

Foliar insecticides for the control of curly top in Idaho sugar beet, 2020.

Six insecticide foliar treatments and four check treatments were evaluated for the control of curly top on the commercial sugar beet (*Beta vulgaris* L.) cultivar B-57 (low level of resistance to *Beet curly top virus* [BCTV]). The four check treatments included two non-treated checks, 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 2019. The field was plowed and fertilized (110 lb N and 120 lb P₂O₅/A) and then roller harrowed on 27 Mar 20. The plots were planted (density of 51,840 seeds/A) on 20 Apr. Plots were four rows 34-ft long with 22-in row spacing and treatments were arranged in a randomized complete block design with eight replications. Fertility and weed management followed recommendations from the 2020 Sugar Beet Grower's Guide Book (Amalgamated Sugar Co. LLC, Boise, ID). The foliar treatments were applied on 10 Jun in a volume of 18.48 gal/A with a CO₂ 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 18 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 10 Aug and 10 Sep using a scale of 0 to 9 (0 = healthy and 9 = dead), with the scale treated as a continuous variable (Plant Dis. 90:1539-1544). The center two rows were mechanically topped on 23 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). Data were analyzed in SAS using the general linear model procedure (Proc GLM), and Fisher's protected least significant difference (LSD; $\alpha = 0.05$) was used for mean comparisons. The foliar rating data were rank transformed prior to analysis, but the non-transformed means are reported.

Curly top symptom development was uniform and no other disease and pest problems were evident in the plot area. The non-treated checks were severely infected based on curly top ratings and yield variables even though a commercial cultivar approved for production was utilized for the study. Three treatments (Poncho Beta seed treatment and the foliar treatments Asana and Venom) provided a similar level of control and allowed for similar yield. The five other foliar insecticide treatments evaluated in the study provided no control of BCTV since all variables had values similar to the non-treated checks. Additional evaluations with other insecticides will be needed if alternatives to neonicotinoid (Poncho and Venom) and pyrethroid (Asana) chemical classes for BCTV control are to be identified.

Treatment and amount/A ^z	Curly top ratings ^y		Sucrose (%)	Root yield (t/A)	ERS (lb/A) ^x
	10 Aug	10 Sep			
Asana 9.6 fl oz (foliar check)	5.4 c	6.2 c	15.98 a	27.46 a	7,627 a
Non-sprayed Poncho Beta check	4.6 c	5.7 c	15.62 ab	26.76 a	7,277 a
Venom 4 oz	5.4 c	6.4 c	15.49 a-c	26.13 a	7,035 a
Pylon 13 fl oz	7.1 b	8.2 b	15.20 b-d	13.58 b	3,555 b
Actigard 50WG 0.75 oz	7.3 ab	8.4 ab	14.92 cd	11.68 b	3,016 b
Mycoshield 2.04 oz	7.1 b	8.4 ab	15.08 b-d	10.77 b	2,835 b
Non-treated check1	7.6 a	8.4 ab	14.78 d	11.01 b	2,815 b
Non-treated check2	7.4 ab	8.5 ab	14.76 d	10.21 b	2,592 b
Requiem Prime 128 fl oz	7.6 a	8.6 a	15.09 b-d	9.80 b	2,552 b
Surround WP 136 oz	7.4 ab	8.5 ab	15.07 b-d	9.81 b	2,547 b
$P > F^w$	<0.0001	<0.0001	0.0016	<0.0001	<0.0001
LSD ($\alpha = 0.05$)	Trans	Trans	0.59	4.85	1,324

^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.

^y Curly top ratings = curly top was rated using a scale of 0 to 9 (0 = healthy and 9 = dead), with disease index (DI) treated as a continuous variable.

^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 are reported. Within a column, means followed by the same letter did not differ significantly based on Fisher's protected least significant difference (LSD; $\alpha = 0.05$) value.