

SMALL GRAIN COVER CROPS FOR IOWA

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What are cover crops?

Cover crops are literally “crops that covers the soil” and are primarily used for erosion control. For most of the Midwest where corn and soybeans are grown, cover crops could be grown between harvest and planting. Unfortunately, in the upper Midwest the potential growing season for cover crops is usually short and cold, which limits the growth and effectiveness of cover crops. This problem can be partly solved by overseeding cover crops into the standing crop in mid-August to early September. Additionally for crops that are harvested relatively early, such as silage corn, seed corn, or early-maturing soybean, a winter-hardy small grain cover crop can be planted with a grain drill or by incorporating seed with light tillage before late October.

Why choose small grains as cover crops?

Oat, winter wheat, barley, triticale, and winter rye are excellent cover crops because they grow rapidly in cool weather, withstand moderate frosts, and their seed is relatively inexpensive or can be produced on site. Many varieties of winter rye, triticale, and winter wheat can overwinter in Iowa, regrow in the spring, and must be killed with herbicides or tillage. Oat, barley, spring wheat, and some rye, winter wheat, and triticale varieties are not winter hardy in Iowa, do not survive the winter, and do not need to be killed before planting. But, because the non winter-hardy small grains don't regrow in the spring, they don't grow as much as winter rye, triticale, or winter wheat and therefore don't provide quite as much erosion protection. Legumes are also excellent cover crops and as an added benefit they fix nitrogen. Legumes, however, don't grow as well as the small grains during the fall and winter months, their seed is expensive, and they must be killed with tillage or herbicides in the spring.

What are the benefits of using small grain cover crops?

Reduced Erosion

Small grain cover crops increase surface cover, anchor main crop residues, increase infiltration, and reduce both rill and interrill erosion. In tests in Iowa in three years, rye cover crops reduced interrill erosion by 54% and rill erosion by 90% compared with no till. Oat cover crops reduced interrill and rill erosion by 26% and 65%, respectively. The relative reductions in erosion would have been even larger if the comparisons had been made with tilled systems. Rill erosion is the loss of soil caused by water moving across the soil surface in rills or channels. The small channels, gullies, or rills that farmers often observe in their fields after a heavy rain are caused by rill erosion and these rills are what most people associate with soil erosion. Interrill erosion is soil loss or detachment caused by raindrop impact and sheet flow. This type of erosion is more difficult to see, but it can result in substantial movement of soil down a hillside over many years. In many fields in Iowa, a lot of the variation in crop yields across the field is caused by loss of soil from soil from the hilltops and its deposition in the low spots over the many years that the

field has been tilled. Yields are reduced on the hilltops because the shallow topsoil holds less water and nutrients and in wet years yields are reduced in the low areas of the field because sedimentation has caused these areas to drain more slowly. Cover crops can help to stop soil movement, can slow the expansion of eroded, low-yielding areas, and can help rebuild eroded soils with organic matter.

Reduced Nitrate Contamination of Water

Nitrate lost from row crop fields in Iowa is a significant source of nitrate contamination for groundwater, wells, streams, and lakes. Nitrate in surface waters contribute to algal blooms and to the overabundance of aquatic vegetation in lakes and streams and has been implicated in the hypoxia problem in the Gulf of Mexico. Small grain cover crops take up nitrate during late Fall, Winter, and early Spring that would otherwise be leached from the soil and would contaminate water supplies. This nitrate is then returned to the soil as plant residues and is recycled to the following crop. In our Iowa studies, rye cover crops reduced off-season losses of nitrate by 96% and an oat cover crop reduced losses by 75%. Between harvest and planting in one year over 45 lbs/acre of nitrogen was lost through leaching.

Increased Soil Organic Matter

Small grain cover crops increase soil organic matter and sequester carbon from the atmosphere. Soil organic matter increases soil water-holding capacity, releases plant nutrients, minimizes crusting, and improves soil structure.

Improved Early Season Weed Control

Small grain cover crops can reduce the number of early season weeds and can provide a mulch for continued weed suppression after planting. In no-till, the burndown herbicide used to kill the cover crops may be the only preplant herbicide needed. Later emerging weeds could be controlled with post-emergence herbicides or cultivation.

Provide Forage for Ruminants in Spring

Small grain cover crops are an excellent source of high quality forage in the spring for grazing or green chopping.

Can Increase Main Crop Yields in Some Situations

Small grain cover crops can increase main crop yields on coarse textured or low organic matter soils where soil water often limits crop growth later in the growing season. On these soils in dry years, cover crop residues can conserve soil moisture through a mulching effect and can recycle plant nutrients through decomposition of the cover crop residues.

What are the disadvantages of cover crops?

Increased Costs and Labor

Cover crops cost time and money to plant, manage, and kill. Small grains, however, have less expensive seed than legumes.

Increased Risk of Main Crop Yield Reductions

Small grain cover crops, especially rye, can cause yield reductions in the following corn crop due to early spring water use, nitrogen immobilization, or rotation affects. Corn yield reductions of up to 25 bu/acre have been observed in Iowa following a rye cover crop killed at planting. These yield effects can be reduced or eliminated by killing the rye cover crop earlier in the spring. Corn yield reductions have not been observed following an oat cover crop, which winterkills. There is no evidence that soybean yields are reduced by small grain cover crops, if the soil water content at soybean planting is adequate.

How are small grain cover crops established?

Small grain cover crops can be overseeded into standing crops in late summer simply by spreading the seed above the main crop canopy and letting it fall to the soil surface. The corn or soybean canopy at this time of year keeps the soil surface shaded and moist following rainfall and this is usually long enough for the small grain seed to germinate and become established. Obviously, this technique is weather dependent and cover crops should not be seeded if the upper 6 inches of the soil is dry or if a prolonged dry or hot period is forecast. Overseeding into standing corn is usually done with aerial seeding from airplanes or helicopters. Seeding cover crops into fields planted to seed corn or silage corn, which is harvested earlier than grain corn, can be done after harvest with a grain drill or with a spreader and light tillage. Overseeding into standing soybean can be done with aerial seeding or using tractor-mounted drop spreaders or rotatory spreaders. Additionally, cover crops can be planted with drills or light tillage following harvest of early maturing soybean. Generally, only small grains that overwinter should be planted after the middle of September in central Iowa and no later than mid-October. Even small grains that don't overwinter, like oat and barley, can be overseeded before mid-September.

How should small grain cover crops be managed in the Spring?

Management of small grain cover crops in the Spring is a compromise between maximizing the benefits of the cover crop and minimizing the yield risk to the following crop. The benefits of the cover crop are maximized by allowing the cover crops to grow as long as possible before planting the main crop. The risks of the decreasing the yield of the following crop are minimized by using a cover crop that does not overwinter or by killing the cover crop soon after it begins growth in the spring. To minimize the risk of reducing corn yield following rye cover crops the rye cover crop should be killed with glyphosate or by tillage 2 to 3 weeks prior to planting. If the spring is dry or if the soil profile has not been recharged with water since harvest, then the cover crop should be killed as soon as it begins to regrow in the spring. For soybean following cover crops, the primary concern is depletion of soil water prior to planting. If soil water is adequate, killing the cover crop can be delayed until planting. Killing the cover crop with glyphosate 5 to 7 days before planting soybean is a reasonable practice.

How do I start using cover crops?

Talk to someone who is using cover crops.

Read about cover crops in magazines and on the Internet.

Try it on a small area first.

Don't expect it to work the first time.

Keep working to improve the system.