Pinto Bean Rhizoctonia Root Rot Management with In-Furrow Fungicides

M. Wallhead1 and W. Stump1

Introduction
Dry beans are an important crop in Wyoming—in 2015, 31,000 acres were harvested. Wyoming dry bean growers have a strong economic incentive to plant dry beans as early as possible: the earlier the planting date, the greater the potential yield. This practice, however, carries considerable risk because emerging seedlings may be killed or infected by soil-borne pathogens. Early season infections and damping-off can lead to significant yield losses at harvest. By utilizing direct placement of fungicide at planting, crop losses due to soil-borne pathogens may be minimized, enhancing crop health and increasing yields and profitability.

Objectives
The objectives of this study are to determine the effect of in-furrow fungicides on Rhizoctonia root rot and yield of pinto bean. (This disease is caused by the soil-borne pathogen \textit{Rhizoctonia solani}.)

Materials and Methods
Field plots were placed in 2015 at the James C. Hageman Sustainable Agriculture Research and Extension Center (SAREC) near Lingle. The experiment was a randomized complete block design with four replications; plots were four rows (30-in row centers) by 20-ft long, with a 5-ft in-row buffer. Inoculum used was a mixture of two \textit{Rhizoctonia solani} isolates cultured on barley grain and was broadcast at the rate of 35 lb/ac and incorporated into the soil. In-furrow fungicide treatments were applied at planting on June 9. All fungicides were applied with the aid of a CO₂ backpack sprayer in a total volume 0.42 gal per 400 ft of row at 40 psi. Stand counts were determined on June 24. On August 3, five plants per plot were pulled randomly and rated for Rhizoctonia root rot symptoms. Two rows by 20 ft were cut and placed in windrows to dry on September 14. Beans were threshed September 17. Mean separation was tested using Fisher’s protected least significant difference (LSD) ($p \leq 0.05$).

Results and Discussion
No phytotoxicity due to treatment was observed on the pinto bean crop. Data is summarized in Table 1. Disease development was light despite plot inoculations. In-furrow fungicide treatment had no effects on stand count. Differences were observed between treatments with Propulse® 400SC applied at 13.6 fl oz/ac and Proline® 480SC applied at 5.7 fl oz/ac having significantly lower levels of Rhizoctonia root rot as compared to the untreated control ($p \leq 0.05$). In-furrow fungicide programs had no significant effect on yield. Since disease pressure was low, it’s difficult to surmise treatments were effective due to the lack of yield effect. However, results are promising since there was a significant reduction of disease at the June 24 plant ratings.

Acknowledgments
We thank Wendy Cecil and SAREC field crews for assistance in plot establishment and harvesting. Also, we thank Bayer CropScience for its support.

Contact Information
William Stump at wstump@uwyo.edu or 307-766-2062.

Keywords: dry bean, \textit{Rhizoctonia solani}, fungicides

PARP: I:1, X:3

1Department of Plant Sciences.
Table 1. Pinto bean Rhizoctonia root rot management with in-furrow fungicides, 2015.

<table>
<thead>
<tr>
<th>Treatment and rate/ac&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Stand count&lt;sup&gt;2&lt;/sup&gt;</th>
<th>RRR (0–4)&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Yield&lt;sup&gt;4&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated check</td>
<td>47&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>27.8&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Proline 480SC 5.7 fl oz</td>
<td>63&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.9&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>28.6&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Propulse 400SC 10.2 fl oz</td>
<td>48&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.3&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>27.5&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Propulse 400SC 13.06 fl oz</td>
<td>35&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.3&lt;sup&gt;c&lt;/sup&gt;</td>
<td>22.6&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Serenade Soil® SC 1 pt</td>
<td>58&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.8&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>29.6&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Serenade Soil SC 2 pt</td>
<td>55&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.7&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>29.5&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>LSD (p≤0.05)</td>
<td>ns</td>
<td>0.855</td>
<td>ns</td>
</tr>
</tbody>
</table>

<sup>1</sup>All treatments were applied in-furrow on June 9 using a single-nozzle sprayer.

<sup>2</sup>Stand counts represent the total number of plants in the two center rows of each plot on June 24.

<sup>3</sup>Five stems per plot were rated (0–4 scale) for Rhizoctonia root rot (RRR) on August 3. A higher number represents greater disease.

<sup>4</sup>Bean seed yield bu/ac on September 17.

<sup>5</sup>Means followed by different letters differ significantly (p≤0.05).