Evaluating Variable Rate Fungicide Applications for Control of Sclerotinia

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2011 progress made possible through OPC and NPB support

- In years with light sclerotinia pressure, variable rate fungicide application appears to be profitable.

Introduction

Oklahoma peanut growers continue to try to increase yields and reduce input costs. Perhaps the largest input in a peanut crop is fungicide applications. This is especially true for areas in the state that have high disease pressure from sclerotinia. On average, a single fungicide application costs $50-$60/acre to help control the disease.

A large portion of the Oklahoma peanut crop is still grown in areas where sclerotinia is present, so a solution to reduce fungicide input costs would greatly benefit producers struggling to control the disease.

Precision agricultural technologies (GPS, variable rate applicators, optical sensors, etc.) are currently available that provide producers with application options. Currently, very few precision agricultural technologies are used in peanut production. A potential technology that could be used to target applications of fungicide to high disease pressure areas is remote sensing (aerial photos). Aerial photos can be used to determine Normalized Difference Vegetation Index (NDVI), which is a simple numerical indicator that can be used to analyze remote sensing measurements and to assess whether the target being observed contains live green vegetation.

In 2009, one peanut field in Caddo County was identified that had visual evidence of sclerotinia. Early observations indicate that it looks promising that we can identify areas of higher sclerotinia pressure from near infrared (NIR) or other aerial photographs. This should enable us to target applications of fungicide to control the highest disease areas. In addition, some areas of the field may not need to be treated or could be treated with a reduced rate of fungicide. Depending on pressure...
level of disease in a field, it is believed that we may be able to reduce sclerotinia fungicide application costs by 15 percent - 35 percent. This is a very early estimate but savings should be realized.

Implementation of this on a producer level should be relatively inexpensive since most agricultural retailers have the capability to make variable rate prescription maps and apply products variably. If producers do their own spraying, costs to get set-up to make variable rate applications should be relatively inexpensive and costs could easily be recouped from fungicide savings. In addition, photographs would not be needed every year but only to identify high disease pressure areas. The objective of this project is to evaluate the potential for variable rate application of fungicide to control sclerotinia.

Materials and Methods

Half-acre drill soil samples were taken on two fields with history of sclerotinia in 2011. Soil samples were taken to a depth of 3 inches an effort to characterize the number of sclerotia present. These sclerotia counts were used to determine areas of high sclerotia concentrations.

In an effort to evaluate variable rate fungicide applications, multiple strips across the field were applied variably depending on disease pressure from sclerotia density. A prescription map was created and given to the producer before Endura® was applied. Peanut yield from these strips was compared to adjacent strips across the field that received the recommended flat rate of fungicide. Yield data was collected with modifying a cotton yield sensor.

Results and Discussion

Figure 1 illustrates the sclerotia concentrations found in soil samples collected. The areas of highest sclerotia concentration was verified by the producer. Four strips were placed to intersect different areas of the field (Figure 2).

Paired comparisons of yield monitor data (Figure 4) did not indicate any significant differences in yield inside the application strip where no Endura® was applied when compared to adjacent areas outside of the application strip where a flat rate of 10 ounces of Endura® was applied (Table 8). Figure 4 illustrates yield along one of the variable application strips and the adjacent strip that received a uniform rate of 10 oz./A. As you can see, a lot of variability exists along the strip. Several things besides sclerotinia are affecting yield.
Sclerotinia was not severe in 2011, but results from this study indicate that fungicide applications can be reduced or eliminated in areas of the field where sclerotia counts were zero. If sclerotinia pressure was severe, a flat rate application may be warranted but in light pressure years a variable rate application appears to be feasible. A basic economic comparison indicates that applying fungicide variably across the entire 56 acres of the field, would result in a cost of $2,587 per application.

In comparison, a flat rate across the field based on a 10 oz/A application rate would result in a cost of $3,474 per application. Variable rate application results in a savings of $887.

This study will be continued in 2012.

<table>
<thead>
<tr>
<th>Paired Comparison</th>
<th>0 oz/ac</th>
<th>Adjacent 10 oz/ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2815</td>
<td>2962</td>
</tr>
<tr>
<td>2</td>
<td>3604</td>
<td>3584</td>
</tr>
<tr>
<td>3</td>
<td>3770</td>
<td>3593</td>
</tr>
<tr>
<td>Average</td>
<td>3396</td>
<td>3380</td>
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</table>

Table 8. Yield comparison of inside (0 oz/ac) and outside (10 oz/ac) of the variable rate fungicide application strips.

<table>
<thead>
<tr>
<th>Sclerotia Count</th>
<th>Percent of field</th>
<th>Rate</th>
<th>Cost</th>
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<tbody>
<tr>
<td>0</td>
<td>35</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.3-0.8</td>
<td>43</td>
<td>8</td>
<td>1505</td>
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<tr>
<td>0.8-1.4</td>
<td>12</td>
<td>12</td>
<td>500</td>
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<tr>
<td>1.4-2.6</td>
<td>10</td>
<td>15</td>
<td>582</td>
</tr>
</tbody>
</table>

Total Cost $2587

Table 9. Fungicide cost if variable rate application applied to the whole field based on sclerotia counts.

Figure 3. Yield map from peanut harvest in 2011.

Figure 4. Yield along one of the variable application strips and the adjacent strip that received a uniform rate of 10 oz/A. The shaded area received no Endura® in the variable application strip.