Modified Relay Intercropping Soybean Nitrogen Evaluation

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Objective

To determine if the timing of spring nitrogen application to wheat influences soybean yield in a modified relay intercropping system.

Background

Crop Year: 1997  
Herbicide: Trt. 1: 4/14/97: 2,4-D 0.5 pt.  
Cooperator: David Brewer  
Trt. 2: 4/19/97: 2,4-D 1 pt.  
County/Town: Crawford/ Bucyrus  
Variety: Wheat: Patterson  
Drainage: Improved  
Soybeans: Resnick  
Major Soil Type: Blount  
Planting Rate: Wheat: 120 lbs./A  
Previous Crop: Soybean  
Soybeans: 90 lbs./A  
Tillage: None  
Planting Date: Wheat: October 4, 1996  
Soil Test: pH 7.2; P 126 lbs./A;  
K 316 lbs./A  
Harvest Date: Wheat: July 21, 1997  
Fertilizer Applied: 300# 7-28-28 pre-plant  
Soybeans: October 21, 1997

Materials and Methods

Top-dress nitrogen was applied to wheat at two different times. Treatment 1 was a single application of 65 lbs. of 28% N applied on 3/24/97, and treatment 2 was a split application of 65 lbs. 28% N on 3/24/97 plus 60 lbs. of 28% N applied 4/16/97. Individual plot size was 0.35 acre with four replications of each treatment.

Results

<table>
<thead>
<tr>
<th>1997 Modified Relay Intercropping Soybean Yield Data (bu/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Single N</td>
</tr>
<tr>
<td>Split N</td>
</tr>
</tbody>
</table>

F value 10.25, significant at .05 level, LSD 4.87 bu/a, CV = 9.92; design was completely randomized
### MRI Soybean Yield Results
(Three-Year Average)

<table>
<thead>
<tr>
<th>Year</th>
<th>Single N Application</th>
<th>Split N Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>41.1</td>
<td>40.1</td>
</tr>
<tr>
<td>1995</td>
<td>28.9</td>
<td>25.2</td>
</tr>
<tr>
<td>1997</td>
<td>31.6</td>
<td>25.2</td>
</tr>
<tr>
<td>3-Year Average</td>
<td>33.9</td>
<td>30.2</td>
</tr>
</tbody>
</table>

No significant difference between three-year averages of nitrogen treatments.

1996 year not analyzed due to severe wheat winter kill. Overall average of all treatments = 32.1 bu/ac.

### Summary and Notes

To address the issues of farm profitability and environmental protection, a modified relay intercropping (MRI) system has been studied. In this system, soybeans are planted into wheat at or past the heading stage of growth. A modified relay intercropping system can effectively utilize farm labor, time, and equipment, while at the same time reducing herbicide usage in the soybean crop. A descriptive study was conducted to measure the effects of variable wheat nitrogen fertilizer rates on soybean yield. The three-year soybean yield over all treatments in the MRI system average was 32.1 bushels per acre. The wheat three-year average over all treatments in the MRI system was 68.9 bushels. See the discussion under "MRI Wheat Nitrogen Research" results for a revenue analysis.

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