Winter Wheat Response to Previous Crop and Foliar Fungicides, Ellendale, 2008

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The trial was conducted as a joint project between Ducks Unlimited and the NDSU Carrington Research Extension Center with financial support from Syngenta. Experimental design was a randomized complete block with a split-split plot arrangement and three replications. Main factor was previous crop, split factor was variety, and split-split factor was fungicide. The trial was direct seeded in 15-inch rows with a 6- to 7-inch seed spread at a soil depth of 1- to 1.5 inches at 1.2 million pure live seeds/acre (treated with Dividend Extreme + Cruiser at 2 + 1 oz/100 lb seed) on September 19, 2007, on previous crop stubble including spring wheat, field pea, flax, and soybean. Soil pH, organic matter, nitrate-N (0- to 24-inch depth), and phosphorus (Olsen test) are listed respectively for each previous crop: spring wheat = 5.5, 4.2%, 193 lbs./A, and 298 ppm; flax = 4.9, 4.2%, 390 lbs./A, and 51 ppm; field pea = 5.4, 3.6%, 149 lbs./A, and 48 ppm; soybean = 5.9, 3.4%, 72 lbs./A, and 47 ppm. Starter fertilizer was deep-band applied as 28-0-0 plus 10-34-0 at 85 lbs. N and 50 lbs. P_2O_5/acre. On April 14, 2008, 28-0-0 was stream-bar applied at 80 lbs. N/A on soybean ground. On May 16, 10 gpa of 12-0-0-26 plus 10 gpa of water was applied using stream bars. Quilt at 7 fl oz/A was applied on May 15 to tillering wheat with a hand-boom plot sprayer equipped with 8001 flat-fan nozzles delivering 10 gal/A at 30 psi. Tilt at 4 fl oz/A plus NIS at 0.125% v/v was applied on June 20 or 23 to wheat at early flowering with TJ60 8002EVS nozzles. Flag leaf disease (leaf rust; leaf spot = tan spot and Septoria) was visually evaluated on July 16. Fusarium head blight (scab) was not evaluated due to low incidence. The trial was harvested with a plot combine on August 1.

Winter wheat grain yield was highest with spring wheat as the previous crop (Table 1). Yield associated with previous crop is reflective of the level of winter injury that was visually observed. Winter injury was least when planted following spring wheat followed by flax, pea and soybean, respectively, as previous crops. The yield of the three winter wheat varieties planted in the previous crop soybean is largely reflective of the difference in cold tolerance of the three varieties with Buteo and Jerry being similar in cold tolerance. Test weight also was reduced with pea and soybean as the previous crops. Winter wheat seed protein was less with spring wheat compared to other previous crops, likely due to the high yield associated with the spring wheat.

Jerry winter wheat response to fungicides and previous crop.

Table 1. Winter wheat response to crop rotation and fungicides, Ellendale, 2008.						
	Flag leaf disease		Seed			
Treatment	Leaf rust	Leaf spot	Yield	Test Weight	Size	Protein
	(%)	(%)	(bu/A)	(lb/bu)	(seeds/lb)	(%)
Previous crop						
flax	2	11	79.2	60.6	14277	14.0
spring wheat	1	14	90.7	61.2	13997	13.4
field pea	5	12	62.3	59.4	14599	14.2
soy	5	12	41.2	59.0	14373	14.4
LSD 0.05	2	NS	16.6	1.2	NS	0.4
Variety						
Buteo	7	13	64.3	61.0	15329	14.0
Jerry	2	10	74.3	59.0	13653	14.4
Millennium	1	14	67.1	60.1	13952	13.6
LSD 0.05	2	NS	5.2	0.5	248	0.2
Fungicide						
UTC	5	12	69.8	59.9	14266	13.9
tiller	5	15	65.6	59.9	14439	14.0
flower	1	11	70.8	60.1	14330	14.0
tiller/flower	2	11	68.0	60.3	14211	14.1
LSD 0.05	2	3	NS	NS	NS	NS
mean	3	12	68.5	60.0	14311	14.0
C.V.%	111.4	60.4	18	1.4	3.7	2.0

Standing and surface residue are both important to provide soil temperature modification to insulate the winter wheat crown. Standing residue was of particular importance because of its ability to hold snow. It was important to retain the small amount of measurable snow that was received.

'Jerry' had the highest seed yield, protein, and size while having the lowest protein compared to the other varieties. Leaf spot and rust severity were low but generally were reduced with fungicide use during the flowering stage compared to the untreated check or fungicide use during the tillering stage.

There were numerous multi-factor interactions with statistically significant differences for winter wheat disease and agronomic performance. Seed yield and size differed among the factors of previous crop and winter wheat varieties (Table 2).

Table 2. Winter wheat response to previous crop by variety, Ellendale, 2008.

		Seed			
Treatments		Yield	Test	Size	Protein
Previous crop	Variety	(bu/A)	(lb/bu)	(seeds/lb)	(%)
	Buteo	73.1	61.5	14984	14.0
	Jerry	84.2	59.2	13867	14.4
flax	Millennium	80.3	60.9	13981	13.6
	Buteo	84.9	62.0	15179	13.4
	Jerry	93.3	60.3	12896	13.6
spring wheat	Millennium	93.8	61.3	13915	13.1
	Buteo	56.5	60.2	15635	14.2
	Jerry	62.9	58.2	14106	14.8
field pea	Millennium	67.6	59.8	14056	13.7
	Buteo	42.5	60.4	15519	14.5
	Jerry	56.7	58.2	13743	14.7
soybean	Millennium	22.9	58.4	13856	14.0
LSD 0.05		10.4	NS	495	NS
mean		68.5	60.0	14311	14.0
C.V.%		18	1.4	3.7	2.0