SUGAR BEET (*Beta vulgaris* 'SX-2283')

Rhizoctonia root and crown rot; *Rhizoctonia solani*

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**Evaluation of in-furrow and banded fungicide applications to manage Rhizoctonia root and crown rot of sugar beet in Michigan, 2022.**

A field trial was established at the Saginaw Valley Research and Extension Center in Frankenmuth, MI to evaluate the efficacy of experimental and commercially available fungicides at managing *Rhizoctonia solani* in sugar beets. Sugar beet variety SX-2283 was planted at a rate of 50,000 seed/A on 17 May. A randomized complete block design, with four replicates, was used. Plot dimensions were four rows wide (30-in row spacing) by 30 ft long. In-furrow treatments were applied at planting, using a tractor mounted $CO_2$-powered backpack sprayer (TJ2502E nozzles) and applying fungicides at a volume of 0.60 gal/1,000 row-ft (32 psi). Plots were inoculated with *R. solani* (anastomosis group 2-2)-infested barley on 23 Jun. Inoculum was deposited atop rows at a rate of 1.25 g/row-ft. Banded applications were made 30 Jun, when plants were at the 6-8 leaf stage. Treatments were applied with a $CO_2$-powered backpack sprayer in an 8-in. band at 15 gal/A (TJ4001E; 19 psi). Asymptomatic and symptomatic plant counts were collected throughout the summer to assess stand establishment and disease progression. The center two rows of plots were harvested 15 Sep. Weights were collected to estimate yield and a target of ten beets from each row were arbitrarily selected to rate disease (0-7 scale). The severity scale is based on the area of root infected: 0=0%, 1=0-2.5%, 2=2.5-5%, 3=5-25%, 4=25-50%, 5=50-75%, 6=95% (only tip not rotten), 7=100% (plant dead). Disease incidence and severity were combined into a single disease index (DX) to assess disease pressure among treatments. The disease index was calculated by multiplying the Rhizoctonia root rot incidence from the total rated roots (0-100%) by the mean symptomatic root severity divided by seven. A generalized linear mixed model procedure was used to conduct the ANOVA and mean separations at an α=0.05 significance level (SAS version 9.4).

Significant differences in the percent stand loss were observed among tested programs ($P < 0.0001$). All programs had lower rates of stand loss, ranging from 0 to 35.2%, than the inoculated control (program 1), which had 59.4% loss. Stand reduction in programs 3, 7, 8, 9, and 10 did not differ from the non-inoculated control (program 2). Disease index values also differed significantly among fungicide programs ($P < 0.0001$). Programs 3, 8, 9, and 10 all had significantly lower disease indices than the inoculated control. Yield estimates also were significantly different among programs ($P < 0.01$). Fungicide programs 3 and 5-10 had estimated values ranging between 11.4 and 22.3 t/A and were significantly greater than the inoculated control, with 3.4 t/A.

| No. | Treatment, Rate[z] | Application Type[y] | Stand Loss (%)[x,w] | Root Disease Index (%)[v] | Yield (t/A) |
|---|---|---|---|---|---|
| 1 | Inoculated Control[u] | - | 59.4 a | 68.2 ab | 3.4 d |
| 2 | Non-inoculated Control[u] | - | 0.7 d | 1.2 d | 13.0 bc |
| 3 | Quadris, 13.9 fl oz<br>Quadris, 13.9 fl oz | In-Furrow<br>Banded | 0.0 d | 14.9 d | 17.8 ab |
| 4 | Experimental, 24 fl oz | In-Furrow | 25.1 bc | 59.0 a-c | 9.1 cd |
| 5 | Experimental, 32 fl oz | In-Furrow | 35.2 b | 76.2 a | 11.4 bc |
| 6 | Experimental, 48 fl oz | In-Furrow | 22.2 bc | 52.8 bc | 12.5 bc |
| 7 | Experimental, 32 fl oz<br>Experimental, 32 fl oz | In-Furrow<br>Banded | 2.7 d | 47.3 bc | 18.4 ab |
| 8 | Experimental, 32 fl oz | Banded | 12.1 cd | 38.3 c | 14.7 bc |
| 9 | Quadris, 13.9 fl oz<br>Elatus, 7.1 fl oz | In-Furrow<br>Banded | 0.6 d | 7.5 d | 22.3 a |
| 10 | Elatus 7.1 fl oz | Banded | 2.2 d | 12.3 d | 17.9 ab |

[z] All rates are listed as measure of a product per acre.

[y] In-furrow treatments were applied at planting (17 May), banded applications were applied at the 6-8 leaf stage (30 Jun).

[x] Stand loss percentages calculated from initial stand counts collected 23 Jun and final dead beet counts collected 15 Sep.

[w] Column values followed by the same letter were not significantly different based on Fisher's Protected LSD ($\alpha$=0.05).

[v] Disease index was calculated by multiplying the Rhizoctonia root rot incidence (0-100%) by the mean symptomatic root severity (1-7) and dividing by 7.

[u] Non-treated control.