



MOSES

How to Choose Cover Crops

Cover crops are gaining popularity as more farmers realize their economic and environmental benefits. A cover crop is a rapidly growing crop, used either between other crops, during fallow years, or as a companion crop. Cover crops can be harvested, but their primary uses are for soil improvement, for protecting natural resources, and for reducing soil erosion.

Is the extra seed expense, labor and time worth it?

Yes—research and experience have shown that cover crops have a wide range of potential benefits, all of which can ultimately improve a farm's bottom line.

Cover crops can:

- Scavenge nutrients (reduce fertilizer inputs)
- Fix nitrogen (reduce fertilizer inputs)
- Reduce erosion (reduce fertilizer inputs, improve soil health, protect water resources)
- Suppress weeds (reduce tillage, reduce inputs)
- Produce forage (reduce feed costs)
- Loosen compacted soils (improve soil health, reduce tillage)
- Improve soil tilth (improve productivity and water retention)
- Attract beneficial insects and animals (pest control, improve pollination)
- Conserve soil moisture (improve crop production)

These benefits vary by farm, situation, and season, but at least two or three usually occur with any cover crop. The crop rotation, time of year, geographic location and input costs are all critical aspects to consider before choosing a cover crop. Farmers must have a clear idea of what benefit they hope to achieve with the cover crop, and a timely plan for removal.

Benefits of Cover Crops

Recommendations for the best cover crops to achieve each benefit are listed in parentheses.

Scavenging Nutrients

Some cover crops are very good at converting "left over" soil nutrients into organic matter. Rye and most cereal grains are good at taking up nitrogen left after the primary crop and holding it until worked back into the soil in the spring. Since nitrogen is very mobile, especially with heavy rain, this is a good way to preserve valuable nutrients. **(cereal grains)**

Nitrogen Fixation

Very few plants are capable of creating their own nitrogen. The family of plants known as legumes are the most important, and can work well as cover crops for this purpose. Clovers, alfalfa, trefoil, and vetch are all legumes and potential cover crops.

(legumes)

Reduced Erosion

All farmers should minimize the amount of time that soil remains bare to reduce erosion. Cover crops are an ideal way to prevent water and wind erosion in between crops. A solid seeded cover crop can decrease runoff, increase water retention and reduce loss of crucial nutrients. **(all)**

Weed Suppression

Solid seeded cover crops can suppress weeds through direct competition and by shading the soil. Weeds that are often a problem in row crops can be reduced by using a cover crop in between crops or as a companion crop growing between rows or underneath the primary crop. Certain cover crops, like rye, release allelopathic compounds that suppress the germination of weeds. **(cereal grains, buckwheat, sorghum sudan)**

Loosening Compacted Soils

Certain deep-rooted cover crops can help break up soil compaction. Their deep tap roots penetrate down into the subsoil, which in turn allows better water infiltration, more effective tillage and better overall soil tilth. **(alfalfa, tillage radish)**

Improved Soil Tilth

Tilth refers to the physical condition of the soil and its suitability to grow a crop. It includes many properties such as water retention, stability, aeration and drainage. Cover crops can improve all aspects of soil tilth and are also an excellent way to increase organic matter both immediately and over time. Increasing soil organic matter is a proven way to improve all aspects of soil tilth and fertility. **(all)**

Beneficial Insect and Animal Habitat

All crop pests have natural enemies. Cover crops encourage these beneficial animals by providing habitat and food. Flowering cover crops are especially useful for attracting beneficial animals and insects. Flowering cover crops also attract pollinators, which will improve pollination rates of other crops in the field. **(clovers, legumes, buckwheat)**

Choosing the Right Cover Crop

First decide which benefits you are looking for, and then decide whether you need a late season, early season or mid-season cover crop. This decision is based on your crop rotation, geographic location (climate), desired benefits, and harvest schedule.

Early Season Cover Crops

In order for an early season cover crop to be successful, it must express two traits: cold tolerance and quick growth. Cold tolerance is necessary because an untimely frost will destroy many cover crops. Quick growth is also important because planting an early season cover crop targets a specific, narrow gap during spring.

Some cover crop species, like buckwheat, have poor frost tolerance. This makes buckwheat a risky choice as an early season cover crop. Some cover crops, like clover, grow too slowly, making them inferior choices as early season cover crops. Spring barley, spring wheat, oats, annual ryegrass, oilseed radish, canola/rapeseed, forage turnip, red clover, and forage/field pea are all frost tolerant and fast growers in the early season, and are the first choices for farmers in the upper Midwest.

Mid- and Late-Season Cover Crops

Midseason and late-season cover crops need to be more heat tolerant. They are very useful following cereal grains, vegetables and other crops that are harvested early, or for any situation where a field will be fallow during the summer months. Buckwheat, sorghum sudan, millet, cowpeas, clovers and vetch can make good summer cover crops.

Late season cover crops need to be frost tolerant to become established before winter, and hardy enough to survive the winter if you want continued growth the next spring. Perennial crops like clover, vetch and alfalfa can be used, if seeded early enough. Winter cereal grains are the best choice for later plantings, especially after corn and soybeans.

Choosing Your Cover Crop

Looking at these examples, it becomes clear that choosing an appropriate cover crop may not be easy. The Midwest Cover Crop Council has created an excellent online tool for producers to sort through numerous individual cover crops and mixtures. It is online at mcccdev.anr.msu.edu/VertIndex.php.

Twenty to 30 species are listed for Midwestern states, including cool and warm season grasses, broadleaves, brassicas, and legumes. The tool was evaluated and vetted by university and agronomy professionals across the Midwest and Canada to ensure that it works for choosing cover crops for local soils and distinct climates. There are years of research data and grower experiences behind the recommendations.

The tool allows growers to select a state and county for regionalized results. The grower enters the cash crop that the cover crop will be planted around (before, after or inter-seeded), including planting and harvest dates of that crop and the soil

conditions of the field, such as poorly drained or well drained. Users of this online tool have an option for selecting three goals of the cover crop that are important for narrowing down results. Examples of goals include quick growth, erosion fighter, and soil builder.

Once these criteria are selected, a table pops up that provides the different cover crops and cover crop mixtures that could meet your specifications and planting window. The user then can select from a pull down menu to see an information page about that particular cover crop or mixture. These information pages provide planting information, termination recommendations, potential advantages and disadvantages of the particular cover crop and more. This tool can be extremely helpful in making the best possible cover crop decisions for your farm.

An excellent book is *Managing Cover Crops Profitably*, by the Sustainable Agriculture Network. This book contains information for all climate zones and specific benefits and management techniques for many common and less common cover crop species.

Terminating the Cover Crop

In most instances you will want to kill the cover crop before it sets seed. In organic systems, herbicides are not an option. Cover crops can be killed by tillage, mowing and crimping. Crimping might not always kill soft and pliable plants. Crimping also leaves all of the residue on the surface; a benefit for weed suppression, but less beneficial if the goal is to return nutrients to the soil for the next crop. Mowing will only be successful if the growing point is removed during the process. Some crops will come back from the root. Tillage is the most consistent tool for killing these cover crops. Ideally this should be done in one or two passes to minimize soil disturbance.

Cover Crop Resources:

Midwest Cover Crops Council
www.mccc.msu.edu

Practical Farmers of Iowa
practicalfarmers.org/member-priorities/cover-crops

Midwest Cover Crops Field Guide
rusk.uwex.edu/files/2013/01/Cover-Crops-Field-Guide-2012-Inside-2.pdf



The Midwest Organic and Sustainable Education Service (MOSES) provides education and resources to farmers to encourage organic and sustainable farming practices.

To learn more, please see:

mosesorganic.org