b
Asana 9.6 fl oz (foliar check)	6.4 c	8.3 c	12.84 e	1.55 c	338 c
Transform (2.75 oz)	6.3 c	8.3 c	15.47 ab	1.64 c	335 c
Prodigiosin + Violacein seed trts (no foliar trt)	7.5 a	8.8 ab	16.06 a	0.82 c	211 c
Prodigiosin seed trt (no foliar trt)	7.1 ab	8.8 ab	15.52 ab	0.67 c	166 c
Senstar (1.8 fl oz)	7.0 ab	8.6 ab	16.07 a	0.60 c	158 c
Non-treated check	7.3 a	8.9 a	13.64 d	0.57 c	125 c
PrevAm (1.7 fl oz) + Cinnaction (1.7 fl oz)	7.2 ab	8.9 a	15.22 bc	0.42 c	101 c
Violacein seed trt (no foliar trt)	6.8 b	8.6 b	14.62 c	0.44 c	101 c
P > *F*[w]	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
LSD ($\alpha = 0.05$)	Trans	Trans	0.64	1.66	428

[z] The foliar treatments were applied at the eight-leaf growth stage 8 days prior to inoculation with viruliferous beet leafhoppers. The non-treated and non-sprayed Poncho Beta (insecticide seed treatment with clothianidin at 2.1 oz a.i. and β-cyfluthrin at 0.3 oz a.i. per 100,000 seed) checks received no foliar treatments. The Violacein (0.00053 oz a.i. per 100,000 seed) and Prodigiosin (0.00088 oz a.i. per 100,000 seed) were applied as seed treatments and received no foliar sprays.

[y] Beet curly top ratings = beet curly top was rated using a scale of 0 to 9 (0 = healthy and 9 = dead).

[x] ERS = estimated recoverable sucrose.

[w] *P* > F was the probability associated with the F value. Trans = the foliar rating data were rank transformed prior to analysis, but the non-transformed means have been reported and mean separation was based on a PDIFF comparison ($\alpha = 0.05$). Within a column for non-transformed data analysis, means followed by the same letter did not differ significantly based on Fisher's protected least significant difference (LSD; $\alpha = 0.05$) value.