

## CONTROLLING SEVERE CURLY TOP IN SUGARBEETS

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Controlling curly top in sugarbeet has been an industry priority in the western United States since the 1920s. Curly top can be caused by one of three virus species in the Curtovirus genus: Beet severe curly top virus (BSCTV; formerly the CFH strain), Beet mild curly top virus (BMC-TV; formerly the Worland strain), and Beet curly top virus (BCTV; formerly the Cal/Logan strain). The virus species are all vectored by the beet leafhopper, *Circulifer tenellus*, which survives over the winter on weed hosts, particularly mustard species. The adult females should be able to survive even our coldest southern Idaho winters. Once temperatures reach 55°F in the spring, the beet leafhopper becomes active and develops through various growth stages all of which are influenced by temperature. The egg stage may range from an average of 5.5 days at 100°F to an average of 43.8 days at 60°F. In Idaho we would expect to see three generations of beet leafhoppers in a normal year. However, if the weather in March is warmer than normal, the beet leafhopper can get an early start on population development. If warm spring weather coincides with dry conditions, the desert weeds dry up early and the beet leafhoppers move into beet fields at early plant growth stages. Beet plants are most susceptible to infection at early growth stages even if cultivars contain good resistance. Thus protecting the young plants from infection is of considerable importance.

When the industry switched from conventional cultivars to herbicide-tolerant cultivars, the seed companies struggled to maintain curly top resistance. The seed companies are making progress in restoring resistance, but even the best resistance in conventional cultivars would have benefited from additional control measures. Since the insecticide seed treatment, Poncho Beta, became available to growers, it has served the industry well under low to moderate pressure. However, Poncho Beta and other seed treatments were not evaluated under severe pressure. Thus, a

study was conducted under severe pressure using seven treatments: 1 = non-treated check, 2 = Poncho Beta (60 g ai clothianidin + 8 g ai beta-cyfluthrin/100,000 seed), 3 = Poncho Beta + 2 Movento (5.0 fl oz/A) applications, 4 = Poncho Beta + 2 Movento and Provado (3.8 fl oz/A) applications, 5 = NipsIt (60 g ai clothianidin/100,000 seed), 6 = NipsIt + experimental fungicide, and 7 = Cruiser Force (60 g ai thiamethoxam + 8 g ai tefluthrin/100,000 seed). The treatments were evaluated on two conventional commercial cultivars at the North Farm in Kimberly, ID using the same severe curly top pressure (6 viruliferous beet leafhoppers per plant) utilized in the Curly Top Nursery. All six treatments provided better control ( $P < 0.0001$ ) of curly top than the non-treated check with both cultivars (data for Beta 4430R in Fig. 1; data for Crystal 217R not shown) on all three evaluation dates (16 Jul, 16 Aug, and 16 Sep; only Sep data shown). In Figure 1, the curly top rating was reduced by 46 to 55% when comparing the insecticide treatments to the non-treated check. By the end of the growing season the non-treated checks for both Beta 4430R and Crystal 217R had severe curly top symptoms and very little root yield (1.28 and 3.21 t/A, respectively). Root yield for the six insecticide treatments ranged from 25.7 to 31.2 t/A for Beta 4430R (Fig. 2) and from 27.3 to 29.84 t/A for Crystal 217R (data not shown). Results were similar for estimated recoverable sucrose (Fig. 3; data for Crystal 217R not shown). Thus, even though curly top pressure was severe enough to almost eliminate the non-treated checks relying only on host resistance for protection, the insecticide seed treatments (Poncho Beta, NipsIt, and Cruiser Force) provided for respectable curly top control and yields. The foliar insecticide treatments (Movento and Provado) provided no detectable curly top control beyond that provided by the seed treatments.

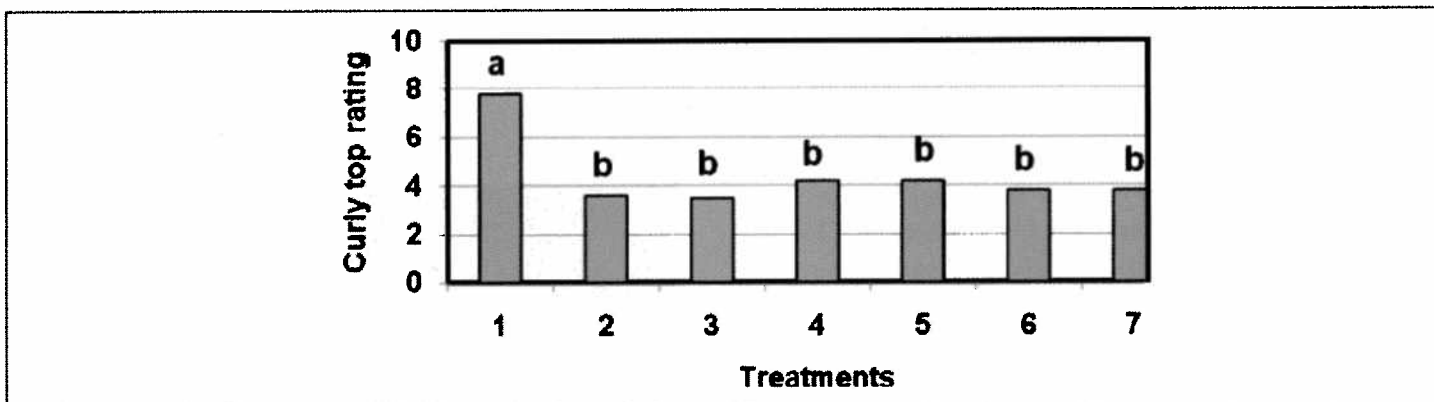


Figure 1. Curly top ratings (scale 0 to 9; 0 = healthy and 9 = dead) on the sugarbeet cultivar Beta 4430R on 16 Sept 2011 in Kimberly, ID for seven treatments (1 = non-treated check, 2 = Poncho Beta, 3 = Poncho Beta + 2 Movento applications, 4 = Poncho Beta + 2 Movento and Provado applications, 5 = NipsIt, 6 = NipsIt + experimental fungicide, and 7 = Cruiser Force). Bars with a different letter were significantly different ( $P > F < 0.0001$ ; mean comparison at  $\alpha = 0.05$ ).

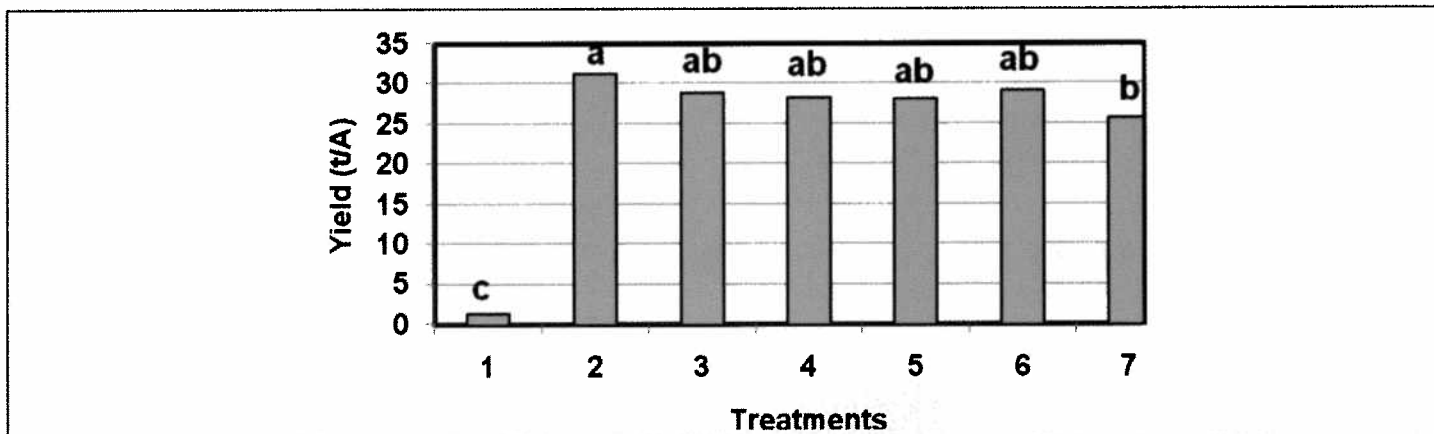


Figure 2. Root yield (t/A) with the sugarbeet cultivar Beta 4430R in Kimberly, ID for seven treatments (1 = non-treated check, 2 = Poncho Beta, 3 = Poncho Beta + 2 Movento applications, 4 = Poncho Beta + 2 Movento and Provado applications, 5 = NipsIt, 6 = NipsIt + experimental fungicide, and 7 = Cruiser Force). Bars with a different letter were significantly different ( $P > F < 0.0001$ ; mean comparison at  $\alpha = 0.05$ ).

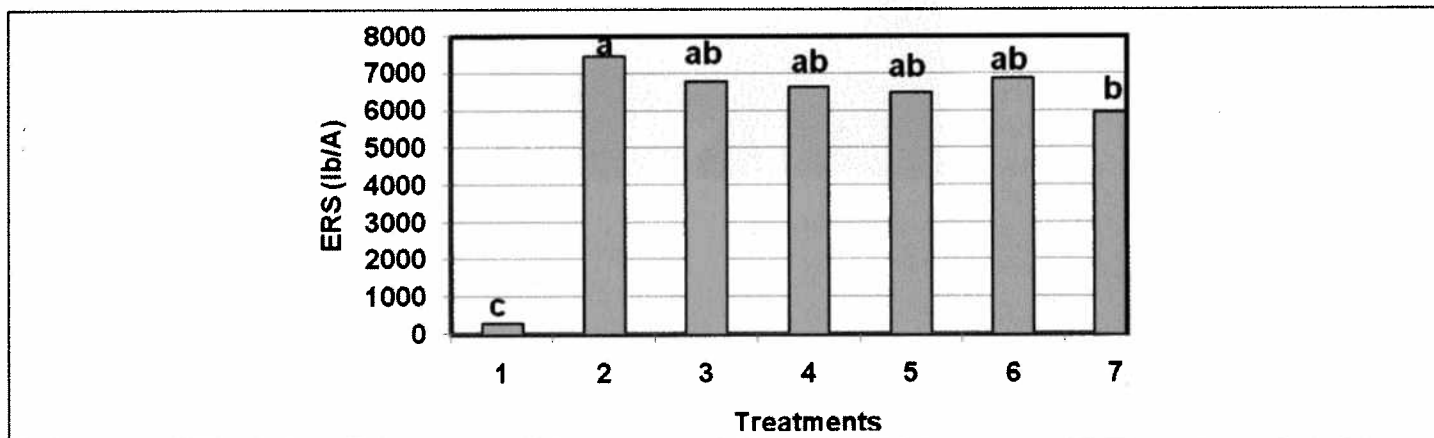


Figure 3. Estimated recoverable sucrose (ERS; lb/A) with the sugarbeet cultivar Beta 4430R in Kimberly, ID for seven treatments (1 = non-treated check, 2 = Poncho Beta, 3 = Poncho Beta + 2 Movento applications, 4 = Poncho Beta + 2 Movento and Provado applications, 5 = NipsIt, 6 = NipsIt + experimental fungicide, and 7 = Cruiser Force). Bars with a different letter were significantly different ( $P > F < 0.0001$ ; mean comparison at  $\alpha = 0.05$ ).