Cover Crop Safety following Wheat Herbicide Application

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In 2016 and 2017 a herbicide residual study was conducted across four locations covering much of the diversity of environments in North Dakota: Carrington, Fargo, Hettinger, and Minot. The goal of the study was to determine which cover crops were safe to plant following wheat. Wheat herbicides were chosen that are known to have residual activity that may be injurious to cover crops that are planted in the same season. Nine herbicides were applied and eight cover crops were planted into each herbicide strip. Treatments were replicated three times at each location. Wheat herbicides were applied in late May or early June, and cover crops were planted within two weeks after wheat harvest, which was mid-August in 2016 and late August or early September in 2017. Treatments were rated for phytotoxicity and reduced stand. Data were compiled across locations. The highest injury rating across all locations was added to a table. For ease, the data were categorized by the level of injury. If a treatment combination caused less than 20% injury at every location, it was categorized as low risk. If a treatment combination caused between 21 and 50% injury at even a single location, it was categorized as medium risk. If there was more than 50% injury at any location it was labeled high risk.

Herbicide safety varied by location, as expected. Carrington had the most incidences of increased injury. In some environments all treatment combinations were safe. Oats, barley, and field peas were the most tolerant cover crops to the herbicides that were studied (Table 1). The brassica species (radish, turnip, and dwarf essex rape) were the most sensitive group of plants. Three combinations received high risk ratings 1) field pea and Widematch, 2) lentil and Widematch, and 3) turnip and Clarity (dicamba). Combinations 2 and 3 were rated as high risk on more than one occasion. Those two combinations would not be recommended.

Table 1. Risk of cover crop injury based on highest damage recorded between five ND locations in 2016 and 2017.

Herbicide	Radish	Turnip	Beet	Field Pea	Lentil	Flax	Oats	Barley	Dwarf Essex Rape
Widematch	MR	MR	.	HR	HR	LR	LR	LR	MR
Huskie	LR	LR	0	LR	MR	MR	LR	LR	MR
Everest 2.0	MR	MR	0	LR	MR	LR	LR	LR	MR
Supremacy	LR	LR	.	LR	LR	LR	LR	LR	LR
Quelex	MR	MR	.	LR	LR	LR	LR	LR	LR
Powerflex	LR	LR	0	LR	MR	MR	LR	LR	MR
Goldsky	MR	MR	.	LR	LR	MR	LR	LR	LR
Varro	MR	LR	3	LR	LR	LR	LR	MR	LR
Clarity	MR	HR	0	LR	MR	MR	LR	MR	MR
2,4-D	MR	LR	.	LR	LR	LR	LR	LR	MR

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

Due to environmental variability from year to year and field to field, some combinations may be higher or lower risk in a particular location and season. Factors that reduce injury risk include high soil organic matter content, high rainfall, tillage, low pH, and others. Table 1 is meant to be a guide. When planting following conditions favorable to herbicide breakdown, cover crop injury risk is reduced. In most instances, combinations listed as medium risk had low levels of injury in all but one environment.