

## Cover Crop Safety Following Wheat Herbicide Applications

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In 2016 a study was conducted at three locations, Carrington, Fargo, and Hettinger, ND, to determine the potential risk of planting various cover crops following a wheat cash crop treated with residual herbicides. The goal of the study was to assist wheat producers with making decisions about which cover crops might be safe and which ones are not after wheat harvest. Herbicide labels do not provide enough information to determine cover crop safety as crop rotation intervals are intended to identify crop damage to cash crops which would carry economic implications, whereas a successful cover crop can withstand some damage or stand loss. Many cover crops are also not listed in crop rotation intervals. Using similar crops to determine risk can be a guide but often even similar species (i.e. canola and dwarf essex rape) may have different responses to herbicide residuals.

In this study nine herbicide treatments were used plus a non-treated check, during the wheat growing season. These were herbicides that may have residual activity at the time of cover crop planting and represent a group of commonly used active ingredients in wheat. After wheat harvest, nine cover crops were planted across each herbicide treatment for a total of 99 treatment combinations with three replicates at each of the three locations. Plots were rated for visual injury three times throughout the fall until frost killed the cover crops. Each treatment combination was given a visual score. For clarity, the scores were converted to a rating system. Low risk (LR) = 0-20% injury, Medium risk (MR) = 21-50% injury and high risk (HR) = 51-100% injury. This system was used with the assumption that up to a 20% stand loss or injury would be acceptable for a cover crop and anything over 50% stand loss or damage would be a failure.

Of the three locations, Carrington had the most injury (Table 1), even though it received more rainfall than the other sites (9" during the study period). In Carrington oats and field peas were the most tolerant to the chosen herbicides. Supremacy was the only product used that did not cause injury to any cover crop. All other products caused some degree of injury to the cover crops though generally injury was in the 20% range which still qualifies as MR. Dwarf essex rape and radishes were most often affected by an herbicide (5 herbicides each). The only situation considered a failure was planting turnips after dicamba application. Even with this degree of damage to many crops, a cover cropping scenario could still be worked out with all herbicides used in this study as there were several safe options for each product.

**Table 1. Cover crop injury risk following wheat herbicide application at Carrington, ND in 2016**

Herbicide	Radish	Turnip	Field Pea	Lentil	Flax	Oats	Barley	Dwarf Essex Rape
Widematch	MR	LR	LR	LR	LR	LR	LR	MR
Huskie	LR	LR	LR	MR	MR	LR	LR	MR
Everest 2.0	LR	LR	LR	MR	LR	LR	LR	MR
Supremacy	LR	LR	LR	LR	LR	LR	LR	LR
Powerflex	LR	LR	LR	MR	MR	LR	LR	MR
Goldsky	MR	LR	LR	LR	MR	LR	LR	LR
Varro	MR	LR	LR	LR	LR	LR	MR	LR
Clarity	MR	HR	LR	MR	MR	LR	MR	LR
2,4-D	MR	LR	LR	LR	LR	LR	LR	MR

LR = 0-20% injury; MR = 21-50% injury; HR = 51-100% injury

The other locations had very little injury across treatment combinations. The exception was that in Hettinger, the herbicide Widematch caused very high levels of damage to lentils and moderate amounts of damage to field peas and turnips. All products were rated as LR in Fargo. When combined across locations (Table 2) most of the product combinations appear safe since even the Carrington MR ratings were fairly low in actual percent damage. Unfortunately this means that it will be difficult to rely on a standard safety rating across locations. Rainfall and soil type ultimately affect how long herbicide residues persist in the soil and each year will likely result in a different set of results. The most prudent thing for now may be to use the worse-case scenario for each treatment combination when making cover crop decisions. The datasets presented may not cover the full scope of possible responses to each treatment combination and so they can only be used as a loose guide until further study is completed. This study will be replicated in 2017 to gain further insight into cover crop response.

**Table 2. Cover crop injury risk averaged across Carrington, Fargo, and Hettinger in 2016**

**Average across locations**

Herbicide	Radish	Turnip	Beets	Field Pea	Lentil	Flax	Oats	Barley	Dwarf essex rape	Sunflower
Widematch	LR	MR	.	MR	HR	LR	LR	LR	LR	.
Huskie	LR	LR	LR	LR	LR	LR	LR	LR	LR	LR
Everest 2.0	LR	LR	LR	LR	LR	LR	LR	LR	LR	LR
Supremacy	LR	LR	.	LR	LR	LR	LR	LR	LR	.
Powerflex	LR	LR	LR	LR	MR	LR	LR	LR	LR	LR
Goldsky	MR	LR	.	LR	LR	LR	LR	LR	LR	.
Varro	LR	LR	LR	LR	LR	LR	LR	LR	LR	LR
Clarity	LR	MR	LR	LR	LR	LR	LR	LR	LR	LR
2,4-D	LR	LR	.	LR	LR	LR	LR	LR	LR	.

LR = 0-20% injury; MR = 21-50% injury; HR = 51-100% injury