Potato Early Blight Management with In-Furrow Fungicide Combinations

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Introduction
Foliar fungicides are the primary means of early blight management on potato in the U.S.; however, fluopyram, the active ingredient in Velum® Prime, has fungicidal as well as nematicidal activity. Because of this, it has shown to have activity on early blight when applied in-furrow at planting for nematode management. Velum Prime is marketed both as a nematicide and fungicide.

Objectives
The objectives of this study are to determine the effects of an in-furrow application of Velum Prime at planting with and without additional foliar fungicides on early blight development and yield for potato.

Materials and Methods
Field plots were placed at the James C. Hageman Sustainable Agriculture Research and Extension Center in 2017. The experimental design was a randomized complete block design with four replications. Plots were four, 20-foot-long rows (36-inch row centers), with a 5-foot in-row buffer. In-furrow treatments were applied to open furrows over planted seed on May 25. Emergence was observed on June 12. After irrigation on July 25, Alternaria solani spores (concentration not determined) were applied along the length of two center rows of each plot. Foliar fungicide treatments were applied July 24 and 31, and August 8 and 15 with a backpack sprayer. Data collected included early blight disease severity and potato yields (Table 1).

Results and Discussion
Early blight was first confirmed in the plots on July 24. After inoculation the disease progressed, resulting in visible necrosis (death of tissues in the potato due to disease) in the non-treated check by late August. Effects of fungicide applications on early blight disease are shown in Table 1. There were significant differences in lesion numbers for treatments. The area under the disease progress curve (AUDPC), a measure of season-long foliar disease, revealed that only the two in-furrow treatments of Velum Prime reduced overall foliar disease significantly compared to the non-treated check. This effect was also apparent in severity ratings of percent foliar necrosis with these two treatments having noticeably less canopy necrosis than the non-treated check and the Echo® ZN/Dithane® program. The addition of the Echo ZN/Dithane foliar sprays to the Velum Prime in-furrow did not significantly change effects on disease suppression. Fungicide programs had no significant effect on yield. A single application of Velum Prime in-furrow at planting for nematode management has the potential to provide significant season-long management of potato early blight under Wyoming’s growing conditions.

Acknowledgments
We thank SAREC field crews for assistance in plot establishment and harvesting, and Bayer Crop Science, Colorado Potato Administrative Committee, Area 3, and Western Potatoes Inc., Alliance, Nebraska, for support.

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Keywords: potato, early blight, in-furrow fungicide

PARP: I:11

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Table 1. Potato early blight management with in-furrow fungicide combinations.

<table>
<thead>
<tr>
<th>Treatment, rate (product/ac), and timing¹</th>
<th>Ave # lesions per leaflet</th>
<th>AUDPC²</th>
<th>% canopy necrosis</th>
<th>Total tuber yield³ (cwt/ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aug. 7</td>
<td>Aug. 21</td>
<td>Aug. 24</td>
<td></td>
</tr>
<tr>
<td>Non-treated check</td>
<td>9.0 a</td>
<td>10.4 a</td>
<td>358.7 a</td>
<td>88.00 a</td>
</tr>
<tr>
<td>Velum Prime (6.8 fl oz) A</td>
<td>0.2 b</td>
<td>1.6 a</td>
<td>9.6 b</td>
<td>17.0 b</td>
</tr>
<tr>
<td>Echo ZN (1 pt) BD Dithane DF (2 lb) C</td>
<td>0.3 b</td>
<td>1.9 a</td>
<td>10.4 b</td>
<td>8.5 b</td>
</tr>
<tr>
<td>Echo ZN (1 pt) BD Dithane DF (2 lb) CE</td>
<td>10.6 a</td>
<td>21.6 a</td>
<td>203.4 ab</td>
<td>80.5 a</td>
</tr>
</tbody>
</table>

¹Fungicide applications dates (A–E, respectively) were: May 25 (in-furrow), July 24 and 31, and August 8 and 15 (foliar fungicide). Listed fungicide rates were adjusted to rates per 1,000 row ft with 36-in row spacing.

²AUDPC=area under the disease progress curve for data collected from August 22 through September 10. The AUDPC is an estimate of season-long early blight disease severity in the plant canopy.

³cwt=hundredweight.

⁴Treatment means followed by different letters differ significantly (Fisher’s protected LSD, p≤0.05).