

# NEONICOTINOID SEED TREATMENTS AND FOLIAR SPRAYS ON SUGARBEET FOR CONTROL OF SEVERE CURLY TOP

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## **Introduction:**

Sugarbeet production in semiarid regions is hindered by yield loss caused by *Beet severe curly top virus* and other closely related species vectored by the beet leafhopper. In 2010, a study was established to investigate the level of control from seed treatments and supplemental foliar insecticide sprays under severe curly top pressure, since previous testing was only conducted under low to moderate pressure in Idaho. Two cultivars and 7 treatments were arranged in a randomized complete block design with 8 replications in 4 row plots planted on 3 May. The treatments included a non-treated check, NipsIt (60 g ai clothianidin/100,000 seed) with and without an experimental fungicide, Cruiser Force (60 g ai thiamethoxam + 8 g ai tefluthrin/100,000 seed), and Poncho Beta (60 g ai clothianidin + 8 g ai beta-cyfluthrin/100,000 seed). Poncho Beta was also tested with Movento (spirotetramat; 5 fl oz/A) or Movento + Provado (imidacloprid; 3.8 fl oz/A), which were applied twice (7 days before and again 5 days after inoculation). The plots were inoculated with 6 viruliferous beet leafhoppers per plant on 23 June at the 8-leaf growth stage. Plants in the center 2 rows were rated for curly top in July, August, and September and harvested on 6 October. The treatments reduced ( $P < 0.0001$ ) curly top ratings by 32 to 43% in July, 36 to 60% in August, and 37 to 55% in September compared to the non-treated check, regardless of cultivar. Treatments yielded 26 to 31 tons/A across the two cultivars, which was significantly greater ( $P < 0.0001$ ) than the non-treated check (1 to 3 tons/A). Yield among treated plots was not different, except Poncho Beta was better than Cruiser Force with Beta 4430R. All the neonicotinoid seed treatments looked promising for control of severe curly top pressure on sugarbeet but the foliar sprays made no difference for curly top control.

## **Objective:**

Neonicotinoid seed treatments have shown they can work under low to moderate pressure but have not been evaluated under severe curly top pressure. Thus a number of seed treatments and foliar treatments were evaluated to determine their efficacy under severe curly top pressure.

## **Materials and Methods:**

Conventional commercial sugarbeet cultivars and insecticide seed and foliar treatments were evaluated on the USDA North Farm in Kimberly, ID where beet curly top and insects had been a problem in previous years. There were six seed/foliar treatment combinations plus a non-treated check compared on two conventional commercial sugarbeet cultivars (Beta 4430R and Crystal 217R). The foliar treatments were applied twice (on June 16 which was 7 days prior to beet leafhopper release and again on June 28). The treatments were: Trt 1 = non-insecticide-treated check + AT (Alliance FL at 15.6 g ai metalaxyl + Thiram 42S at 250 g ai thiram per

100 kg seed), Trt 2 = Poncho Beta (60 g ai clothianidin + 8 g ai beta-cyfluthrin per 100,000 seed) + AT, Trt 3 = Poncho Beta + AT with two foliar applications of M (5.0 fl oz Movento/A), Trt 4 = Poncho Beta + AT with two foliar applications of M + P (5.0 fl oz Movento + 3.8 fl oz Provado/A), Trt 5 = NipsIt INSIDE (60 g ai clothianidin per 100,000 seed) + AT, Trt 6 = NipsIT + AV (Apron XL = 7.5 g ai mefenoxam/100kg seed + V-10116), and Trt 7 = Cruiser Force (60 g ai thiamethoxam + 8 g ai tefluthrin per 100,000 seed). The field had been in beans in 2009 and disked on 16 March 2010. Fertilizer (30 lb N/A + 160 lb P<sub>2</sub>O<sub>5</sub>/A) and ethotron (2 pints/A) was applied and incorporated with a roller harrow on 7 April. The field trial was planted on 3 May. The plots were planted to a density of 142,560 seeds/A, and thinned to 47,520 plants/A on 12 June. Plots were four rows wide (22 in-row spacing) and 34 ft long. The experimental design was a randomized complete block design with eight replications. The crop was managed according to standard cultural practices. Prior to thinning, a stand count was taken on 20 May when the plants had only cotyledons and no true leaves. Percentage of plants with leafminer in the center two rows was recorded on 22 June at the six- to eight-leaf growth stage. On 23 June, three viruliferous beet leafhoppers per plant were released to generate uniform curly top pressure. Curly top in the center two rows was rated on a scale of 0 to 9 (0 = healthy, 9 = dead) on 16 July, 16 August, and 16 September. The center two rows were harvested on 6 October using a small plot harvester. The sugar content of the roots was determined by the Amalgamated Sugar Co. laboratory, and recoverable sugar was estimated. Data were analyzed using the Proc GLIMMIX procedure in SAS and mean comparisons were conducted using the least squared means (LSMEANS) statement (alpha = 0.05).

### **Results and Conclusions:**

Leafminer and curly top pressure were uniform throughout the field. The spring weather was unusually cool and wet. The fungicide seed treatment V-10116 led to stunting and abnormal leaf shape on both cultivars just after emergence. However, plants with this fungicide seemed to recover and yield normally. Other than stand, there were significant differences between treatments for all variables regardless of cultivar. All treatments controlled leafminer damage up to the six- to eight-leaf growth stage. The treatments reduced ( $P < 0.0001$ ) curly top ratings by 32 to 43% in July, 36 to 60% in August, and 37 to 55% in September compared to the non-treated check, regardless of cultivar. Treatments yielded 26 to 31 tons/A across the two cultivars, which was significantly greater ( $P < 0.0001$ ) than the non-treated check (1 to 3 tons/A). With Beta 4430R, some treatments had less curly top than others but there were no differences between treatments on the July and August readings. However, Poncho Beta out yielded (tons/A and ERS) Cruiser Force with Beta 4430R. In August with Crystal 217R, some treatments had less curly top than Cruiser Force and the Poncho Beta + Movento + Provado treatment. With Crystal 217R, the NipsIT + AV treatment had significantly less curly top than Cruiser Force in September. However, there were no yield differences between treatments with Crystal 217R. In summary, it seems Cruiser Force is a little weaker than the other treatments at times for curly top control and always ranked last among the treatments for both tonnage and ERS. The foliar insecticide treatments provided no additional benefit beyond that provided by the seed treatments. Although disease control was reasonable, good host resistance would likely have resulted in additional yield benefit.