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Department of Agronomy

Soil Science News & Views



Vol. 1 No. 4 September 1980

USE OF ANNUAL LEGUMES AS WINTER COVER FOR NO-TILL CORN

R. L. Blevins

Legumes in crop rotations have traditionally provided nitrogen for nonlegume crops since the early history of agriculture. When in association with the proper strains of Rhizobium bacteria, legumes are capable of fixing atmospheric nitrogen, which when residues from the legumes decompose, enrich the soil content of nitrogen. Legume cover crops recycle other nutrients, thus reducing leaching losses that often occur in soils during the winter and spring seasons. In addition to these advantages, legume cover crops used with no-tillage corn provide a surface mulch which reduces soil erosion, slows evaporation of soil moisture, increases infiltration of rainfall, and increases soil organic matter content.

Nitrogen is probably the most important fertilizer in corn production, and represents the greatest single energy input into the production of nonirrigated corn. The possibility of increased nitrogen fertilizer prices or scarcity of nitrogen associated with diminishing supplies of fossil fuels may make the use of biological sources of nitrogen fixation by legumes more desirable and economically feasible. Concern over rising fuel and labor costs has led to a growing interest in no-tillage crop production.

The winter cover crops commonly used for no-tillage corn are primarily small grains. However, legume cover crops have proven to be suitable cover crops for no-tillage corn while providing nitrogen to the corn.

An experiment was established in 1976 at Lexington to determine the amount of nitrogen provided by hairy vetch, big-flower vetch, and crimson clover grown as winter cover crops for continuous no-tillage corn. These legumes were compared with rye cover crops and corn stalk cover. The yield results are shown in the table on the next page.

All cover crops resulted in increased corn yields compared to corn stalk cover. The increased yields with rye cover crops may be attributed to nitrogen conservation during the winter and spring or water conservation due to the mulch during corn growing season or both. Crimson clover and big flower vetch did not appear to provide much advantage over rye, but hairy vetch greatly increased yields of corn.

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Yield of No-tillage Corn as Affected by Winter Cover
Crops and Nitrogen Rates. Lexington, KY. 1977-78.

| Winter Cover | Fertilizer Nitrogen Applied (lb/ac) | | | Average |
|---|-------------------------------------|-----|-----|---------|
| | 0 | 44 | 88 | |
| - - - - - yield of corn grain (bu/ac) - - - - - | | | | |
| Corn stalks | 52 | 87 | 116 | 85 |
| Rye | 66 | 98 | 124 | 96 |
| Crimson clover | 79 | 97 | 120 | 99 |
| Big flower vetch | 70 | 104 | 121 | 98 |
| Hairy vetch | 110 | 113 | 142 | 122 |

Analysis of soil samples and corn plants for nitrogen content showed that crimson clover, big flower vetch, and hairy vetch all supplied additional nitrogen to the corn. As the yield data indicated, however, hairy vetch was the most effective by a large margin.

Results to date indicate that a substantial amount of nitrogen can be provided for no-tillage corn by a winter legume crop. Based on yield data, we estimated that a hairy vetch cover crop has the potential to provide nitrogen equivalent to about 80 lb/ac nitrogen fertilizer. It appears that the practice may be attractive from an economic standpoint as well as from an energy conservation standpoint.

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