Termination of winter rye and annual ryegrass using glyphosate

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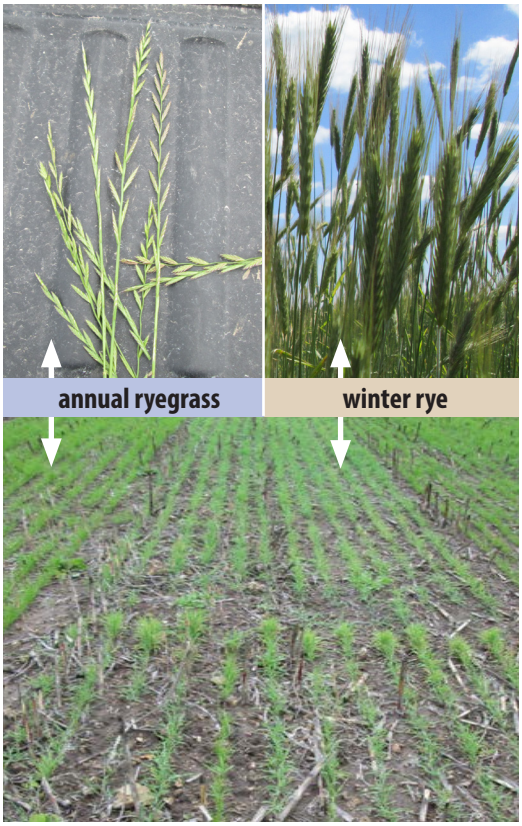

Farmers and agronomists agree that terminating cover crops with glyphosate can be challenging. When termination fails, the cover crop becomes a weed that can reduce quality and yield in the following crop. Due to these concerns, experiments were established to evaluate the termination of the most common cover crops — annual ryegrass and winter rye — using two glyphosate rates and three timings.

Wisconsin dairy farms also use winter rye and annual ryegrass as a forage crop and terminate with glyphosate following harvest. See the other side of this page for a second study that evaluates the termination of winter rye and annual ryegrass utilized as a spring forage crop.

Wisconsin research trial

Field experiments were conducted at the University of Wisconsin Arlington Agricultural Research Station from 2013-15. Plots were planted into corn after silage harvest in early September. The cover crops were no-till seeded perpendicular to the harvested corn rows in the second week of September. In the spring, percent cover estimates and dry biomass weights were collected two weeks after treatments were applied.

Cover crop varieties planted

- 'Guardian' winter rye — seeding rate of 120 lb/acre @ 1" deep
- 'Gulf' annual ryegrass
- 'Bruiser' annual ryegrass
- 'King' annual ryegrass

(seeding rate 32 lb/acre @ 1" deep)

Termination timing

- mid-May .....ryegrass (9 inches) .....winter rye (Feekes 9)
- late May.....ryegrass (12 inches).....winter rye (Feekes 10)
- early June .....ryegrass (22 inches).....winter rye (Feekes 10.5.2)

(8 days; 6 days)

Termination treatments

All applications occurred under dry, active growing conditions in the mid- to late afternoon, with mid- to full sun, 70-86°F air temperatures and 1-7.5 mph wind speeds.

- glyphosate 16 fl oz
- glyphosate 32 fl oz

(@ 4.5 lb acid equivalent per gallon of glyphosate with ammonium sulfate @ 17 lb /100 gallons of spray solution applied @ 15 gallons/acre)

- non-treated control

NPM

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Results

annual ryegrass

2013 plantings results are reported, the 2014's planting winter-killed.

- All three timings had successful termination on the three varieties.

  Although differences were detected among varieties, they were all considered successfully terminated (>95% reduction in green cover).

- Both glyphosate rates resulted in termination.

  Table 1 shows that both treatments had greater than 95% reductions, indicating successful termination two weeks after treatment. Visual assessment three weeks after applications confirmed successful termination (100% reduction in green cover) of all annual ryegrass populations.

winter rye

- Termination in late May (Feekes 10) and early June (Feekes 10.5.2) were both successful two weeks following treatment.
- Mid-May (Feekes 9) termination did not occur two weeks after application. However, visual assessment three weeks after application confirmed 100% termination, indicating there may be a delay in termination for this timing.

  Table 2 shows results over two years for termination. Mid-May termination takes more time for 100% results when compared to late May and early June, respectively.

Winter rye two weeks after termination with glyphosate.

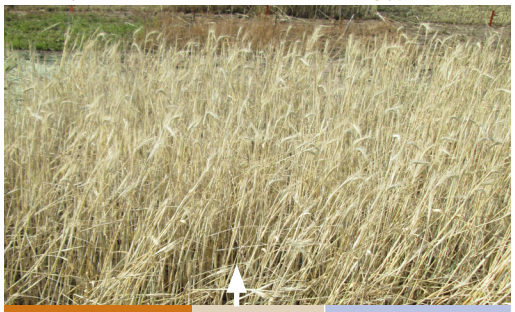


Table 1: Glyphosate rate	winter rye	annual ryegrass
	-----mean reduction in % cover----	
16 fl oz/acre	78%*	97%
32 fl oz/acre	80%*	99%

p-values for winter rye (NS) and annual ryegrass (0.0031)

* Visual assessment determined 100% termination after 3 weeks.

Winter rye three weeks after mid-May termination.

Table 2: Termination timing	winter rye	annual ryegrass
	-----mean reduction in % cover----	
mid-May	54%*	98%
late May	87%*	98%
early June	96%	99%

p-values for winter rye (<0.0001) and annual ryegrass (NS)

* Visual assessment determined 100% termination after 3 weeks.

Take home message

- Recommended glyphosate rates (16 or 32 fl oz/ gallon @ 4.5 lb acid equivalent per gallon) were effective in terminating both cover crop species at all timings.
- Application timing and glyphosate rate should both be considered when estimating crop planting date.

  Note that in these trials, all herbicide applications were conducted under optimal conditions — sub-optimal conditions may influence results.

- ***Always consult herbicide labels for rotation restrictions and crop insurance guidelines prior to termination. The label is the law.***

Termination of winter rye and annual ryegrass utilized as a spring forage crop

A similar experiment was also conducted to assess termination methods for these crops when used as spring forages.

Two varieties:

- 'King' annual ryegrass
- 'Guardian' winter rye

Three termination treatments:

- glyphosate only*
- harvesting only
- harvesting followed by glyphosate (same day)

Harvest treatments were applied using a sickle bar mower; plants were cut to approximately 3.5 inch height; and the biomass was raked off.

Two termination timings [applied 13 days apart in 2014 and 8 days apart in 2015]**:**

- mid-May ..... ryegrass (9 inches) ..... winter rye (Feekes 9)
- early June .... ryegrass (22 inches) .. winter rye (Feekes 10.5.2)

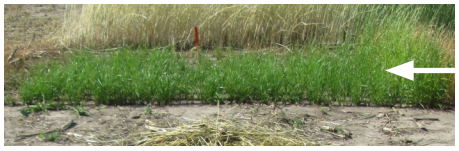
* Treatment used for comparison purposes only, glyphosate application **prior** to forage harvest is illegal.

Results

- Glyphosate provided successful termination of both species in both mid-May and early June.
- Harvesting followed by glyphosate (same day) provides successful termination of both species.
- Harvesting only:

  For winter rye, the harvesting only treatment was effective, however, the winter rye did slowly regrow but was not competitive.

  Annual ryegrass regrew quickly from the harvesting only treatment, suggesting that additional managemnt is needed for termination.



Annual ryegrass regrowth two weeks after mid-May termination.