Northeast Cover Crop Termination

Introduction

- Cover crops can increase soil organic matter, decrease soil erosion, and—depending on the species—supply nitrogen for the next cash crop.
- Timely removal of a cover crop can help maximize benefits and minimize any negative impact on the yield potential of the following crop.
- Removal timing and removal method is specific to the cover crop species planted.

Cover crops are mostly planted for their beneficial qualities, and are not harvested for their seed, fruit, or forage. They often include grasses, broadleaves, legumes, or any combination of these. Cover crops are terminated before planting cash crops to prevent the cover crops from functioning as weeds or otherwise hindering crop production.[1]

Removal Timing

The removal timing is specific to each cover crop species. The optimal cover crop removal timing also varies by growing conditions, the goals of the grower, and the cash crop to be planted. Terminating cover crops four to eight weeks prior to commercial crop planting can allow soil warming, soil water replenishment, residue drying, and residue decomposition.[2] However, terminating cover crops less than four weeks before commercial crop planting may instead provide the benefits of increased cover crop biomass, soil conservation, water conservation, and may provide possible nitrogen sources.

As mentioned, nitrogen release and commercial crop yields can be affected by the timing of cover crop removal. Early termination of small-grain cover crops can result in more rapid decomposition of the residue, due to the low carbon to nitrogen ratio of young plant tissue.

Conversely, higher carbon to nitrogen ratios of 30 to 1 or greater are reached at the flowering stage of small grains.[3] This higher ratio may be desirable for increasing above-ground biomass production and residue coverage.

The cash crop to be planted following a cover crop should also be considered when terminating cover crops. For example, if a grower intends to plant corn, a winter-hardy cereal cover crop such as cereal rye, triticale, or wheat should be terminated at least two weeks prior to corn planting to minimize nitrogen immobilization and soil water depletion, thus avoiding a yield reduction.[4] Cash crops have also been successfully seeded into cover crops, a process known as “planting green.” The flexibility in planting date and option to use non-selective herbicides make soybean a good cash crop to consider when planting green.

Figure 1. Annual ryegrass growth in the spring should be controlled as the first node is just starting to form.

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Termination Methods

In general, cover crops can be removed using mechanical methods, herbicides, or winterkill. The winterkill termination method involves leaving the cover crop in the field until it is terminated by a hard freeze. This method is only possible in northern climates and for certain cover crops that are susceptible to the first hard frost (temperatures below 25 °F), such as turnip and radish.[3] A survey of farmers in 2006 found that approximately 54 percent of cover crop growers applied herbicides, 33 percent used tillage, and 13 percent used both methods to terminate overwintering cover crops.[5] While this study found that tillage is the second most common method of terminating cover crops, tillage can be expensive, exposes the soil to erosion, and may reduce the benefits of cover crops.

Mechanical. Aside from tillage, other mechanical methods of cover crop termination include using a roller-crimper or mower. Roller-crimpers (mechanical rollers) can be used to kill tall-growing cover crops by breaking or crimping the stems. This method can be effective when used on cover crops at the flowering stage or later.[3] Mowing can be an effective method for removing some species of cover crops, but cover crop regrowth and residue distribution should be evaluated before mowing is used for termination.

Although livestock are not machinery, they can be used to remove cover crops. Using livestock to remove cover crops adds value to cover crops by making them a source of nutrition for grazing livestock. Grazing might be selected as a method of cover crop termination when an operation has infrastructure to manage livestock movement.

Herbicides. Generally, the herbicide burndown application is most successful when cover crops are small and actively growing. Cover crops in bolting or jointing stages can be more difficult to control with standard herbicide rates so higher, labeled rates may be warranted under these conditions. Herbicide applications should be made after three to four days of daytime temperatures in the high 50s to low 60s with nighttime temperatures greater than 40°F.[6] Avoid spraying in the early morning, late afternoon, or evening, as plant growth is slower during these times in the spring. If glyphosate applications are used, always include ammonium sulfate (AMS) at 8.5 to 17 lbs per 100 gallons of spray solution as directed by the label.

Here are some tips for terminating various cover crop species:

- **Radish, turnips, buckwheat, oats, and annual ryegrass.** Winterkill if temperatures fall below 25 °F. Apply Roundup PowerMAX® 3 Herbicide (40 oz/acre) + AMS in 10 to 15 gallons of spray mix per acre. Target grass heights of 8 to 12 inches (prior to jointing), and spray mid-morning to early afternoon for best results. Avoid the use of residual herbicides with Roundup PowerMAX® 3 Herbicide, as this tank mix may cause a reduction in control. Scout fields after application to confirm complete death of the cover crop.
- **Cereal rye**. Apply Roundup PowerMAX® 3 Herbicide (30 oz/acre) + AMS in 10 to 15 gallons of spray mix per acre. Spray before plants are 18 inches tall. In general, this cover crop is easier to kill than annual ryegrass. Avoid the use of residual herbicides with Roundup PowerMAX® 3 Herbicide, as this tank mix may cause a reduction in control.
- **Winter wheat.** Apply Roundup PowerMAX® 3 Herbicide (30 to 40 oz/acre) + AMS in 10 to 15 gallons of spray mix per acre. Spray prior to joint stage. Target application timing for early spring during a period of warm weather. Avoid the use of residual herbicides with Roundup PowerMAX® 3 Herbicide, as this tank mix may cause a reduction in control.
- **Legumes (crimson clover, red clover, hairy vetch, peas).** Apply Roundup PowerMAX® 3 Herbicide (30 to 40 oz/acre) + 2,4-D LV4 (16 oz/acre) or saflufenacil (10 g ai/acre) in 10 to 15 gallons of spray mix per acre. Consult labels for soybean replant intervals and recommended adjuvants. Target spray applications from the mid-April to first of May for optimum plant activity and herbicide effectiveness.

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Summary

- Cover crop species differ in their ability to survive winter conditions.
- Herbicides are often preferred over tillage as a method for removing an overwintered cover crop, as tillage can decrease some of the benefits of the cover crop.
- Generally, it is best to remove cover crops prior to seed set to help manage the seed bank.

Sources

[1] Legleiter, T., Johnson, B., Jordan, T., and Gibson, K. 2012. Successful cover crop termination with herbicides. Purdue University. WS-50-W. https://mdc.itap.purdue.edu/item.asp?Item_Number=WS-50-W

[2] Schomberg, H. and Balkcom, K. 2009. Cover crops. Soil Quality for Environmental Health. http://soilquality.org/practices/cover_crops.html

[3] Clark, A. (Ed.) 2012. Managing cover crops profitably (3rd edition). https://www.sare.org/resources/managing-cover-crops-profitably-3rd-edition/

[4] Singer, J.W. 2006. Cover crops in the Corn Belt: Survey finds underused potential as conservation tool. Leopold Letter. Vol. 18 (No. 4). Iowa State University. https://dr.lib.iastate.edu/entities/publication/b92afc82-442f-48ab-87a7-c47261cba010

[5] Singer, J. 2008. Corn belt assessment of cover crop management and preferences. Agronomy Journal. Vol. 100 (6):1670-1672. https://doi.org/10.2134/agronj2008.0151

[6] Loux, M. 2007. Burndown herbicide activity—Can we kill anything when it's this cold? C.O.R.N. Newsletter 2007-08. The Ohio State University. https://agcrops.osu.edu/newsletters/2007/08#1

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