

### Foliar insecticides for the control of curly top in Idaho sugar beet, 2021.

Seven insecticide foliar treatments and three 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 three check 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 2020. The field was plowed and fertilized (120 lb N and 120 lb P<sub>2</sub>O<sub>5</sub>/A) and then roller harrowed on 26 Mar 21. The plots were planted (density of 51,840 seeds/A) on 20 Apr. 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 2021 Sugar Beet Grower's Guide Book (Amalgamated Sugar Co. LLC, Boise, ID). The foliar treatments were applied on 17 Jun in a volume of 18.48 gal/A with a CO<sub>2</sub> 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 22 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; Plant Dis. 90:1539-1544). The center two rows were mechanically topped on 27 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 rank transformed prior to analysis in SAS with mixed linear models (Proc MIXED), but the non-transformed means have been presented in the table. Foliar mean separation was based on a PDIFF comparison ( $\alpha = 0.05$ ).

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 curly top ratings and yield variables even though a commercial sugar beet cultivar approved for production was utilized for the study. Two treatments (Poncho Beta seed treatment and the Scorpion foliar treatment) provided a similar level of control on the second rating and had similar root yield and ERS. The Applaud foliar treatment provided less control based on ratings, but ERS was not significantly different from the Poncho Beta and Scorpion treatments. The foliar insecticide treatments containing Asana or Spear T provided marginal control of BCTV, but these treatments were better than the non-treated check in foliar ratings, root yield, and ERS. The Venom and Ninja + Asana treatments also showed higher root yield and ERS relative to the non-treated check. The remaining treatments were similar to or worse than the non-treated check with respect to sucrose, root yield, and ERS. Additional evaluations with other insecticides will be needed if alternatives to the neonicotinoid (Poncho and Scorpion) chemical class for BCTV control are to be identified.

Treatment and amount/A <sup>z</sup>	Curly top ratings <sup>y</sup>		Sucrose (%)	Root yield (t/A)	ERS (lb/A) <sup>x</sup>
	10 Aug	10 Sep			
Non-sprayed Poncho Beta check	4.3 e	5.3 f	16.98 ab	33.25 a	9,300 a
Scorpion 7 fl oz	5.0 d	5.2 f	17.21 a	31.94 ab	9,216 a
Applaud 12 oz	6.0 bc	7.6 bc	16.99 ab	27.86 bc	7,938 ab
Asana 9.6 fl oz (foliar check)	5.2 d	6.7 de	16.73 a-c	27.87 bc	7,813 b
Spear T 65.3 fl oz	5.8 c	7.0 cd	16.95 ab	27.38 c	7,776 b
Ninja 11 oz + Asana 9.6 fl oz	5.0 d	6.4 e	16.92 ab	27.24 c	7,719 b
Venom 4 oz	6.5 b	7.6 bc	16.49 b-d	26.88 c	7,317 b
Non-treated check	6.4 b	7.9 ab	16.55 b-d	16.88 d	4,664 c
Ninja 11 oz	6.6 b	8.0 ab	16.29 cd	16.86 d	4,619 c
Vacciplant 22 fl oz	7.3 a	8.4 a	16.08 d	10.73 e	2,932 d
$P > F^w$	<0.0001	<0.0001	0.0029	<0.0001	<0.0001
LSD ( $\alpha = 0.05$ )	Trans	Trans	0.56	4.60	1,374

<sup>z</sup>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  $\beta$ -cyfluthrin at 0.3 oz a.i. per 100,000 seed) checks received no foliar treatments.

<sup>y</sup>Curly top ratings = curly top was rated using a scale of 0 to 9 (0 = healthy and 9 = dead).

<sup>x</sup>ERS = estimated recoverable sucrose.

<sup>w</sup> $P > F$  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.