Economics of Legume Cover Crops

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Economics of Legume Cover Crops

W.W. Frye

We have compared hairy vetch, big flower vetch, rye, and corn residue as winter cover treatments in no-tillage corn production since 1977. One of the objectives of this research is to determine the economic feasibility of using a legume cover crop to supply a portion of the nitrogen needs of a corn crop. Results reported here are based on corn yields obtained during 1977 through 1981 at Lexington and 1980 through 1985 at Princeton.

Corn Yields

Corn yields at Lexington were greatest with hairy vetch and 90 lb/acre fertilizer N (Table 1). Neither the hairy vetch cover crop alone nor N fertilizer with corn residue produced as much corn yield as did the combination of hairy vetch and fertilizer N. Grain yields increased rather steadily at an average rate of 8 bu/acre/year over the 5-year period with this combination compared to corn residue with 90 lb/acre fertilizer N. This was attributed to the hairy vetch cover crop.

At Princeton, hairy vetch and big flower vetch increased corn yields over both rye and corn residue treatments at all N rates. The increase appeared to be due mostly to N provided by the legumes. Extremely dry weather in 1980 and 1983 caused low corn yields across all treatments and contributed to the unusually low average yields at Princeton.


<table>
<thead>
<tr>
<th>Winter cover</th>
<th>Lexington N rate, lb/acre</th>
<th>Princeton N rate, lb/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0  45  90</td>
<td>0  45† 90†</td>
</tr>
<tr>
<td>Hairy vetch</td>
<td>102 109 145</td>
<td>51  67  96</td>
</tr>
<tr>
<td>Corn residue only</td>
<td>60  83  109</td>
<td>18  42  83</td>
</tr>
</tbody>
</table>

† Increased to 75 and 150 lb/acre in 1984 and 1985.
Returns Above Costs

Table 2 summarizes the returns above operating costs for hairy vetch and corn residue treatments. Cost estimates used were those contained in "Field Crop and Forage Budget Estimates for Kentucky for 1986" (Ag. Econ. Ext. Public. No. 55, Univ. of Ky.).

Table 2. Returns above operating costs for two winter cover treatments.

<table>
<thead>
<tr>
<th>Winter cover</th>
<th>Lexington</th>
<th>Princeton</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N rate, lb/acre</td>
<td>N rate, lb/acre</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>45</td>
</tr>
<tr>
<td>Hairy vetch</td>
<td>60</td>
<td>59</td>
</tr>
<tr>
<td>Corn residue</td>
<td>3</td>
<td>30</td>
</tr>
</tbody>
</table>

† Increased to 75 and 150 lb/acre in 1984 and 1985.

Princeton. The returns at Princeton were below operating costs, except at the 90-lb fertilizer N rate, due to low corn yields in two very dry years during the 6-year study. However, yields with legume cover treatments were sufficiently greater than with the corn residue treatment to more than pay for the seeding costs.

Lexington. Returns above operating costs were by far the highest for the treatment of hairy vetch with 90 lb/acre of fertilizer N. Big flower vetch returns were lowest, due largely to the high cost of seed (30 lb/acre at $1.00/lb). When applied with the cover treatments, 90 lb/acre fertilizer N increased returns above operating costs by $49, $40, $74, and $60 per acre, respectively, for hairy vetch, big flower vetch, rye, and corn residue compared to the same treatments without N fertilizer.

Summary. The combination of hairy vetch and 90 lb/acre N was the most profitable treatment. Even with two dry years at Princeton, additional yield due to the hairy vetch in this treatment was sufficient to recover seeding costs. At Lexington, estimated returns from this combination exceeded estimated operating costs by $59 to $109/acre, depending on N fertilizer rate.

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Extension Soils Specialist