

# Impact of Wheat Herbicide Residues on Fall-Seeded Cover crops



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# Considerations for a cover cropping system

- Goals for the system
- Herbicide history
  - Cover vs forage crop

# Knowledge gaps with cover crops

- Are cover crops on herbicide labels?
- Typically we have to use similar crop species to gauge cover crop safety (WCG pp. 104-106)
  - Is that reliable?

## **2016-2017 STUDY GOAL**

Identify in-season wheat herbicides that increase risk to cover crop establishment following wheat harvest

Mike Ostlie – Carrington Research Extension Center

Caleb Dalley (Hettinger) and Kirk Howatt (Fargo)

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# Wheat herbicide residues and cover crops

- 5 site-years
  - 3 locations (Fargo, Carrington, and Hettinger) and 2 years (2016-17)
- Compared combinations of 9 cover crops (CC) and 9 herbicides: 81 combinations
  - Wheat sprayed at 3-4 leaf
  - Chose a range of active ingredients with potential residuals of >60 days
  - High-end rates were used for all products
- CC direct seeded within 7-10 days of wheat harvest

# Wheat herbicide impact on fall-seeded cover crops, Carrington, 2017



October 9, 2017

# Wheat herbicide residues and cover crops

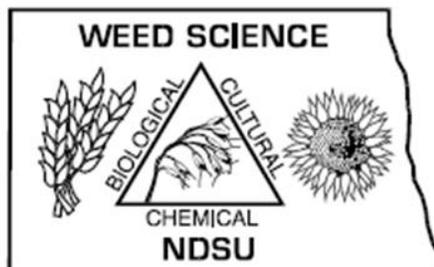
- Measured injury to each cover crop and assigned a risk score to each cover crop/herbicide combination

☐ LR – 0-20% damage      safe

☐ MR – 21-50% damage      might be ok

☐ HR – 51-100% damage      not ok

# 2018 NORTH DAKOTA WEED CONTROL GUIDE



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**THIS PUBLICATION SUPERCEDES ALL PREVIOUS ISSUES OF W-253 SUBJECT TO CONDITIONS UNDER "WEED GUIDE INFORMATION"**

[www.ndsu.edu/weeds/](http://www.ndsu.edu/weeds/)

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#### Y16. Herbicide residue and fall cover crop establishment.

Late summer/ fall-seeded cover crops promote soil health, protect water quality, and enhance wildlife habitat. Cover crop response to spring-applied herbicides is limited but crop tolerance research is ongoing at several academic institutions. Herbicides labels may be expanded to consider soil residue effects on establishment of cover crops. Refer to pages 100 to 104 for current data base. Use rotational restrictions of common crops or herbicide effectiveness on common weeds with close relatives of fall seeded cover-crops:

- Use alfalfa for other legumes/pulse species.
- Use canola/mustard for Cruciferae species: radishes and turnips.
- Use small grains and wild oat for other grass species.

Greater flexibility is provided where the cover crops is only used for conservation practices. However, the grower assumes all risk if the herbicide interferes with the establishment of the cover crop. Consider soil type, soil pH, and precipitation patterns on herbicide degradation. In general, herbicides with crop rotation restrictions of 4 months or less should be safe to most cover crops as they have half-lives of 30 days or less. This information was adapted from information developed by Dr. Bill Curran and Dr. Dwight Lingenfelter, Pennsylvania State University.

Residues may accumulate in cover crops that may be fed to animals as forage and consumed by humans. Follow rotational restriction on labels when planting cover crops that may be grazed or harvested for forage to avoid illegal residues.

#### Herbicide rate, half-life values, and comments.

Herbicide	Rate/A	Half-lives (days <sup>1</sup> )	Comments
2,4-D	0.5 to 1 pt	7	Allow 30 days prior to planting broadleaf crops.
Dicamba	0.5 to 1 pt	5 to 14	Allow 45 days/pt as a general rule for dicamba degradation.
Dual II Magnum	1 to 2 pt	15 to 50	Ryegrass may be more susceptible than other crops.
Flexstar	0.75 to 1 pt	100	Small-seeded legume and brassica crops may be more susceptible than other crops.
Glyphosate	32 to 48 fl oz	47	-
Liberty	22 to 36 fl oz	7	-
Spartan	4.5 to 12 fl oz	36	Small-seeded legume and brassica crops may be more susceptible than other crops.
Valor	2 to 3 oz	12-18	Small-seeded legume and brassica crops may be more susceptible than other crops.

<sup>1</sup> Note: In general, herbicides with half-lives of 30 days or less should allow planting of cover crops after 4 months. Estimates derived from the WSSA Herbicide Handbook, 2014.

#### Risk of cover crop injury based on highest damage recorded at 5 ND locations in 2016-2017.

Herbicide <sup>1</sup>	Radish	Turnip	Field pea	Lentil	Flax	Oat	Barley	Dwarf Essex Rape
Dicamba	MR	<del>HR</del>	LR	MR	MR	LR	MR	MR
Everest	MR	MR	LR	MR	LR	LR	LR	MR
Goldsky	MR	MR	LR	LR	MR	LR	LR	LR
Huskie	LR	LR	LR	LR	MR	LR	LR	MR
PowerFlex	LR	LR	LR	MR	MR	LR	LR	MR
Quelex	MR	MR	LR	LR	LR	LR	LR	LR
Supremacy	LR	LR	LR	LR	LR	LR	LR	LR
Varro	MR	LR	LR	LR	LR	LR	MR	LR
WideMatch	MR	MR	HR	<del>HR</del>	LR	LR	LR	MR
2,4-D	MR	LR	LR	LR	LR	LR	LR	MR

<sup>1</sup> or generic herbicide.

Key: LR - low risk - 0 to 20% injury, MR - medium risk = 21 to 50% injury, HR - high risk = 51 to 100 injury. Strike through = severe injury. Products were chosen due to known residual activity. Other products may be safe for cover crops. This list is not all-inclusive. Most instances of medium or high risk were observed in only one environment. Most combinations were LR in most environments. High OM, high rainfall, tillage, low pH, and other factors will reduce the risk of herbicide carryover to cover crops. If cover crops will be grazed or harvested in some way (including haying), refer to label regarding grazing restrictions.

Reference for additional information include:

'Herbicide Rotation Restrictions in Forage and Cover Cropping Systems'

<http://www.caes.wisc.edu/new-fact-sheet-herbicide-rotation-restrictions-in-forage-and-cover-cropping-systems/>

by the University of Wisconsin, June, 2014. It contains tables summarizing rotation restriction intervals in months along with specific restrictions for forages grown after commonly used herbicide applications in small grains, soybean, and corn.

'Managing risk when using herbicides and cover crops in corn and soybean'

<http://www.extension.umn.edu/agriculture/weeds/herbicides/docs/cover-crops-and-herbicides.pdf>

by University of Minnesota Extension, Spring, 2016.

'Herbicide Use May Restrict Grazing Options for Cover Crops'

<https://store.extension.iastate.edu/Product/Herbicide-use-may-restrict-grazing-options-for-cover-crops>

by Iowa State University Extension, December, 2016.

# General results

- Locations varied greatly – this is ok
  - Fargo had least injury, Carrington had the most
  - Hettinger was more similar to Fargo
- 3 crops with danger signs
  - Field pea, lentil, turnip
  - Several others are at-risk if conditions are favorable for carryover

# Summary

- One must consider what risk means
  - A rating of MR means that noticeable injury occurred in one or two environments for this study (out of 5). The other environments had conditions more favorable to herbicide breakdown.
  - One must consider the environment
    - The given table is a guide to determine risk, but risk can be elevated or alleviated depending on the region (soil texture, pH, OM, etc) and environment (rainfall, soil moisture, etc).

# Example

- A tank-mixture of Varro and WideMatch was applied to spring wheat on May 30 to control group 1 resistant green foxtail, wild oat, kochia and wild buckwheat. Crop was harvested August 1 and sunflower is planned for next year. A cover crop mixture of radish with bin-run barley and field pea will be planted by August 15 into the wheat stubble, primarily for additional snow trap and long-term improvement in soil productivity.
- Is this a good cover crop mix considering herbicides previously used?
- Are there better cover crop substitutes?

# Cover crop labeling

- It is important to differentiate cover crops with forage crops
  - If the 'cover crop' is being harvested in some manner, it will be subject to herbicide plant-back restrictions, if indicated.
  - Cover crops for soil health (all biomass left in the field) are a gray area and considered exempt from plant-back restrictions

# Cover crops for grazing

- Iowa state publication
  - Easy to follow, but limited to corn and soy products
  - <https://store.extension.iastate.edu/Product/Herbicide-use-may-restrict-grazing-options-for-cover-crops>
  - Check label of potential products to ensure there are no grazing restrictions
    - pp. 110-112 in ND Weed Control Guide

# Questions or comments?

