# EFFECT OF FUNGICIDE SEED TREATMENT AND POST-FUNGICIDE APPLICATION ON RHIZOCTONIA SOLANI AND SUGARBEET YIELD AND QUALITY

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Rhizoctonia root and crown rot, caused by *Rhizoctonia solani* Kühn, is currently the most devastating soilborne disease of sugarbeet (*Beta vulgaris* L.) in North Dakota and Minnesota. In the bi-state area, *R. solani* anastomosis group (AG) 1, AG-2-2, AG-4, and AG-5 cause damping off and AG-2-2 causes root and crown rot of sugarbeet (Windels and Nabben 1989). *R. solani* has a wide host range including broad leaf crops and weeds (Anderson 1982; Nelson et al. 1996). Severe disease occurs if sugarbeet follows beans or potato in a rotation (Baba and Abe 1966; Johnson et al. 2002). In fields with a history of high disease severity, growers may plant varieties that are more resistant but with significantly lower yield potential compared to more susceptible varieties (Panella and Ruppel 1996). All varieties, including Rhizoctonia resistant varieties, are susceptible to the pathogen in early growth stages.

The objective of this research was to determine the safety of different seed treatments and their efficacy at controlling Rhizoctonia damping off and root rot in sugarbeet.

## MATERIALS AND METHODS

A field trial was conducted in Hickson, ND in 2015. The site was inoculated on 23 April with *R. solani* AG 2-2 IIIB grown on barley. Inoculum was broadcast using a three-point mounted rotary/spinner type spreader calibrated to deliver 37 lbs/A of inoculum. The inoculum was incorporated with a Konskilde field cultivator to about the two-inch depth before planting. The experimental design was a randomized complete block with four replicates. Field plots comprised of six 25-foot long rows spaced 22 inches apart. Plots were planted to stand on 29 April with various varieties and seed treatments. The first variety was SES Vanderhave 36918RR treated with Tach 45 and Nipst Suite (tolclofos-methyl + metconazole) with and without Kabina (penthiopyrad). The second variety was Crystal 101RR treated with Tach 45 and Poncho Beta with and without Kabina. Counter 20G was applied at 9 lb/A at planting to control insect pests. Weeds were controlled on 4 June and 24 June using glyphosate.

Treatments were applied either as seed treatments or seed treatments followed by one post-application of Quadris used at 9.2 fl oz/A at the four leaf stage. The post-application was made on 1 June using a bike sprayer with flat fan nozzles (4002E) spaced 22'' apart, set 9.5 inches above the soil, and calibrated to deliver 17 gal solution/A at 40 p.s.i pressure in a 7" band centered over the middle four rows of plots.

Stand counts were taken during the season and at harvest. The middle two-rows of plots were harvested on 14 September and weights were recorded. Samples (12-15 roots) from each plot, not including roots on the ends of plots, were analyzed for quality at American Crystal Sugar Company tare laboratory at East Grand Forks, MN. The data analysis was performed with the ANOVA procedure of the Agriculture Research Manager, version 8 software package (Gylling Data Management Inc., Brookings, South Dakota, 2010). The least significant difference (LSD) test was used to compare treatments when the F-test for treatments was significant.

## RESULTS AND DISCUSSIONS

Planting was done relatively early into dry soils. Emergence was slow and plants did not show any symptoms of damping-off or root rot early or during the season. Both varieties had a rating of 4.8 for Rhizoctonia root rot which would suggest they were fairly tolerant to the pathogen. As such, there was no damping-off early in the season because of the dry conditions and the older plants probably became tolerant later in the season when the pathogen became infective.

There were no significant differences in plant stand, yield, quality or recoverable sucrose when comparing the different treatments for each of the variety used. There were significant differences in yield and sucrose concentration between the Kabina seed treatments for the two varieties, as well as the Kabina seed treatment with post-fungicide application for the two varieties. However, differences in tonnage and sucrose concentration did not result in significant differences in recoverable sucrose when comparing the same treatments for each variety. The data suggests that neither the seed treatments nor the seed treatments used with a post-fungicide application adversely affected sugarbeet stand, yield and quality for each variety in the absence of disease symptoms.

## References


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**Table 1. Effect of varieties, seed treatments and fungicides at controlling *R. solani* on sugarbeet at Hickson, ND in 2015.**

| Product and Rate in fl oz/A | Application Date(s) | 9 June Stand Count | 27 July Stand Count | 14 September Stand Count | 14 September Yield | 14 September Sucrose concentration | 14 September Recoverable sucrose |
|---|---|---|---|---|---|---|---|
| | | beets/100’ | beets/100’ | beets/100’ | Ton/A | % | lb/A |
| SESVdh 36918RR w/o Kabina | - | 178 | 162 | 167 | 26.0 | 16.7 | 7,908 |
| SESVdh 36918RR w/ Kabina | Seed Trt | 157 | 153 | 152 | 26.1 | 17.9 | 8,610 |
| SESVdh 36918RR w/ Kabina | Seed Trt; 1 June | 162 | 160 | 157 | 27.7 | 17.3 | 8,743 |
| Crystal 101RR w/o Kabina | - | 173 | 176 | 162 | 28.7 | 16.8 | 8,587 |
| Crystal 101 w/ Kabina | Seed Trt | 177 | 165 | 168 | 31.3 | 16.3 | 9,003 |
| Crystal 101 w/ Kabina | Seed Trt; 1 June | 167 | 165 | 161 | 31.9 | 16.3 | 9,178 |
| **LSD (P=0.05)** | | **NS** | **NS** | **NS** | **3.2** | **0.8** | **NS** |