

AGRONOMY NEWS

Grasslands For Tomorrow



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HORSCH ANDERSON PLOT RESULTS

Kevin Anderson with Horsch Anderson, an air-seeder manufacturing company, continues to cooperate with DU and their agronomy programs in the management of winter wheat and the promotion of conservation cropping systems.

Kevin hosted a winter wheat variety plot that included 10 treatments of fungicides in cooperation with SDSU and Dr. Marty Draper. Dr. Draper also established a durum fungicide trial at the Horsch Anderson site.

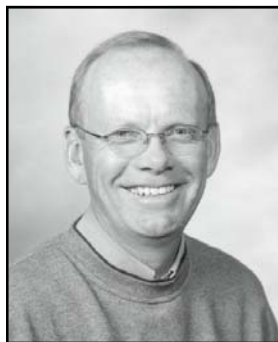
Yield data from the individual fungicide treatments will not be available for either trial due to soil variability. Rainfall was very limited through June and minimal in July exposing the sand and gravel sub-soil areas within the plots. Variability was also increased in the winter wheat plot due to differing degrees of varietal winterkill and injury.

The yield range in bushels per acre across replications of the winter wheat and durum plots follow to demonstrate the soil and winter survival variability.

	<u>Yield Range Across Reps (bu/A)</u>	
Durum	0	71
Winter Wheat varieties:		
CDC Falcon	27	63
Wesley	34	60
Ransom	35	68
Harding	22	67
Crimson	8	52
Arapahoe	25	45
Elkhorn	29	41

Observations: Considering the fall, winter and spring climatic and growth conditions, Crimson exhibited the most winterkill and injury of the winter wheat varieties in the plot. Elkhorn was clearly the most winter hardy, but also exhibited the greatest lodging and was later in maturity. CDC Falcon and Ransom exhibited slightly better winter hardiness than Harding, Arapahoe and Wesley. CDC Falcon and Wesley were the clear winners for standability. The above yield data should not be used in an attempt to compare varieties, but as a measure of potential yield.

A big thank you to Kevin Anderson and Dr. Draper and his staff for their cooperation and Hansmeier & Sons, Inc. for supplying the winter wheat seed.



Blake Vander Vorst
Regional Agronomist
Ducks Unlimited, Inc.
2525 River Road
Bismarck, ND 58503-9011
701-355-3533
Cell: 701-391-2251



Roger Knapp,
DU Field Agronomist
Wild Rice Soil Conservation Dist.
8991 Hwy 32 North
Forman, ND 58032-9702
701-724-3247 Ext. 115
701-678-4311 (Mobile)

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Natural Resources Conservation Service (NRCS)

Day, Marshall, Ransom and Wild Rice Conservation Districts

North Dakota Dept. of Health 319 Program

NDSU and SDSU Cooperative Extension Service

HRSW VARIETY SELECTION CRITERIA

Straw strength and **length** are two criteria to consider as you select Hard Red Spring Wheat varieties. This can be of particular benefit for fields you plan to plant winter wheat this fall.

A HRSW variety with strong straw will provide more upright residue after harvest. This will result in greater snow catch that will increase winter wheat survival. Standing residue, depending on the length, usually allows both shank and disk drills to obtain better winter wheat seed to soil contact than in HRSW fields with heavy surface residue due to lodging and extra straw produced by tall varieties.

Agronomy News

**Editors: Blake Vander Vorst,
Helen Tessmann**

Phone: (701) 355-3533

E-mail: bvandervorst@ducks.org

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Ducks Unlimited, Inc.
2525 River Road
Bismarck, ND 58503-9011

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Joe & Patty Breker 2001 Intensive Wheat Management

The Breker's of Rutland, ND planted 1.4 million seeds/acre of Russ Hard Red Spring Wheat in soybean stubble with a Concord air-seeder on April 22, 2001 to evaluate the effect of intensive wheat management practices on wheat yield, protein, test weight and lodging. All treatments received 80 lbs/acre of 10-50-0 starter fertilizer applied with the drill at seeding. Anhydrous ammonia was also applied with the drill at seeding on all plots either at 40 lbs or 120 lbs of actual nitrogen per acre. Starane/Salvo was applied at 0.8 pint per acre to the entire field. The following table lists the inputs and amount applied, crop stage at application and cost.

Input (in order of sequence)	Crop Stage	Cost
A. Starter 40 lbs. actual P (80 lbs) 10-50-0	at seeding	\$ 9.60
B. Nitrogen 120 lbs. actual N NH3 @ \$.18	at seeding	21.60
C. Nitrogen 40 lbs. actual N NH3 @ \$.18	at seeding	7.20
D. Starane/Salvo herb. 0.8 pint	4 to 5-leaf	4.70
E. Nitrogen 70 lbs. actual N 28% @ \$.36	applied 6-05-01 (6-leaf)	25.20
F. Cerone 0.5 pint	applied 6-15-01	4.00
G. Tilt + Zinc Sulfate 3 oz. + 1 quart	applied 6-25-01	9.20
H. Protein (Pro) 15 lbs. actual N 28% @ \$.36	applied 7-01-01 (after flower)	5.40

RESULTS:

The following table lists the combination of treatments and corresponding results.

TRT	<u>Lbs/Ac Actual Nitrogen</u>			<u>Cerone Early Flag</u>	<u>Tilt + Zinc/Sul E. flower</u>	<u>Reps</u>	<u>Test</u>				
	<u>NH3 Seeding</u>	<u>UAN 6-leaf</u>	<u>UAN Pro</u>				<u>Weight lbs/acre</u>	<u>Protein Percent</u>	<u>Lodging Percent</u>	<u>Yield bu/acre</u>	<u>Input Cost *</u>
1	120	70	15	yes	yes	2	61.5	14.7	40	77.5	79.70
2	120		15	yes	yes	4	62.0	14.3	20	79.6	54.50
3	40	70	15	yes	yes	3	62.5	14.0	0	80.3	65.30
4	40	70	15			2	62.1	13.7	30	80.4	52.10
5	40	70				1	61.9	13.3	30	79.9	46.70
6	120		15			2	61.5	14.3	70	77.5	41.30
7	120					1	60.9	13.3	70	78.5	35.90

*Input costs include starter fertilizer, all forms of nitrogen fertilizer, herbicide, Cerone growth regulator, Tilt, and zinc sulfate. The input cost does **not** include the cost of application. The number of extra applications can be determined by counting the treatments in the columns UAN 6-leaf, UAN Pro, Cerone, and Tilt + Zinc/Sul.

DISCUSSION:

The **yield, test weight and quality enhancements** were not significantly different to justify the added cost of treatments over the Breker's base treatment of 120 pounds of anhydrous ammonia at seeding for the 2001 crop year. Joe indicated that in 2000 he did see positive returns from some of the treatments. The environmental conditions during the 2001-growing season negated the benefits of these treatments with the exception of lodging.

The increase in **protein** generated by either the amount or timing of the nitrogen applied was not a cost effective treatment with the current protein premiums and nitrogen cost. There does appear to be a trend towards higher protein levels with the 15 pounds of liquid nitrogen applied after flower (treatment H). However, the amount of nitrogen applied also appeared to have an effect on protein levels as well as an interaction between nitrogen amount and timing of application.

The difference in **lodging** between the treatments was quite substantial and very visible at harvest. Joe indicated that harvest travel speed ranged from 2.5 mph for treatment 7 to 4.0 mph for treatment 3. Treatment 2 verses 6 reveal a 50% reduction in lodging from the use of **Cerone growth regulator**. Treatment 4 verses 6 show a 40% reduction in lodging due to the **timing of the nitrogen** applications. Treatment 1 verses 3 show a 40% reduction in lodging due to the **amount of nitrogen** applied. The after flower nitrogen application of 15 pounds did not appear to increase the percent of lodging. The results appear to indicate that the amount and the timing of nitrogen applications and the use of the growth regulator Cerone affected the amount of lodging under the environmental conditions present in the 2001 growing season. The question is, "At what cost does the reduction in lodging become important or economical to each producer and what is the impact on the following crop?" The percent lodging was a visual rating at harvest by Joe Breker.

Results of Winter Wheat Variety/Fungicide Trials - Lisbon, ND, 2001
Dr. Marcia McMullen
Extension Plant Pathologist, NDSU, Fargo

Introduction:

A cooperative project to evaluate fungicide treatments on winter wheat varieties was done on the Randy Mairs farm near Lisbon, ND in 2001. Cooperators in the project included: Blake Vander Vorst of Ducks Unlimited; Randy Mairs, grower; Mike Peel, Marcia McMullen, and Scott Meyer, NDSU Extension Service, Fargo; and Emmett Lampert, Syngenta Crop Protection, Inc. The objective of the project was to evaluate a number of fungicide treatments on several varieties of winter wheat for leaf disease and head scab control. The project was supported, in part by Ducks Unlimited and Syngenta Crop Protection, Inc.

Materials and Methods:

Mike Peel planted seven winter wheat varieties on Sept. 19, 2000 at the Randy Mairs farm near Lisbon, ND (Table 1A). The site of the plots had been planted to barley in 2000, to sunflower in 1999, and to corn in 1998. Starter fertilizer was applied at planting at the rate of 35 lbs of 18-46-0. Randy Mairs broadcast applied 275 lbs of 46-0-0 on May 5, 2001. An application of Express with MCP herbicide was made at late tillering for weed control. Emmett Lampert of Syngenta applied the Tilt fungicide treatments. Treatments were applied across the varieties at several growth stages as split applications or as one application (Table 1B). The total plot area was approximately 12,000 square feet; with plots arranged in a split plot design with treatments as the main plots and varieties as sub-plots. Marcia McMullen took the Fusarium head blight (scab) and leaf disease ratings on July 11, 2001 at the soft to mid-dough stage of kernel development. Mike Peel and Scott Meyer harvested plots on Aug. 4, 2001.

Table 1. Varieties and Fungicide Treatments, Winter Wheat, Lisbon, ND 2001

A. Varieties	B. Fungicide Treatments	
Arapahoe	Product	Rate and Growth Stages Applied
CDC Falcon	Untreated control	-----
Crimson	Tilt	1 fl oz at jointing (Feekes 4-6) + 3 fl oz at head emergence (Feekes 10.5)
Harding	Tilt	4 fl oz at early flag leaf emergence (Feekes 8)
Ransom	Tilt	2 fl oz at early flag leaf (Feekes 8) + 2 fl oz at head emergence (Feekes 10.5)
Wesley	Tilt	4 fl oz at head emergence (Feekes 10.5)
2137		

Results:

Winter wheat varieties differed significantly in their response to Fusarium head blight (FHB = scab), fungal leaf spots (primarily tan spot and Septoria species), and leaf rust (Table 2) when evaluated in the untreated plots. The highest severities of FHB were observed in Wesley and 2137. The highest leaf spot disease severities were observed also in Wesley and 2137, followed closely by CDC Falcon and Ransom. Leaf rust severities were highest in Crimson, 2137, Arapahoe and Wesley, while CDC Falcon and Ransom had virtually no leaf rust or none. Some observations also were made of stem rust, but levels were very low and inconsistent across varieties.

Table 2. Disease response of varieties in untreated plots

Variety	FHB (scab) field severity *	Fungal leaf spots ** %	Leaf rust ** %
Arapahoe	1.5	5.8	9.8
CDC Falcon	9.2	14.4	0.3
Crimson	3.3	6.8	14.3
Harding	2.3	5.3	1.7
Ransom	1.7	13.4	0
Wesley	21.9	15	8
2137	24.2	15	10
LSD 0.05	8.2	8.3	9.1

* FHB field severity = incidence (% of tillers showing symptoms) x head severity (% of head with FHB symptoms)

** Fungal leaf spots primarily tan spot and Septoria species; leaf spot and leaf rust severity measured as % of flag leaf area covered by these diseases at soft dough stage

Treatment effects across varieties indicated that Treatment 2 (Tilt applied with 1 fl oz at jointing followed by 3 fl oz at head emergence) and Treatment 5 (4 fl oz Tilt at head emergence) resulted in the lowest field severity of FHB, although differences were not different statistically among treatments (Table 3). Treatments 2 and 5 also resulted in the lowest levels of fungal leaf spots on the flag leaf and were significantly better than the untreated control and treatment 3. For leaf rust, treatment 2 resulted in a significantly lower level than the untreated control, followed by treatment 5.

Winter survival ranged from 43% in the 2137 variety to 79% survival in Ransom. Because of the low winter survival of 2137, yield was quite low in this variety (38 bu/acre vs. 61 to 77 bu/acre across treatments for other varieties). The yield and test weights analyses for fungicide treatments shown in Table 3 do not include yield of 2137 because of its poor winter survival. The highest yield was achieved with a split application of Tilt, at jointing and at head emergence (Treatment 2) across varieties, but differences were statistically non-significant. The highest test weights were achieved with treatments 2, 4, and 5 (Table 3).

Table 3. Effect of treatment on disease, yield and test weight - across varieties

Trt #	Treatment	FHB field Severity *	% Leaf Spot **	% Leaf Rust **	Yield ** Bu/acre	Test wt. *** Lbs./bu
1	Untreated	9.2	10.8	6.3	66.7	58.4
2	Tilt (1 fl oz at jointing + 3 fl oz head emerg.)	6.4	3.5	1.1	73.3	59.0
3	Tilt (4 fl oz early flag)	7.2	7.1	2.9	64.8	58.7
4	Tilt (2 fl oz early flag + 2 fl oz head emerg.)	7.7	3.6	2.1	67	59.1
5	Tilt (4 fl oz at head emerg.)	6.4	3.5	2	69.2	59.0
	LSD 0.05	NS	3.3	4.6	NS	0.7

* FHB field severity = incidence (% tillers showing symptoms) x head severity (% of head with FHB symptoms)

** Fungal leaf spots primarily tan spot and Septoria species; leaf spot and leaf rust severity measured as % of flag leaf area covered by these diseases at soft dough stage

*** Yield and test weights across 6 of 7 varieties; 2137 not included because of poor winter survival

For individual varieties, the best fungicide treatments improved yield from 0 bushels (in Arapahoe) to 11.2 bu/acre in Harding, 12.5 bu/acre in Crimson, and 12.6 bu/acre in Ransom wheat (Table 4). It appears that a combination of control of FHB, fungal leaf spots, and/or leaf rust accounted for yield increases in these varieties (Tables 2 and 4). Although, Wesley had some of the highest disease levels in this study, the best fungicide treatment resulted in only an 8 bu/acre yield increase. Substantial variation in plot uniformity among replicates may have resulted in some non-significant differences in yields among treatments. Test weights with Wesley were quite low and reflect the level of disease damage. Test weight increases ranged from 0 lbs to 1.5 lbs/bu (Table 4) with fungicide treatment.

Table 4. Yield and test weights of varieties without fungicide and with best fungicide treatments

Variety	Untreated Yield	Yield with Treatment 2 *	Untreated Test Wt.	Test wt. With Treatment 2 *
Arapahoe	73.1	69.3	58.8	58.8
CDC Falcon	76.4	82.0	57.7	57.9
Crimson	56.1	68.6	59.6	60.9
Harding	66.0	77.2	58.9	60.4
Ransom	65.4	78.0	58.2	59.4
Wesley *	63.1	71.1*	56.9	57.5*

* Yield and Test Weight Response for Wesley are from treatment 5 = 4 fl oz Tilt at head emergence

Conclusions:

Variety Responses: Significant differences among winter wheat varieties in disease tolerance exist. Arapahoe, Ransom, Harding, and Crimson had the most tolerance to FHB, while Wesley and 2137 were quite susceptible. Arapahoe, Crimson and Harding had the most tolerance to fungal leaf spots, while Ransom, CDC Falcon and Harding had excellent resistance to leaf rust. The highest yield observed in the study was when fungicide treatment two was applied to CDC Falcon, giving 82 bu/acre. The greatest difference between untreated and a treatment was achieved with treatment two on Ransom wheat, with a 12.6 bu/acre increase. Higher yield increases, ranging from 10.6 to 29.5 bu/acre were achieved with fungicide treatment on 2137, but because of poor winter survival, yield results with this variety were unreliable.

Treatment Responses: Results indicate that a split application of Tilt with 1 fl oz at jointing followed by 3 fl oz at head emergence, or a 4 fl oz rate at head emergence provided the most consistent FHB and leaf disease control. *Greater FHB control may have been achieved if the heading treatments had been applied approximately a week later, at early flowering instead of early head emergence.* Leaf disease control appeared satisfactory with either treatment 2 or 5, but a single application of Tilt at early flag leaf emergence (Treatment 3) or a split application of half the full label rate at early flag leaf emergence and at early head emergence (Treatment 4) was *not* adequate to control both leaf and head diseases. Results indicate that fungicide treatments can significantly reduce disease in winter wheat and that certain varieties are more disease susceptible and will respond better to fungicide treatments than others.