Rhizoctonia Management in Sugarbeet with Xanthion

M. Wallhead\textsuperscript{1} and W. Stump\textsuperscript{1}

Introduction
Sugarbeet (Beta vulgaris) represents an important crop for Wyoming. In 2015, farmers harvested 942,000 tons having an estimated value of $46.3 million, according to the Wyoming office of National Agricultural Statistics Service. Rhizoctonia root and crown rot (RRCR), which is caused by the pathogen Rhizoctonia solani, is the number one disease affecting sugarbeet across the growing region. To manage soil-borne diseases, in-furrow fungicide at planting is one management option. Xanthion\textsuperscript{TM} is a new generation biofungicide from BASF Corp., Research Triangle Park, North Carolina. It combines Bacillus subtilis (strain MBI 600) with the chemical fungicide pyraclostrobin. Foliar fungicides are an option later in the growing season if in-furrow applications are not made, fail, or are found to provide inadequate control.

Objectives
The objectives of this study are to determine the effect of in-furrow fungicide and foliar fungicides on Rhizoctonia root and crown rot development and final sugarbeet yield.

Materials and Methods
Field plots were placed at the James C. Hageman Sustainable Agriculture Research and Extension Center (SAREC) near Lingle in 2015. The experiment was a randomized complete block design with four replications; plots were 4 rows (30-in row centers) by 20-ft long, with a 5-ft in-row buffer. Inoculum was a 50:50 mixture of Rhizoctonia solani AG2-2 R1 and R9 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 at planting May 5. Foliar-banded fungicides were applied at the 8–12 beet leaf stage on June 19. Stand counts were determined on June 30 on the two middle rows by 20 ft. On July 2 the plots were evaluated for percent canopy decline. RRCR incidence in each plot was determined August 17 (2 rows x 2 ft). Two rows by 20 ft were harvested September 28. During harvest, 10 random beets per plot were evaluated for percent RRCR severity.

Results and Discussion
Seedling decay was not a factor early in the season as evidenced by no significant effect on stand counts between the non-treated inoculated check and the non-treated non-inoculated check. Data is summarized in Table 1. For percent canopy decline only Headline\textsuperscript{®} applied at 9 fl oz/ac and Xanthion\textsuperscript{TM} IF Comp A Integral (1.2 fl oz/ac) + Xanthion IF Comp B Headline (9 fl oz/ac) had significantly less canopy decline compared to the non-treated inoculated control (p≤0.05). All fungicide treatments reduced disease incidence compared to the non-treated inoculated control. The treatments of Headline alone and Xanthion IF Comp A Integral (1.2 fl oz/ac) + Xanthion IF Comp B Headline (9 fl oz/ac) + Priaxor\textsuperscript{™} (foliar band) also had incidence numbers similar to the non-treated non-inoculated check (p≤0.05). All fungicide treatments had significantly higher yields compared to the non-treated inoculated control (p≤0.05). As a result of completing this research we have identified several fungicides and non-traditional fungicides suitable for managing RRCR. The biofungicide efficacy results are promising, but will require further testing.

Acknowledgments
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**PARP:** I:1, X:3

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**Table 1.** Rhizoctonia management in sugarbeet with Xanthion, 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>1. Non-treated non-inoculated check</td>
<td>A</td>
<td>0.0 b</td>
<td>0.3 d</td>
<td>2.0 a</td>
<td>30,202.1 a</td>
</tr>
<tr>
<td>2. Non-treated inoculated check</td>
<td>A</td>
<td>23.5 a</td>
<td>58.8 a</td>
<td>11.0 a</td>
<td>11,297.9 b</td>
</tr>
<tr>
<td>3. Headline 9 fl oz</td>
<td>B</td>
<td>0.5 b</td>
<td>7.8 bcd</td>
<td>8.0 a</td>
<td>29,222.2 a</td>
</tr>
<tr>
<td>4. Xanthion IF Comp A Integral 1.2 fl oz</td>
<td>B</td>
<td>15.9 ab</td>
<td>10.5 bc</td>
<td>5.5 a</td>
<td>26,842.3 a</td>
</tr>
<tr>
<td>Xanthion IF Comp B Headline 9 fl oz</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Xanthion IF Comp A Integral 1.2 fl oz</td>
<td>B</td>
<td>2.0 b</td>
<td>3.0 cd</td>
<td>3.0 a</td>
<td>30,726.8 a</td>
</tr>
<tr>
<td>Xanthion IF Comp B Headline 9 fl oz</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Priaxor 6.7 fl oz Priaxor 6.7 fl oz</td>
<td>C</td>
<td>23.5 a</td>
<td>14.8 b</td>
<td>5.5 a</td>
<td>22,579.4 a</td>
</tr>
</tbody>
</table>

| LSD (p≤0.05) | 17.79 | 9.81 | ns | 9,590.0 |

¹Treatments were applied using a single-nozzle sprayer.

²Timings: A=untreated, B=In-furrow on May 5, C=Banded 8–12 leaf stage on June 19.

³Percent canopy decline was determined July 2.

⁴Incidence is reported as average number of plants displaying RRCR symptoms August 17.

⁵Ten beets per plot were rated for percent surface area showing discoloration at harvest.

⁶lb/ac of roots on September 28.

⁷Treatment means followed by different letters differ significantly (p≤0.05).