

Cover Crop Choices for Michigan

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Introduction

Using cover crops in farming systems is not a new practice. Before the development of manufactured fertilizers, cover crops were commonly used to improve soil structure and productivity. Recent economic and environmental concerns have fueled a resurgence in cover crop use. This bulletin summarizes cover crop information from research and demonstrations conducted at the Michigan State University W.K. Kellogg Biological Station and on farms throughout Michigan.

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potential for nitrogen leaching to ground-water and gaseous losses. Nitrogen from an organic source such as cover crop residues

acts as slow-release fertilizer that can be closely matched to crop demand for nitrogen, particularly if the cover crop is incorporated when it is still green and vegetative. Residue from a mature, dry cereal cover crop that is incorporated may not release nitrogen until late in the growing season.

◆ Erosion control

Cover crops can be used to reduce wind and water erosion. Maintaining ground cover through fall, winter and early spring drastically reduces soil loss.

◆ Improving soil quality

Cover crops enhance soil structure while increasing soil biota activity. They reduce soil compaction while increasing water percolation and retention. Cover crops enhance soil organic matter level. They also improve soil aggregation, infiltration and bulk density.

◆ Weed suppression

Cover crops can play a role in managing weeds by shading and interfering with weed germination and establishment. Cereal rye produces allelochemicals, naturally produced compounds that can control or suppress weeds. Cover crops can also become weeds and must be carefully managed to prevent this from happening.

Cover crops have many purposes

◆ Nitrogen management

Cover crops can enhance N production and/or reduce leaching. Legumes such as clovers, cowpea and hairy vetch can be frost seeded into wheat or late-summer seeded to provide nitrogen for future crops. Grass and non-legume broadleaf covers recycle excess nitrogen over the winter season and reduce the



Red clover in wheat.

Steve Deming

◆ Insect management

Cover crops may play an important role in biological insect control. They have increased *Trichogramma* wasp survival for European corn borer control in corn. MSU researchers are investigating using cover crops for biological control programs. Very little information is currently available.

◆ Pastures

Cover crops can be used as forage crops and feed sources. Many Michigan farmers seed cover crops for livestock grazing with profitable results.



Cattle grazing on oats.

Cover crops can be established in several ways

◆ Overseeding

Seeding a cover crop between rows of a growing crop is known as overseeding. These cover crops need to be seeded early enough to establish growth, but late enough to avoid interfering with the crop. Overseeding has been successful in corn, seed corn and sweetcorn. Several shorter-season cover crops are being evaluated for overseeding into vegetable and fruit systems.

◆ Frost seeding

Cover crops can be seeded into an established crop in late winter or early spring. The most common frost-seeding practice is broadcast seeding red clover into wheat or cereal rye in March.



Steve Deming

Overseeding crimson clover into sweetcorn.

◆ Drilling and planting

Cover crops can be no-tilled and conventionally drilled or planted into crop residue following a short-season crop. These crops are usually harvested from mid-July to mid-August. The extra month to 1-1/2 months before frost provides farmers with additional cover crop choices.

Cover crops can still be drilled, following a fall harvest (after September), though farmers have fewer choices then. Only a few cover crops, such as cereal rye and hairy vetch, have sufficient winter hardiness to survive late planting.

◆ Aerial or highboy seeding

If farmers have access to a highboy or airplane, they can seed cover crops before harvest.

Once a cover crop is established, it needs to be managed for next year's planting.



Todd Martin

Buckwheat.



Steve Deming

Hairy vetch.



Todd Martin

Oilseed radish.

Managing cover crops

1. Cultural. Several cover crop species cannot survive Michigan winters. These cover crops will die during the winter (winter kill) without mechanical or chemical control. Examples: oats, Berseem clover, cowpea, oilseed radish, sorghum and annual medics.
2. Mechanical. Traditionally, farmers moldboard plowed to control cover crops. This is a very effective means of control, although some grass species (annual ryegrass, cereal rye) can cause rapid soil drying and grow considerably, leaving heavy residue, that makes plowing very difficult if it is not done early. In reduced tillage systems, several trips across the field are often required for satisfactory cover crop control. A chisel plow may be used twice if a cover crop is achieving vigorous growth in the fall, then a fall and a spring trip may be necessary to keep the residue production manageable.
3. Chemical. Herbicides can control cover crops. To maximize chemical control, it is extremely important to time the herbicide application to the cover crop's species and growth stage.



Todd Martin

No-till pumpkins in burned down hairy vetch.

Please refer to Extension bulletin E-434, "Weed Control Guide for Field Crops," for herbicide recommendations to control cover crops.

Identifying the best time and place for a cover crop

Consider the entire farm, as well as individual fields, to identify a time and space for growing cover crops. Cover crop strips can be planted along field boundaries to provide beneficial insect habitat and protect soil. For currently fallow fields, consider how a cover crop might be inserted into the cropping system. Are moisture, nutrients and light sufficient to establish a cover crop? Is the soil too cool or too hot? Evaluate the extremes as well as the average condition.

Cover crop solutions for challenging situations

◆ Short time before primary crop is planted to establish a cover crop

- Plant a rapid cycling cover crop such as a brassica or buckwheat.
- Interseed a legume into a small grain or corn crop.

◆ Insufficient water

- Consider the timing of annual rainfall and residual water that may be available to support growth of a cover crop with minimal water requirements, such as cowpea or a rapid cycling cover crop.

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Crimson clover in wheat stubble.



Steve Deming

Alfalfa.

- Consider any supplemental water sources that would allow irrigation.

◆ Growing cover crops under cold conditions

- Plant a very cold tolerant cover crop species or variety. Some cover crops that can be established late in the fall and survive winters in plant hardiness zone 5 are: cereal rye, winter wheat and hairy vetch.
- If possible, establish cover crops as early as possible (at least six weeks before frost).
 - ◆ Frost seed in the spring to maximize survival the following winter (e.g., red clover or alfalfa).
 - ◆ Establish a cover crop in mid-August after an early-harvested crop. Oilseed radish, oriental mustard, hairy vetch, white clover, Alsike clover, red clover, milkvetch, black medic and yellow sweetclover all perform well.

◆ Intermittently flooded or saturated soil

- Consider a legume cover crop that can tolerate occasional inundation. One example is Alsike clover.

◆ Soil pH that is too acid or too alkaline

- Acid-tolerant legume cover crops include black medic and common vetch.
- Moderately alkaline-tolerant cover crops include alfalfa and barley.

◆ Degraded soil that is low in fertility and organic matter

- A full year of cover crop fallow is the best approach to rehabilitating soil. A spring-seeded crop such as yellow sweetclover or alfalfa will provide deep taproots to biologically aerate the soil and residues to help build soil quality.
- A perennial forage rotation will also improve the soil. The forage can be either removed and sold, or mowed and left on the soil surface.



Todd Martin

Cereal rye.

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