



Considerations for Terminating Cover Crops for Weed Management

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Summary

Cover crops used for weed management are often terminated shortly before planting, or after planting, to allow maximum biomass production. Terminating cover crops at late vegetative, or flowering stages, can be challenging and often requires planning to achieve maximum success.

Including cover crops in a cropping system provides farmers with several opportunities to control weeds.

- A preplant “burndown” herbicide may be applied before cover crop planting.
- Living cover crops suppress weeds by competing for light, nutrients, and space.
- Terminating cover crops can kill weeds (depending on termination method and specific weeds).
- After termination, cover crop mulch can suppress weeds in the following cash crop.
 - Weed suppression from cover crops increases the later the cover crop is terminated; delaying termination until 10 to 14 days prior to cash crop planting (or terminating after planting the cash crop) often improves overall weed suppression compared to terminating three weeks or more before planting.

Cover crops are best used in tandem with other tactics, such as herbicides, narrow row spacing, and tillage to control weeds.

Consider termination options when choosing a cover crop. Farmers who are just beginning to use cover crops or who have limited time and labor resources may consider growing cover crops that do not overwinter.

A cover crop that survives a termination attempt may compete with the cash crop planted into it and impact yields. If a cover crop that escapes termination is allowed to produce seed, those seeds can germinate and become weeds in subsequent cropping seasons.

TERMINATION OPTIONS

1) Winter-kill termination

- Some common cover crops, including fall-planted oats and forage radishes, usually winterkill (i.e. fail to survive the winter) when temperatures fall below 20° F for 2 to 3 days.
- Such cover crops typically require little to no time commitment for termination.
- These species can be quite effective in managing winter annual weeds, but have little to no impact on weeds germinating in the late spring or summer.
- *If these cover crops survive the winter due to mild weather, it may be necessary to terminate the cover crop using another means before planting the cash crop.*
- Winterkilled cover crops do not provide as many ecosystem services, such as weed control in the spring.



Winterkilled radish. Picture Sjøerd Duiker, Penn State University

2) Mechanical termination methods

Roller-Crimper

A roller-crimper is an implement used to terminate some cover crops. This implement consists of a round drum with angled fins, often weighed down with water, that knock down a cover crop and damage or break the vascular

system to kill the plants. Newer versions of the roller-crimper consist of two mechanisms: a smooth drum with a spring-loaded crimping device right behind. This design provides the crimper with more force to improve cover crop kill.

- Roller-crimping is an option for many cover crop species.
- Out of all the mechanical methods listed, roller-crimping is the most successful for weed management since most of the cover crop remains intact.
- Timing is crucial for successful termination with a roller-crimper.
- Grass cover crops should be roller-crimped after they start *flowering* (anthesis).
- Legumes such as hairy vetch or crimson clover should be roller-crimped after they *start to produce pods*.
- When terminating mixtures, roller-crimp at the correct time for the latest-maturing species in the mixture, unless multiple passes are possible.
- Depending on field conditions, the need to roller-crimp a cover crop at the correct stage for best control may delay cash crop planting.
- Roller crimpers are not effective for killing small weeds.
- Many farmers are using roller-crimpers along with herbicides. In this situation, the main function of the roller crimper is to flatten the cover crop.



Roller-crimper in operation at Harborview Farms, Trey Hill, MD. Picture: Claudio Rubione



Mowing a cover crop. Picture: Kara Pittman, VA

Tillage

- Tillage is a highly effective means of cover crop termination.
- Multiple tillage passes may be necessary, which reduces the benefits provided by cover crops.
- Cover crops with extensive root systems, such as annual ryegrass and perennial clovers, may require multiple tillage passes.
- Tillage breaks down and incorporates cover crop biomass into the soil, leaving no mulch to provide weed suppression.
- Tillage often leaves little residue on the soil surface, thus limiting the weed suppression.

Mowing

- Mowing is less effective than tillage or herbicides for cover crop termination.
- Mowing may leave an uneven layer of mulch, which decreases weed suppression potential.
- Cover crops that grow back after mowing (e.g. grass species) may need to be mowed more than once for successful termination.
- Mowing will chop and shred cover crops into small pieces that allow them to break down rapidly, thus providing shorter periods of mulch cover for weed suppression.

3) Chemical termination methods

- Herbicides have more flexible timing windows than mechanical termination methods.
- However, herbicides may have rotational restrictions so choice depends on both cash and cover crop species in use.
- Most cover crops can be terminated with herbicides.
- Glyphosate readily controls grass cover crops, while tank mixtures (e.g., glyphosate + dicamba or 2,4-D) are needed to control legume or brassica cover crops.
- For cover crop species in which herbicide resistance has been documented (e.g., annual ryegrass), be prepared to use a different termination method or an effective herbicide that relies on a different site of action to completely terminate the cover crop.

ADDITIONAL COVER CROP TERMINATION CONSIDERATIONS

- A number of factors can reduce herbicide effectiveness, including weather conditions in the spring. Be sure to scout the field after termination to ensure the cover crop is successfully terminated.
- Choose only certified cover crop seed from reliable sources to avoid introducing new weeds into the field via contaminated seed. Know what you are buying. Annual

ryegrass, perennial ryegrass, and Italian ryegrass can interbreed and are sometimes confused in the trade but have distinct traits.

- Many termination methods are dependent on timing. *If field conditions such as excess spring rain delay or prevent timely cover crop control, consult your local Extension office for termination options and recommendations for addressing the effects of delayed cover crop termination.* For example, slightly more N may be applied as a starter in corn to balance the effect of large

amounts of cereal rye biomass on soil N levels.

Bottom line: it is crucial to successfully terminate a cover crop. Have a strategy in mind before you plant your cover crops. More than one termination method or pass through the field may be needed if the first method or pass fails.

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