

# Winter Cover Crops--Their Value and Management

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Cover crops are grasses, legumes or small grains grown between regular grain crop production periods for the purpose of protecting and improving the soil. The most common cover crops in Indiana are fall-seeded cereals, such as rye or wheat, and fall-seeded annual ryegrass. Late summer-seeded spring oats are sometimes used, even though they winterkill. Late summer or early fall-seeded legumes, such as hairy vetch, bigflower vetch, Austrian winter peas and crimson clover, may also serve as alternative crops for winter cover.

## Advantages of Using Cover Crops

**Water erosion control.** This is one of the two major reasons for growing winter cover crops in Indiana. Over 40 percent of our 13.5 million cropland acres have sufficient slope to be seriously damaged by water erosion if not adequately protected. As more and more of this sloping land is used for soybean production, the need for winter cover increases, since the soil after soybeans is much more erosive than after corn. Another situation that often calls for use of cover crops is where corn has been removed for silage.

Past research has shown that fields with winter cover plowed under in the spring have 55 percent less water runoff and 50 percent less soil loss annually than do fields with no winter cover. More recent studies show soil losses from corn or soybeans no-tilled into a vigorous growth of rye or wheat to be 90-95 percent less than soil losses from corn and soybeans conventionally tilled.

**Wind erosion control.** This is the second major reason for winter cover crops. Perhaps up to 1,000,000 acres of land in Indiana is subject to serious wind erosion damage if not adequately protected. These are primarily the coarse-textured soils (sands) and mucks that occur in north central and northwestern Indiana and along major rivers throughout the state. A cover crop left on the surface to be no-till planted is tremendously effective in controlling wind erosion.

**Improved soil tilth.** The added tilth from a winter cover crop, whether turned under or left on the surface, would benefit nearly all Indiana soils, but especially those having less than 2.5 percent organic matter in the plow layer. This characterizes the soils on at least one half of our cropland acres.

**Improved crop yield.** In recent Kentucky experiments, winter cover used with no-till planting markedly increased corn yield. For instance, 3-year average continuous corn yields were 8 bushels per acre greater when planted into a winter cover of rye and 25 bushels per acre greater when planted into hairy vetch than yields from plots without winter cover. The significantly higher yield in the hairy vetch cover plots was due primarily to the extra nitrogen (N) that this legume provides. All plots in the experiments had received 88 pounds of fertilizer N.

It should be pointed out that only the extreme southern portion of Indiana could expect to get as much response from N supplied by hairy vetch. The shorter growing season in the central and northern regions would not permit that amount of growth and N-fixation.

**Other advantages.** Cover crops recycle nutrients that might otherwise be lost to leaching during the winter and spring. Also, cover crops used in no-till production of corn or soybeans provide an excellent surface mulch after being killed with a contact herbicide; the mulch not only reduces soil erosion, but also slows evaporation of soil moisture, increases infiltration of rainfall, increases soil organic matter and aids in control of annual weeds. Additionally, cover crops can often be grazed by ruminant animals in the early spring before row crops are planted.

## Selecting Cover Crops

Cereals like rye or wheat are the most popular cover crops in Indiana for a number of reasons. They are easy to establish and fast growing; seed is readily available and relatively inexpensive. Legumes, on the other hand, do not provide cover as rapidly, but they do supply some nitrogen that can be used by a spring-seeded corn crop.

Be sure to select a cover crop type and variety that is adapted to your section of the state. Hairy vetch, for instance, is better adapted in the southern part of Indiana because of its slow, early growth. In selecting a wheat variety, Hessian fly resistance and growth potential should be taken into account. One of the better soft red winter wheats for use as a cover crop is Auburn, because of its fall growth potential.

Weigh the relative importance of the above factors in choosing the "right" cover.

## Seeding Cover Crops

**Small grains.** There are two recommended methods for seeding a winter rye or wheat cover crop: (1) into standing corn or soybeans in late summer (late August), broadcast the seed with an airplane or helicopter at a rate of 2-3 bushels per acre; or (2) after corn or soybean harvest, disk lightly, fertilize (if needed), and broadcast or drill the seed at a rate

of 1.5 bushels per acre. After beans, the disking step could be eliminated if heavy duty drills are used.

Aerial seeding is less work but more risky than drilling, because stands are highly dependent on late summer rainfall. If corn is to follow corn, planting a medium- or short-season hybrid that can be harvested earlier will allow the cover crop to get better established before winter; this is a more important consideration in the northern half of the state.

**Legumes.** Generally, hairy vetch should be drilled or broadcast onto a disked seed bed at a rate of 30-40 pounds per acre. Aerial seeding of a legume on untilled land is just too risky in too many years. Also, legume seed should be inoculated before seeding with the proper species of rhizobia bacteria for N-fixation.

## **Fertilizing Cover Crops**

The phosphorus and potassium soil test levels required for high yields in a continuous corn or corn-soybean rotation should adequately meet the needs of any winter cover crop. To insure rapid growth of wheat or rye, it would be well to incorporate 30-40 pounds of nitrogen at disking. Soil pH should be kept around 6.6 if growing a legume cover.

## **Weed Control in Cover Crops**

Weeds are usually not a major problem with a fall-seeded winter cover crop. In fact, a well-established, uniform cover will suppress weed growth in the spring. However, if you have a serious perennial weed problem, try to control it with an appropriate herbicide before seeding the cover crop.

Residual carry-over of row-crop herbicides can slow cover crop establishment, particularly in corn fields where a high rate of triazine herbicide like Atrazine had been used. In those situations, rye should be used instead of wheat, because it is much more tolerant to triazine herbicides. Or consider substituting Bladex (a less persistent triazine) for part of the Atrazine if planning to grow a less triazine-tolerant cover crop.

## **Spring Management of Cover Crops**

For maximum soil and moisture conservation and tilth improvement benefits from a cover crop, delay as long as possible killing or plowing it under in the spring. To gain the greatest advantage, kill it with a contact herbicide at planting time or a few days before, then no-till corn or soybeans into the killed sod.

Sometimes rye as a cover crop can get too rank and be difficult to plant into. In this situation, use a contact herbicide to kill it when 18-24 inches tall, but leave it stand. Mowing would cause too great a penetration problem for the no-till coulters. If corn is planted late in the season, wheat or hairy vetch may be preferable to rye; if planted early, rye would be preferred.

If you no-till into a killed cover crop, be alert for increased rodent and insect problems, especially an armyworm infestation when no-tilling into grass cover.

## Economics of Cover Crops

Likely costs for seeding and managing a winter cover crop include: disking; drilling or aerial seeding; purchasing seed; and purchasing and applying nitrogen for rye or wheat, and a contact herbicide if no-till planting. At 1982 prices, some typical per-acre costs might be as follows:

Disking	\$ 5.25 (custom rate)
Drilling	5.50 (custom rate)
Aerial seeding	5.00 (custom rate)
Rye seed	10.00 (2 bu. @ \$5)
Hairy vetch seed	24.50 (35 lb. @ \$0.70)
Nitrogen	6.00 (30 lb. @ \$0.20)
Paraquat	12.00 (2 pt. + surfactant)

Using the above, total costs for a cover crop, including contact herbicide, should be in the \$33-\$39-per-acre range (more, if hairy vetch is used). However, offsetting that somewhat is the nitrogen value of the cover crop--e.g., \$16-per-acre for vetch (80 lb. @ \$0.20) or \$2 for rye (10 lb. @ \$0.20).

Even ignoring the N add-back, a cover crop usually more than pays for itself in increased production of the row crop that follows. Research studies usually show at least a 10 percent increase in yield when switching to well-managed no-till sod planting on drouthy or erosive soils. At a 100-bushels-per-acre yield level, that could add \$30-per-acre to gross profit (10 bu. @ \$3).

## Summary

Too much of Indiana's cropland is losing too much soil through erosion to maintain its future productivity. To adequately protect our soils resource, the practice of using winter

cover crops, such as rye, wheat and hairy vetch, needs to be revived where continuous row crops are grown on the highly erosive soils. Besides the soil conservation benefits, research confirms that cover crops increase crop yields on drouthy and erosive soils. Although some are using winter cover crops effectively, more farmers need to adopt the practice.

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