The effect of soybean seeding rate on yield in a field with high disease pressure from water molds

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Objective
To determine the effects of seeding rate on soybean yield when the crop is affected by water molds (P. sojae and Pythium spp.)

Background
Crop Year: 2014
Location: Archbold, OH
County: Fulton
Soil Type: Fulton silty clay loam
Drainage: Undrained
Previous Crop: Corn

Tillage: Minimum
Soil Test: pH 6.7, P 73 ppm*, K 284 ppm
Planting Date: May 8, 2014
Fertility: VRT applied in corn year
Harvest Date: September 20, 2014
Rainfall (May-Sept): 15.7”
*Bray P1 Extractant

Methods
Five soybean populations were evaluated in a field with high disease pressure from P. sojae and Pythium spp. The study was planted in a randomized complete block design with four replications. A 40 foot John Deere 1790 air seeder which could accurately monitor see was used to plant the study. All treatments received the same tillage and herbicide applications. Seed used was Rupp 7251 with Apron Maxx fungicide seed treatment at a rate of .32 oz/cwt and Cruiser insecticide seed treatment at a rate of 1.28 oz/cwt. Data for stand counts were taken at V3, R1, and leaf drop from 8 locations within each treatment. Plot centers were harvested with a commercial combine equipped with a 35 foot grain header. Yields and moistures were obtained by using a calibrated GreenStar 2630 monitor. Yields were adjusted to 13% moisture. Precipitation data was obtained from Weather.com and recorded weekly.

Results

<table>
<thead>
<tr>
<th>Seeding Rate 5/8/2014</th>
<th>Stand Count- V3 6/11/2014</th>
<th>Stand Count- R1 7/9/2014</th>
<th>Stand Count 9/18/2014</th>
<th>% Total Stand Loss</th>
<th>% Moisture</th>
<th>Yield Bu/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>107</td>
<td>80.1</td>
<td>73.8</td>
<td>73.8</td>
<td>-31%</td>
<td>13.6%</td>
<td>51.2 B</td>
</tr>
<tr>
<td>131</td>
<td>106</td>
<td>97.3</td>
<td>88.9</td>
<td>-32%</td>
<td>13.4%</td>
<td>52.9 B</td>
</tr>
<tr>
<td>154</td>
<td>127</td>
<td>118</td>
<td>113</td>
<td>-27%</td>
<td>13.3%</td>
<td>55.5 A</td>
</tr>
<tr>
<td>175</td>
<td>157</td>
<td>139</td>
<td>136</td>
<td>-22%</td>
<td>13.6%</td>
<td>54.2 AB</td>
</tr>
<tr>
<td>200</td>
<td>160</td>
<td>149</td>
<td>126</td>
<td>-37%</td>
<td>13.8%</td>
<td>55.7 A</td>
</tr>
</tbody>
</table>

LSD = 2.49 (p<.05); CV 3.00

**Seeding rates and stand counts reported to 3 significant figures, in thousands per acre**
### Summary

<table>
<thead>
<tr>
<th>Seeding rate (x1,000)</th>
<th>Yield Bu/acre</th>
<th>Gross Revenue per acre</th>
<th>Seed Cost per acre</th>
<th>Net Revenue per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>107</td>
<td>51.2</td>
<td>$512.00</td>
<td>$43.87</td>
<td>$468.13</td>
</tr>
<tr>
<td>131</td>
<td>52.9</td>
<td>$529.00</td>
<td>$53.71</td>
<td>$475.29</td>
</tr>
<tr>
<td>154</td>
<td>55.5</td>
<td>$555.00</td>
<td>$63.14</td>
<td>$491.86</td>
</tr>
<tr>
<td>175</td>
<td>54.2</td>
<td>$542.00</td>
<td>$71.75</td>
<td>$470.25</td>
</tr>
<tr>
<td>200</td>
<td>55.7</td>
<td>$557.00</td>
<td>$82.00</td>
<td>$475.00</td>
</tr>
</tbody>
</table>

**Economics:** Gross income= yield x $10.00/bu; Seed cost= $0.41 per 1,000 seeds x seeding rate; Net revenue= Gross revenue – seed cost.

**Discussion:**
The loss in plant population averaged 30% across treatments due to *P. sojae* and *Pythium spp.* during the growing season. Treatments where harvest stands fell below 100,000 plants per acre resulted in significantly lower yields than treatments with a harvested population above 100,000 plants per acre. Based on 1 year of data, planted population of 154,000 seeds/acre or harvest stand of 113,000 plants/acre resulted in the greatest returns per acre when significant stand losses occurred. Further data in the form of multi-year replications will add to the validity of these results.

**Acknowledgement**
The author expresses appreciation to on-farm collaborators Rufenacht Farms for the planting and harvesting of this plot. Thanks also to Rupp Seed Co. for their cooperation and support in this trial. Thanks to Dr. Anne Dorrance’s lab in assisting with the diagnostics. Thanks to student workers Emily Herring and John Schoenhalts for assistance with data collection and processing.

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