

Evaluation of banded and broadcast fungicide applications to manage *Rhizoctonia* root and crown rot of sugar beet in Michigan, 2023.

A field trial was conducted at the Saginaw Valley Research and Extension Center in Frankenmuth, MI to compare the efficacy of banded or broadcast fungicides for managing *Rhizoctonia solani* in sugar beets. Sugar beet variety BTS-1065 was planted at a rate of 50,000 seed/A on 10 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. Plots were inoculated with *R. solani* (anastomosis group 2-2)-infested barley on 13 Jun. Inoculum was deposited atop rows at a rate of 1.3 g/row-ft. Fungicide applications were made 21 Jun when plants were at the 6-8 leaf stage. Both banded and broadcast treatments were applied with a CO₂-powered backpack sprayer at 20 gal/A (TJ8003; 25 psi); the boom was lowered to apply bands at an 8-in width. 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. After weights were collected, subsamples from each plot were sent to Michigan Sugar Company (Bay City, MI) to determine percent sugar and pounds of recoverable white sugar per ton (RWST). A generalized linear mixed model procedure was used to conduct the ANOVA and mean separations at an $\alpha=0.05$ significance level (SAS version 9.4).

Disease pressure was moderate and significant differences in the percent stand loss were observed among treatments ($P<0.0001$). All treatments, including the non-inoculated control, had significantly lower stand loss than the inoculated control. Percent stand loss ranged between 0 and 11% in programs 2-8, while the inoculated control had a stand loss of 40.3%. There were no significant differences among root disease index ($P>0.05$) or yield ($P>0.05$) in the programs. All programs had numerically lower DX than the inoculated control (57.0%). The relatively high DX for the non-inoculated control (44.8%) suggests that there was natural pressure that influenced these results. The lowest yield was found in the inoculated control, with a value of 1.9 t/A. All treated programs and the non-inoculated control had greater values with a range of 12.2-16.1 t/A. All fungicide programs had significantly greater sugar content ($P < 0.01$) and RWST than the control ($P < 0.01$).

No.	Treatment, Rate ^z	Application Type ^y	Stand Loss (%) ^{x,w}	Root Disease Index (DX, %) ^v	Yield (t/A)	Sugar (%)	RWST ^u
1	Inoculated Control ^l	-	40.3 a	57.0	1.9	11.7 c	163.3 c
2	Non-inoculated Control ^l	-	1.7 b	44.8	13.7	13.8 a	198.9 ab
3	Quadris, 13.9 fl oz	Banded	0.0 b	38.2	16.1	13.8 a	200.6 a
4	Elatus, 7.1 oz	Banded	0.0 b	34.5	12.2	13.5 ab	195.0 ab
5	Excalia, 0.47 fl oz	Banded	0.4 b	41.1	12.4	13.2 ab	186.6 b
6	Quadris, 13.9 fl oz	Broadcast	1.8 b	46.4	13.4	13.1 ab	186.0 b
7	Elatus, 7.1 oz	Broadcast	11.0 b	45.7	12.7	12.9 b	185.6 b
8	Excalia, 2.0 fl oz	Broadcast	0.3 b	44.9	13.7	13.3 ab	189.9 ab

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

^y Banded and broadcast applications were applied at the 6-8 leaf stage (21 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 (DX) was calculated by multiplying the *Rhizoctonia* root rot incidence (0-100%) by the mean symptomatic root severity (1-7) and dividing by 7.

^u Pounds of recoverable white sugar per ton of beets.

^l Non-treated control.