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Effective Termination of Cover Crops before Planting Cash Crops

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Introduction

COVER CROPS HAVE SEVERAL DOCUMENTED BENEFITS, including improving soil health and fertility, reducing fertilizer and pesticide use, weed suppression, and erosion control, among others. Despite these documented benefits, Idaho ranks thirty-first in the nation in cover-crop acreage, though planting has increased over the past ten years or so to nearly 129,000 acres (an increase of 24.6% from 2012), according to the 2017 United States Department of Agriculture Census of Agriculture.

One of the top reasons some Idaho farmers remain reluctant to plant cover crops is the weed potential of cover crops. This is a real concern. Some herbicide-resistant and noxious weeds have been introduced to several states through cover crop mixes (Brainard and Noyes 2010; Robison 2018). In addition, most cover crops have the potential to become weeds in cash crops if not terminated properly (Figure 1). Furthermore, some species of annual ryegrass, one of the commonly planted cover crops, have developed resistance to multiple herbicide groups, including glyphosate, the most-used herbicide for cover crop termination. Thus, to prevent ryegrass and other cover crop species from becoming problematic weeds or contaminants in cash crops, growers need to identify a termination plan before planting cover crop mixes. Based on field trial data collected in 2022 and 2023 for several Idaho cover crops, this bulletin identifies herbicide options for effective termination of these cover crops.



Figure 1. A, volunteer buckwheat in newly planted wheat and B, annual ryegrass in sugar beet after termination in Kimberly, Idaho.

Field Trials

Objective:

- Evaluate the efficacy of different herbicide products in terminating common cover crop species found in crop mixes in Idaho (annual ryegrass, cereal rye, red clover, common vetch, hairy vetch, buckwheat, yellow sweet clover, and chickory).

Annual ryegrass (25 lbs/acre), cereal rye (100 lbs/acre), red clover (10 lbs/acre), common vetch (20 lbs/acre), hairy vetch (20 lbs/acre), buckwheat (50 lbs/acre), yellow sweet clover (20 lbs/acre), and chickory (5 lbs/acre) were planted in the summers of 2022 and 2023 at the University of Idaho Kimberly Research and Extension Center and sprayed when they reached a height of 5–8 inches. For grassy cover crops (annual ryegrass, cereal rye), herbicide treatments included Roundup PowerMax (*glyphosate*) at 32 fl oz/acre, Section Three (*clethodim*) at 5.3 fl oz/acre, Liberty 280 SL (*glufosinate-ammonium*) at 22 fl oz/acre, and Targa (*quizalofop p-ethyl*) at 8 fl oz/acre. Herbicide treatment for broadleaf cover crops (red clover, common vetch, hairy vetch, buckwheat, yellow sweet clover, and chickory) included Roundup PowerMax at 32 fl oz/acre, Liberty 280 SL at 22 fl oz/acre + Sharpe (*saflufenacil*) at 2 fl oz/acre, 2,4-D ester (*2,4-D*) at 32 fl oz/acre, and 2,4-D ester + Clarity (*dicamba*) at 8 fl oz/acre.

All herbicides were applied with the recommended spray adjuvants. Herbicide application was accomplished using a UTV (utility vehicle) sprayer calibrated to deliver 16 gal/acre. Visible cover crop control was estimated on a percentage scale (0% = no cover crop control and 100% = complete cover crop control) within three weeks after herbicide. Photographs document the level of cover crop control. Data analysis follows standard statistical procedures.

Glyphosate was the most effective herbicide for terminating grassy cover crops like cereal rye and annual rye (Figures 2 and 3). If these grassy cover crops develop resistance to *glyphosate*, *glufosinate-ammonium*, *quizalofop p-ethyl*, and *clethodim* may provide some

suppression. However, multiple applications of these herbicides may be needed to provide good control.

The herbicides *2,4-D* or *2,4-D* + *dicamba* appeared to be better options for terminating common and hairy vetch (Figures 2 and 3). Other herbicides evaluated as part of the trials provided less than optimal control of common and hairy vetch. Where *2,4-D* or *dicamba* cannot be applied due to carryover, drift, or other concerns, herbicides like *glyphosate*, *saflufenacil*, or *glufosinate-ammonium* may have to be applied multiple times or at higher rates to provide good suppression. Common and hairy vetch are both perennial cover crops and may be even more difficult to control if they become established for a year or longer.

None of the herbicides evaluated provided good control of chicory, red clover, or yellow sweet clover. Multiple herbicide applications may be needed to provide good control of these cover crops. Since red clover and yellow sweet clover are both perennials, established stands (one or more years) may be even harder to control with herbicides. Unlike *glyphosate*, some of the herbicides evaluated may have plant-back restrictions to common rotational crops (Table 1). It is important to consider plant-back restrictions when selecting a herbicide program to properly terminate a cover crop before planting the cash crop.

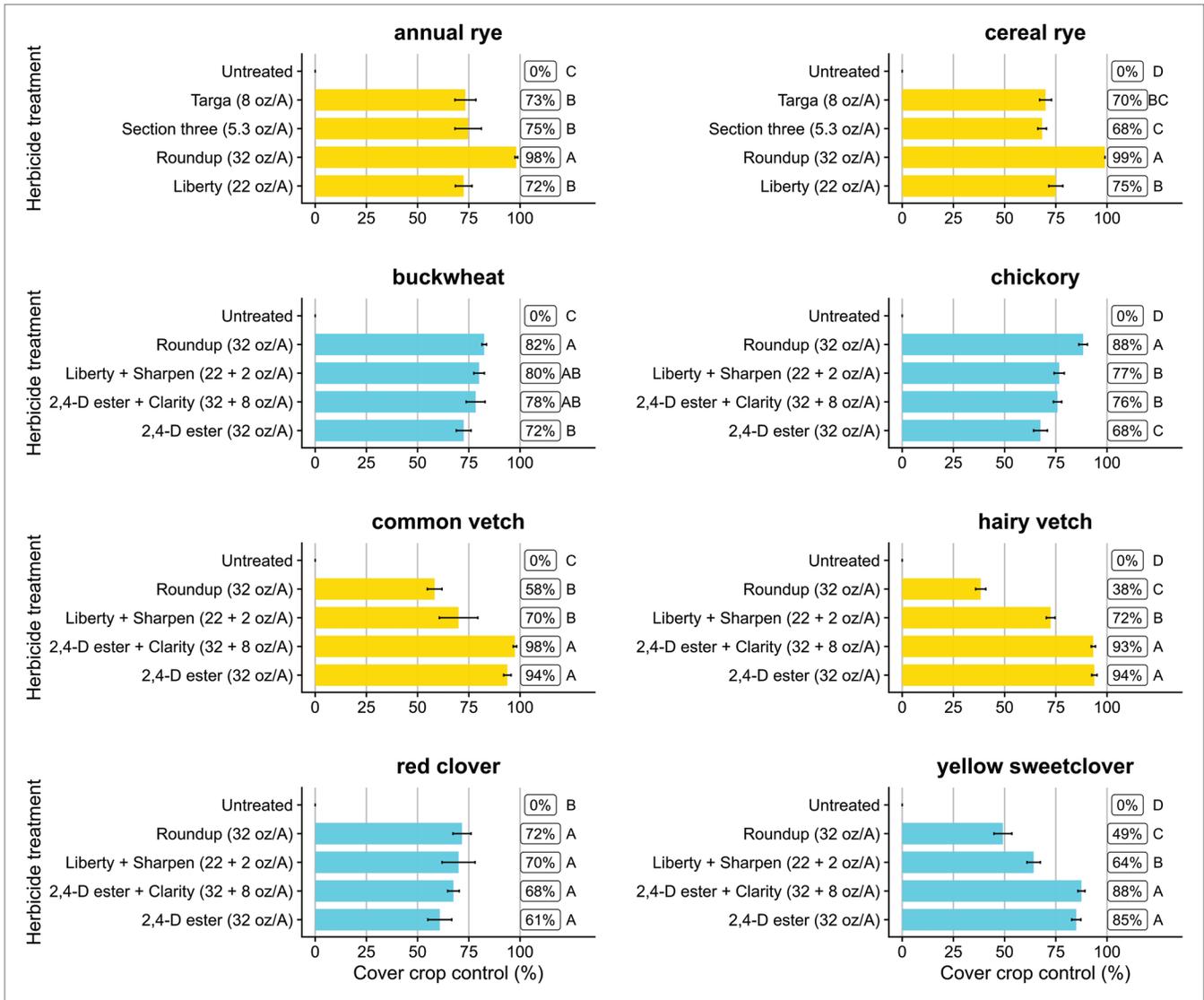


Figure 2. Efficacy of herbicides for cover crop termination at Kimberly, Idaho. Data from three weeks after herbicide application. Each cover crop control value on the right of each bar is an average of six data points over a two-year period (2022 and 2023). Means followed by the same letter within each cover crop are not statistically different using Tukey's HSD (honestly significant difference) from analysis of variance performed at the 0.05 probability level. Visual cover crop control was rated on a 0% (no control)–100% (completely dead) scale.

Table 1. Rotation restrictions of herbicides used in the trials to selected crops that typically follow cover crops in southern Idaho.

Herbicide	Rotation Restrictions (Number of Months) to Selected Crops That Typically Follow Cover Crops		
	Dry Bean	Sugar Beet	Potato
2,4-D ester (2,4-D)	NI ¹	NI	NI
Clarity (<i>dicamba</i>)	4	4	4
Liberty 280 SL (<i>glufosinate-ammonium</i>)	6	0	2
Roundup PowerMax (<i>glyphosate</i>)	0	0	0
Section Three (<i>clethodim</i>)	0	0	1
Sharpen (<i>safinlufenacil</i>)	4–9	4–9	4–9
Targa (<i>quizalofop p-ethyl</i>)	0	0	4

¹NI, not indicated on the label. Allow at least thirty days before planting cash crops.

Annual ryegrass



Untreated



Roundup PowerMax
(32 oz/acre)



Liberty
(22 oz/acre)



Section three
(5.3 oz/acre)



Targa
(8 oz/acre)

Buckwheat



Untreated



Roundup PowerMax
(32 oz/acre)



Liberty + Sharpen
(22 + 2 oz/acre)



2,4-D Ester
(32 oz/acre)



2,4-D Ester + Clarity
(32 + 8 oz/acre)

Hairy vetch



Untreated



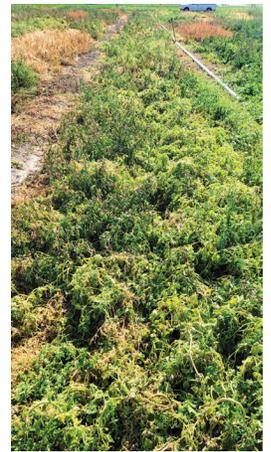
Roundup PowerMax
(32 oz/acre)



Liberty + Sharpen
(22 + 2 oz/acre)



2,4-D Ester
(32 oz/acre)



2,4-D Ester + Clarity
(32 + 8 oz/acre)

Figure 3. Efficacy of herbicides for cover crop termination at Kimberly, Idaho. Photos from three weeks after herbicide application of selected cover crops.

Conclusion

To prevent cover crops from becoming weeds in cash crops, properly terminate them before planting cash crops. Note that not every cover crop can be effectively terminated with glyphosate. Where using alternative herbicides, carefully consider the plant-back restrictions to the cash crop. Also, consider the herbicide options labeled for use in the cash crop that might provide additional control of any volunteer cover crops.

Further Reading

- Brainard, D., and D. C. Noyes. 2010. "Don't Plant Weeds with Your Winter Rye: Weed Seed Contamination Can Spell Disaster." https://www.canr.msu.edu/news/dont_plant_weeds_with_your_winter_rye_weed_seed_contamination_can_spell_dis. Accessed 7 December 2023.
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- Justice, G. G., T. F. Peeper, J. B. Solie, and F. M. Epplin. 1994. "Net Returns from Italian Ryegrass (*Lolium multiflorum*) Control in Winter Wheat (*Triticum aestivum*)." *Weed Technology* 8(2): 317–23.
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- Liebl, R., and A. D. Worsham. 1987. "Interference of Italian Ryegrass (*Lolium multiflorum*) in Wheat (*Triticum aestivum*)." *Weed Science* 35(6): 819–23.
- Robison, D. 2018. "Cover Crops and Weed Seeds—A Study of Lab Results over Three Years." <https://extension.entm.purdue.edu/newsletters/pestandcrop/article/cover-crops-and-weed-seeds-a-study-of-lab-results-over-three-years/>. Accessed 7 December 2023.
- Zulauf, C., and B. Brown. 2017. "[Cover Crops, 2017 US Census of Agriculture](#)." *farmdoc daily* (9): 135.

ALWAYS read and follow the instructions printed on the pesticide label. The pesticide recommendations in this UI publication do not substitute for instructions on the label. Pesticide laws and labels change frequently and may have changed since this publication was written. Some pesticides may have been withdrawn or had certain uses prohibited. Use pesticides with care. Do not use a pesticide unless the specific plant, animal, or other application site is specifically listed on the label. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

Trade Names—To simplify information, trade names have been used. No endorsement of named products is intended nor is criticism implied of similar products not mentioned.

Groundwater—To protect groundwater, when there is a choice of pesticides, the applicator should use the product least likely to leach.