

# Cover Crop Overview For Small Farms and Gardens

## Purpose

Cover crops are grasses, legumes, and forbs planted for seasonal vegetative cover. In most cases, each of the following benefits are maximized when they are planted as early as possible and terminated as late as feasible.

- Reduce erosion
- Maintain or increase soil health and organic matter content
- Reduce water quality degradation by utilizing excessive soil nutrients
- Suppress weeds and break pest cycles
- Improve moisture use efficiency
- Minimize soil compaction
- Grow in situ mulch



Cover crops increase soil health

## Soil Health and Organic Matter

Cover crops have the potential to increase soil organic matter and increase the biodiversity of soil organisms in the soil. Increase the diversity of cover crops (ex. mixtures of several plant species and plant families) to promote a wider diversity of soil organisms, and thereby promote increased organic matter. Increased populations of beneficial organisms such as earthworms and arbuscular mycorrhizal fungi greatly increase nutrient use efficiency, water retention, aeration and improved soil structure.

The cover crops should be managed as a part of a conservation cropping system. Soil health is a product of a combination of practices, including crop rotation, cover crops, no-till, reduced tillage, mulching, and compost.

## Erosion Control

Cover crops reduce soil erosion in several ways. They protect the soil surface from raindrop or irrigation water impact, increase water infiltration, secure crop residues and compost applications, improve soil aggregate stability and provide a network of roots which protect soil from flowing water.



Cover crops in a garden



Oats and field peas

## Minimize Soil Compaction

To minimize soil compaction, select and manage cover crop species that will produce deep roots and large amounts of surface and or root biomass to penetrate or prevent compacted layers, increase soil organic matter, improve soil aggregate stability, and increase water infiltration. Tillage can increase compaction, especially in wet soils. Prevent compaction by utilizing cover crops in a no-till or reduced till system. If grazing, limit to only times with ideal soil conditions. When appropriate for the crop production system, mowing certain grass cover crops (ex. sorghum-sudagrass, pearl millet) prior to heading out and allowing the cover crop to regrow can enhance rooting depth and density, thereby increasing their subsoiling and nutrient-recycling efficiency.

## Weed Suppression

Growing cover crops provide competition for sunlight, nutrients, water, and space. Once terminated, the mulch cover creates a weed barrier by blocking sunlight or by producing natural chemicals which suppress weed growth. If greater weed suppression is needed, seed a higher density cover crop stand to promote rapid canopy closure. High seeding rates and good seed to soil contact for quick germination can improve weed competitiveness.

## Break Pest Cycles

Cover crops can be selected to help break pest cycles or suppress plant pests or pathogens. Select cover crop species that do not harbor pests or diseases of subsequent or preceding crops in the rotation, but rather provide food or habitat for natural enemies of pests. Cover crops may be selected that release bio fumigation compounds that inhibit soil-borne plant pests and pathogens. Regularly scout for pests and disease.

## Bed Preparation

It is very important to plant cover crops into a weed



*Oilseed radish breaks up compaction*



*Oats and crimson clover*



*Spring cover crops on a small farm*



*Fall cover crops on a small farm*

free seedbed. Pay particular attention to noxious and potentially invasive species. Many of these species are perennials that spread through seed and roots, and may have rhizomatous root systems that will persist and negatively impact the planting. Common methods include stale seedbeds, mechanical or hand weeding, and/or tarping.

## Seeding

Use seed that has been cleaned, tested, and labeled according to Indiana Seed Law. Use of cover crops with stated varieties is encouraged for quality assurance, as opposed to seed listed as “variety not stated” or VNS.

Select a species or a mix that is adaptable to the desired planting date with ample time to germinate and reach an acceptable growth stage prior to a killing freeze or achieve adequate root growth to survive the winter. Utilize *USDA-NRCS Indiana Seeding Windows* for suitable seeding dates and the *Indiana Cover Crop Tool for Small Farms and Gardens* for appropriate seeding rates. The document provides further information on seeding methods, including broadcast, broadcast with incorporation, and direct seed (i.e. row seeders).

## Termination

Living cover crops improve soil health, but in most cases, they need to be terminated before planting



Seeding cover crops with a row seeder

vegetables for crop plantability and to not outcompete the crop for nutrients, water, and sunlight.

Some cover crop species die in the winter, or “winterkill.” Some species survive the winter and have a growth spurt in the spring before producing grains or flowers. For most cropping systems, it is not desirable to allow the cover crop to produce seed. There are multiple ways to kill a cover crop, and sometimes a combination of methods is best. Options include winterkill, mow or cut, crimp, tarp, solarization, mulch, tillage, and chemical. Refer to *Cover Crop Termination for Small Farms and Gardens* for further information.

Time the termination of the cover crops to meet nutrient release goals. Though mulch production may be reduced, terminating at early vegetative stages may cause a more rapid release compared to a more mature stage. Some cover crop species have potential allelopathic effects that can inhibit the growth of weeds and potentially the establishment of following crops. Follow a wait period especially with small-seeded crops.

## Nitrogen Fixation

Legume cover crops can typically produce most or all of subsequent crop nitrogen needs. Many legumes require Rhizobium Bacteria to fix nitrogen. In many cases these are specific strains to individual species



Winterkilled oats cover crop

of legumes. Assure the proper inoculant is applied to the seed just before planting and use only fresh inoculant. Legumes add the most plant-available nitrogen if terminated when the cover crop is in early bloom.

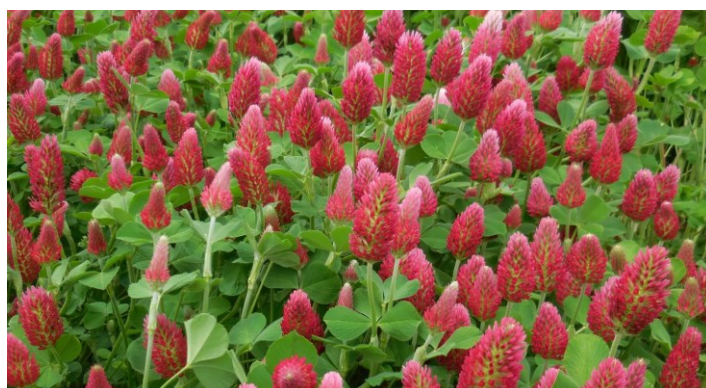
Choose a cover crop species or mixture, and timing and method of termination, that will maximize efficiency of nitrogen utilization by the following crop. Consider soil type and conditions, season and weather conditions, cropping system, C:N ratio of the cover crop at termination, and the anticipated nitrogen needs to the subsequent crop.

## Improve Moisture Efficiency

Increased soil organic matter and improved soil structure will result in enhanced water infiltration and water holding capacity. As soil health improves, the soil develops a better relationship with water. The soil will have an increased capacity to retain moisture in droughts and regulate water in intensive rainfalls. In areas with limited soil moisture, a cover crop can be terminated sufficiently early to conserve soil moisture for the subsequent crop. If a cover crop matures in a dry season and utilizes soil moisture reserves, be prepared to irrigate. Cover crops established for moisture conservation should be left on the soil surface after termination. In areas with potential excess soil moisture, a cover crop can be allowed to grow as long as possible to maximize soil moisture removal.



*Nitrogen fixing bacteria nodes on legume root*



*Crimson clover legume cover crop*



*Cover crops at a garden*

## References

- Indiana Cover Crop Tool, Table, Cover Crop Seeding Windows, Cover Crop Seeding Methods, and Cover Crop Termination Methods for Small Farms and Gardens: [Marionswcd.org/soil-health-guide/](https://marionswcd.org/soil-health-guide/)
- [Managing Cover Crops Profitably, 3rd Edition.](#) SARE 2007.