

### Foliar and seed treatment insecticides for the control of beet curly top in Idaho sugar beet, 2023.

Seven insecticide 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 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 2022. The field was fall plowed with a Terrano chisel plow. In the spring, the field was fertilized (115 lb N and 140 lb P<sub>2</sub>O<sub>5</sub>/A), disked, and roller harrowed on 10 Apr 23. The plots were planted (density of 51,840 seeds/A) on 1 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 2023 Sugar Beet Grower’s Guide Book (Amalgamated Sugar Co. LLC, Boise, ID). The foliar treatments were applied on 7 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 12 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 7 Aug and 25 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 to remove the foliage on 25 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 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 three treatments with the Poncho Beta seed treatment provided better control than the other treatments based on foliar ratings, root yield, and ERS. Combining Methyl Jasmonate and Jasmonic Acid foliar treatments with the Poncho Beta seed treatment led to the best root yield and ERS. The Asana foliar check had the next best foliar ratings, root yield, and ERS. All other treatments including the non-treated check were dead at the second foliar rating and had almost no yield or 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.

Treatment and amount/A <sup>z</sup>	Beet curly top ratings <sup>y</sup>		Sucrose (%)	Root yield (t/A)	ERS (lb/A) <sup>x</sup>
	7 Aug	25 Aug			
Poncho Beta seed trt					
Methyl Jasmonate (4.35 fl oz)					
Jasmonic Acid (0.04 fl oz)	5.1 c	7.6 c	15.65	12.0 a	3,124 a
Poncho Beta seed trt					
Violacein seed trt	5.3 c	7.4 c	15.98	9.1 b	2,423 b
Poncho Beta seed trt	5.4 c	7.5 c	15.65	9.1 b	2,388 b
Asana 9.6 fl oz	6.4 b	8.2 b	15.61	5.2 c	1,355 c
Miteus (32 oz)	8.5 a	9.0 a	15.66	0.8 d	196 d
Methyl Jasmonate (4.35 fl oz)					
Jasmonic Acid (0.04 fl oz)	8.6 a	9.0 a	15.70	0.7 d	175 d
Non-treated check	8.6 a	9.0 a	15.27	0.6 d	150 d
Violacein seed trt	8.7 a	9.0 a	15.70	0.5 d	126 d
Bountify (20 oz) + Dyne Amic (0.5% v/v)	8.4 a	9.0 a	15.86	0.4 d	112 d
Jasmonic Acid (0.04 fl oz)	8.5 a	9.0 a	15.50	0.4 d	98 d
<i>P</i> > <i>F</i> <sup>w</sup>	<0.0001	<0.0001	0.3383	<0.0001	<0.0001
LSD ( $\alpha = 0.05$ )	Trans	Trans	NS	2.1	572

<sup>z</sup> The foliar treatments were applied at the eight-leaf growth stage 5 days prior to inoculation with viruliferous beet leafhoppers. Treatments were foliar treatments except for 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) and Violacein (0.00053 oz a.i. per 100,000 seed) which were applied as seed treatments.

<sup>y</sup> Beet curly top ratings = beet 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. NS = not significant. 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.