Management of Rhizoctonia Root and Crown Rot with Single Fungicide Applications at Planting Under a Sugarbeet Replant Scenario

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Introduction
Rhizoctonia solani is the soil-borne fungus that causes a seedling damping off and Rhizoctonia root and crown rot disease (RRCR). It is a major problem facing sugarbeet growers in Wyoming and across the country. One of the management strategies is to plant early when soil temperatures are not optimal for R. solani activity, thereby giving the crop a head start. When growers are faced with a replant scenario, soils are typically warmer and, hence, have an increased R. solani infection risk. A study was designed to determine which single fungicide application method would provide the best season-long management of beet diseases caused by R. solani. This was the second year of the study, which started in 2014.

Objectives
The objectives are to determine which single fungicide application method would provide the best season-long management of sugarbeet diseases caused by R. solani in a shortened season.

Materials and Methods
Field plots were placed at the James C. Hageman Sustainable Agriculture Research and Extension Center (SAREC) near Lingle. The experimental design was a randomized complete block with four replications; plots were four rows (30-in row centers) by 25-ft long, with a 5-ft in-row buffer. Inoculum was a mixture of two Rhizoctonia solani isolates cultured on barley grain and was broadcast with a cyclone spreader at a rate of 25 lb/ac and then incorporated into the soil. In-furrow fungicide treatments were applied June 1, 8, and 19, 2015. Foliar fungicides were applied at the 4–8 leaf stage on July 2 for planting date one, July 10 for planting date two, and July 22 for planting date three. In-furrow and foliar fungicides were applied with the aid of a CO2 backpack sprayer in a total volume of 0.42 gal per 400 ft of row at 40 psi. For each planting date stand counts were conducted by counting all plants in a sub-plot (2 rows by 25 ft). Disease incidence is presented as the average number of plants showing RRCR symptoms in the two rows by 25 ft. On September 25 the plots were evaluated for percent canopy decline. Two rows by 25 ft were harvested September 29 and 30 using a mechanical beet harvester. At harvest, 10 random beets per plot were evaluated for RRCR severity.

Results and Discussion
Fungicide treatment had significant effects on stand count, percent canopy decline, RRCR, and yield. Data is summarized in Table 1. All in-furrow fungicides and the Kabina® seed treatment improved stands compared to the non-treated inoculated check (p≤0.05). Although RCR development was low to moderate, fungicide treatments reduced late-season canopy decline compared to the non-treated inoculated check (p≤0.05). For root yield all in-furrow and foliar-band treatments resulted in yields greater than the inoculated check and equivalent to or greater than the non-inoculated check (p≤0.05). The Proline® treatment also had greater yield than the non-treated, non-inoculated check (p≤0.05). Results indicate that in a shortened season due to a plant back scenario, a Kabina seed treatment alone does not provide season-long disease protection. The in-furrow treatments of Quadris®, Priaxor™, and Vertisan® provided season-long protection against RRCR. Waiting until the 4–8 leaf stage to apply the foliar band provided some protection, but there are more losses due to disease in the period prior to the foliar application.

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PARP: I:1, X:3

Table 1. Management of Rhizoctonia root and crown rot with single fungicide applications at planting under a sugarbeet replant scenario, 2015.

<table>
<thead>
<tr>
<th>Treatment and Rate¹</th>
<th>Timing²</th>
<th>Stand Count³</th>
<th>% Canopy Decline⁴</th>
<th>RRCR⁵</th>
<th>Yield⁶</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-treated inoculated check</td>
<td>A</td>
<td>124 e⁷</td>
<td>35 a</td>
<td>10 a</td>
<td>20,370 c</td>
</tr>
<tr>
<td>Non-treated non-inoculated check</td>
<td>A</td>
<td>140 a</td>
<td>1 c</td>
<td>1 b</td>
<td>26,779 b</td>
</tr>
<tr>
<td>Quadris (0.6 fl oz/1,000 ft)</td>
<td>B</td>
<td>131 dc</td>
<td>2 c</td>
<td>0 b</td>
<td>30,710 ab</td>
</tr>
<tr>
<td>Priaxor (0.46 fl oz/1,000 ft)</td>
<td>B</td>
<td>136 abc</td>
<td>1 c</td>
<td>0 b</td>
<td>28,904 ab</td>
</tr>
<tr>
<td>Proline (0.33 fl oz/1,000 ft)</td>
<td>B</td>
<td>132 c</td>
<td>2 c</td>
<td>1 b</td>
<td>33,227 a</td>
</tr>
<tr>
<td>Vertisan (1.2 fl oz/1,000 ft)</td>
<td>B</td>
<td>139 ab</td>
<td>1 c</td>
<td>1 b</td>
<td>29,526 ab</td>
</tr>
<tr>
<td>Quadris (0.6 fl oz/1,000 ft)</td>
<td>C</td>
<td>125 de</td>
<td>3 c</td>
<td>0 b</td>
<td>25,972 b</td>
</tr>
<tr>
<td>Kabina (0.75 fl oz/seed unit)</td>
<td>D</td>
<td>133 bc</td>
<td>27 b</td>
<td>12 a</td>
<td>20,623 c</td>
</tr>
</tbody>
</table>

LSD (p<0.05)  6.42  6.66  5.00  5,226.7

¹Treatments were applied using a single-nozzle sprayer.
²Application timings: A=untreated, B=In-Furrow, C=Foliar band at the 4-8 leaf stage, D=seed treated by manufacturer.
³Total number of plants in each plot was determined on July 10, July 21, and August 3 for June 1, 8, and 19 planting dates, respectively.
⁴Percent canopy decline was determined September 25.
⁵Ten beets per plot were rated for percent surface area showing discoloration at harvest.
⁶Beet root yield in lb/ac on September 29 and 30.
⁷Treatment means followed by different letters differ significantly (p≤0.05).