

INTEGRATED MANAGEMENT OF RHIZOCTONIA

Project Description (Continuing): *Rhizoctonia solani* causes damping-off and crown and root rot on sugarbeet throughout the growing season. Diseases caused by *R. solani* have been the most common problems in samples received by the NWROC sugarbeet plant pathology laboratory for several years. There continue to be questions about the best practices for full-season control of Rhizoctonia damping-off and crown and root rot and also controlling root rot that is occurring toward the bottom of the roots.

Project Leader: Ashok K. Chanda, University of Minnesota, NWROC

Other Personnel Involved: Jason Brantner and other personnel at NWROC, Mike Metzger and personnel at Minn-Dak Farmers Cooperative (MDFC), and research personnel at Southern Minnesota Beet Sugar Cooperative (SMBSC).

Project Location: University of Minnesota, NWROC, growers' fields in the southern Red River Valley and southern Minnesota

Objectives: Determine the best combination of seed treatment, in-furrow fungicide and/or postemergence fungicide applications on resistant and moderately resistant cultivars for full-season control of *R. solani* while limiting negative impact on emergence and stand establishment. In-furrow Quadris application will also be included as one of the treatments mainly to look at efficacy in controlling the root rot that is occurring toward the tip of the root.

Materials and Methods: Trials will be established at three sites inoculated with *R. solani*, one site at the NWROC, one site at MDFC, and one site at SMBSC. Each trial will be arranged in a randomized block design or a split plot design (variety as main plot, seed treatment as sub-plot and Quadris application as sub-sub plot) with 4 replicates. Sugarbeet will be planted-to-stand so efficacy in disease control and effect on emergence of seed treatments are reflected in stand and yield data. One of the registered seed treatments (**Kabina 14g or Vibrance 1.5g or Systiva 5g**) and in-furrow fungicides (**Quadris**) will be evaluated on **resistant and moderately resistant cultivars**; these fungicides will be evaluated as stand-alone products and in combination with a **postemergence** fungicide application of **Quadris @ 0.6 fl oz product/1000 ft** at 4-6 leaf (**normal timing**) and 8-10 leaf (**late timing**) stages. Experiments will include a *Rhizoctonia*-inoculated control with no fungicides control for each variety. Data will be collected for emergence, stand, Rhizoctonia crown and root rot ratings, yield, and quality.

Time Line of Anticipated Accomplishments:

2018

February – March: Locate fields in MDFC and SMBSC area, prepare *R. solani* infested barley inoculum

April/May: Broadcast *R. solani* infested barley inoculum, plant trials, collect emergence and stand data

June: Apply postemergence fungicide, continue collecting stand data

September-October: Assess Rhizoctonia crown and root rot, harvest for yield and quality

November-December: Analyze data and write Sugarbeet Research & Extension Reports

Progress Toward Objectives of On-going Projects: Results from 2017 will be included in the Sugarbeet Research and Extension Reports. The trial was established at 3 sites, one at the NWROC, one with MDFC (Wahpeton) and one with SMBSC (Raymond). Inoculation with *R. solani* (35 kg/ha) and early planting into cold and dry soils resulted in low early-season disease pressure.

NWROC site: There were no significant ($P > 0.05$) two way or three way interactions for stand data. For harvest data there was a significant seed treatment x postemergence application interaction ($P < 0.05$) for root rot rating and incidence. Resistant and moderately resistant varieties had similar stands from 2 to 8

weeks after planting (WAP). At-planting (seed) treatments and untreated control had similar stands at 2 WAP and by 3 WAP all the seed treatments had higher stands compared to untreated control. At 5 WAP, Vibrance had highest stands, Kabina and Systiva had intermediate, and untreated control had lowest stands. There were no significant differences between two varieties for stand data and harvest data. Root rot rating, yield, and other harvest parameters were not significantly different for the seed treatments and untreated control. Root rot severity and percent incidence (percent of roots with a disease rating of > 2.0) was significantly higher in the treatments without postemergence Quadris application, compared to 4- or 8-leaf Quadris application. Yield, recoverable sugar A⁻¹ (RSA), percent sucrose and recoverable sucrose T⁻¹ (RST) were not significantly different between Quadris and no Quadris application.

This research trial was used for field tour during NWROC annual crops and soils day in July 2017.

MDFC site: There were significant ($P < 0.05$) variety x seed treatment interactions for percent sugar, purity, and RST; variety x postemergence interactions for root rot rating. There were significant ($P < 0.05$) variety x seed treatment x postemergence three way interactions for percent sugar, purity, and RST. Both varieties had similar stands until 6 WAP and had similar yield, percent sugar, RST, and RSA. There were no significant differences for stands between seed treatments and untreated control until 6 WAP. Root rot severity and incidence were higher in no Quadris compared to 4- or 8- leaf Quadris application. Percent sugar, purity, RST, and RSA were higher for 8-leaf Quadris compared to 4-leaf and no Quadris application.

SMBSC site: There were significant ($P < 0.05$) seed treatment x postemergence application interactions for root rot rating and incidence and no three way interactions. From 2 to 9 WAP there were no differences in stand between two varieties. However, by harvest, moderate variety had higher yield. Resistant variety had higher percent sugar and RST compared to moderate variety. Stand data and harvest data were not different between seed treatments and untreated control. Eight-leaf Quadris application had lower Root rot severity and incidence compared to no Quadris and 4-leaf Quadris application. Yield, percent sugar, RST, and RSA were not significantly different between 4- or 8-leaf Quadris and no Quadris application.

Budget Requested: \$28,749.00

LABOR: SALARIES (19,800.00) AND FRINGE (5,481.00)

EQUIPMENT (OVER \$250.00): NONE

SUPPLIES: 1,200.00

TRAVEL: 1,643.00

LEASES: NONE

OTHER: 625.00

TOTAL: \$28,749.00