North Dakota State University

Hettinger Research Extension Center

NDSU | HETTINGER RESEARCH EXTENSION CENTER

2017 Annual Report

2017 Table of Contents

NORTH DAKOTA **AGRICULTURE EXPERIMENT STATION**

Hettinger Research Extension Center

Hettinger REC Research in Brief

- Integrated crops, livestock, and range research and extension
- Variety, herbicide, and crop production research
- Lamb and beef feedlot nutrition and management
- Reproductive management of fall, winter, and spring lambing ewes
- Multiple-land use management including cropping systems, livestock, and wildlife as potential outputs
- Range monitoring techniques

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The Hettinger Research Extension Center (HREC) was established from a gift of 160 acres by the residents of Adams County and the city of Hettinger in 1909. Original work at the HREC involved converting native prairie to farm land for the purpose of agronomic research. In 1912, through cooperation with the United States Department of Agriculture, a dry land farming trial began. In 1913 a herd of Guernsey and Jersey cows and bulls was purchased to aid local producers in the production of replacement dairy cattle. Following a brief closure during the Depression, the HREC continued to grow the research programs, focusing on agronomy and sheep breeding. In 1947, an option was secured for the purchase of an extra quarter of land to continue and expand sheep and agronomy research. In the 1980's the research programs were solidified with the addition of land bringing the total owned land to 1130 acres, and the hiring of an agronomist.

The HREC is a semi-arid site located in southwest North Dakota, providing the most southerly NDSU location in the non-glaciated portion of North Dakota as a site for its agronomy research program. The HREC also is located at the center of the North Dakota sheep industry, the focus of one of its animal research programs. Furthermore, the HREC is located in an area of rapidly growing livestock feeding ventures, another focus of animal research at the HREC. Additionally, the HREC is located in a region where much of the land base is in the Conservation Reserve Program and Forest Service lands, which has resulted in additional research evaluating potential changes in the CRP program and how these changes may affect upland native and game bird populations. A new research program evaluating low-cost rangeland monitoring strategies on U.S. Forest Service lands has resulted in a significant increase in the quantity of rangeland, livestock, and wildlife interaction research conducted at the HREC throughout the western Dakotas. Research at HREC involves the disciplines of animal science, range and wildlife science agronomy, and weed science. Collaboration is with Main Station scientists, Branch Station scientists, U.S. Forest Service, grazing associations, university scientists from WY, SD, and MT, and USDA research entities in these research disciplines to improve the productivity of livestock and cropping systems and economic development of the region. Through these efforts, the center's research program has gained a national reputation for its involvement with sheep production systems as well as a strong regional and state reputation for its research in agronomy, multiple-land use, and calf backgrounding.

AGRONOMY and WEED SCIENCE

- Conducted crop variety and hybrid yield trials for 21 different crops at Hettinger along with off-station small grains trials at 4 locations. The 2016 ND spring wheat variety survey shows 51 percent of the acres in southwest ND were planted to varieties released in the past five years. The HREC variety testing program is an excellent source of unbiased information on new varieties to help farmers determine the optimal crop cultivars to plant.
- Evaluation of carinata, an oilseed mustard like canola, for adaptation to western ND for use biofuel production. This crop looks promising with yields of carinata being competitive with hybrid canola and having fewer problems with seed shatter.
- Conducted crop production studies including planting date and seeding rate on soybean, planting date and zinc fertilization to reduce cadmium uptake in durum wheat, and a study looking at the management of root rots in field peas with crop rotation
- Evaluation of new herbicides for crop safety and weed control in crops important to SW ND.
- Evaluation of herbicides for weed control on rangelands and their impact on the growth and establishment of desirable forages.

RANGE and LIVESTOCK SCIENCE

- Collaboration with the USDA-ARS evaluating the effects of woody cover and Kentucky Blue Grass encroachment on bird and butterfly abundance.

HREC Crops, Weeds, Livestock, and Range

- Evaluation of rangeland restoration and wildlife habitat opportunities on the Elkhorn Ranch near Medora, ND.
- Evaluate the ecological effects of integrating livestock herbivory and annual forages into a winter wheat cropping system.
- Evaluate alternative land management options on expiring CRP lands that integrate livestock, wildlife, and fire.

- Evaluated supplementation strategies during pregnancy and their effect on embryonic death loss, fetal development, and potential feedlot and reproductive performance of offspring.
- Continued research in “Value Added Animal Production”; a research program focused on evaluating forage, grain, byproduct, and marketing alternatives in calf backgrounding and lamb finishing.
- Evaluation of feeding and supplementation strategies that impact ram fertility.
- Conduct the Dakota Fall Performance Ram Test; a 140 day Rambouillet Certificate of Merit program, one of three Rambouillet Ram Tests in the nation.

OUTREACH and EXTENSION

- Contributed to NDSU Weed Control Guide.
- Conduct annually the HREC Beef Day, Sheep School, Shearing School, Wool Classing School, Carcass Ultrasound School, Crops Tours, Crops Day, and Soil Health and Wildlife Workshops.
- Published NDSU Sheep Research Report and Hettinger Crops Day Report and contributed to NDSU Beef and Range Report and Weed Research Report.
- Hired a new Area Livestock Extension Specialist who is developing a new Extension program for SW North Dakota focusing on cattle production systems.

HREC Research Faculty

Dr. Christopher Schauer, Director & Animal Scientist
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Mr. John Rickertsen, Agronomist
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Weather Summary - Hettinger

Frost Free Days

	28ºF	32ºF	Normal 32ºF
Date of Last Frost	May 4	May 30	May 18
Date of First Frost	October 3	October 4	September 20
Frost Free Days	**152**	**127**	**125**

Precipitation (inches)

Month	2012-13	2013-14	2014-15	2015-16	2016-17	62 Year Average
October	0.7	4.4	0.1	2.0	0.9	1.1
November	0.1	0.2	1.0	0.0	0.4	0.5
December	0.5	0.5	0.0	0.5	0.1	0.3
January	0.2	0.1	0.1	0.2	0.6	0.4
February	0.2	0.3	0.0	0.4	0.2	0.4
March	0.2	0.6	0.2	0.2	0.9	0.7
April	0.2	1.6	1.0	3.7	1.2	1.6
May	7.9	1.6	4.0	1.0	0.6	2.7
June	3.7	5.1	5.2	0.9	0.3	3.3
July	2.0	0.9	1.0	1.5	1.7	2.0
August	1.8	5.2	1.9	1.7	1.8	1.8
September	3.4	1.3	0.9	2.3	1.9	1.4
April-Sept.	**15.6**	**14.3**	**13.1**	**8.9**	**7.5**	**11.5**
Total	**20.7**	**21.7**	**15.4**	**14.4**	**10.6**	**16.3**

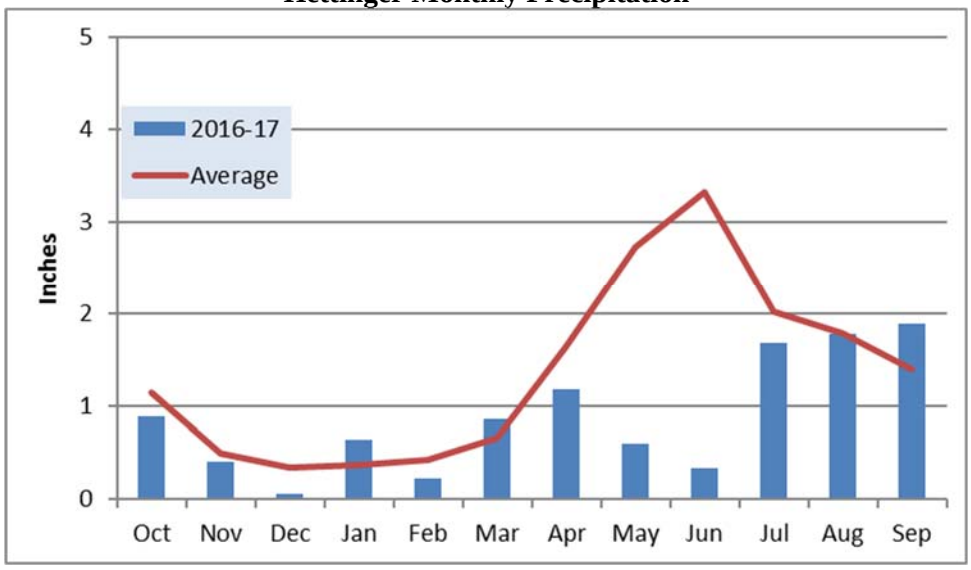
Air Temperature (ºF)

Month	2012-13	2013-14	2014-15	2015-16	2016-17	62 Year Average
October	42.1	39.7	46.6	48.5	48.1	45.6
November	32.4	28.8	21.3	32.4	39.5	30.1
December	18.5	12.9	23.4	23.9	10.1	19.5
January	18.3	16.6	21.6	20.1	11.8	15.6
February	26.7	10.1	19.1	32.0	24.6	20.2
March	27.4	26.5	38.0	38.8	34.1	29.3
April	35.5	39.1	43.2	44.2	43.6	42.5
May	53.5	52.8	50.2	54.2	55.2	53.6
June	61.7	59.5	64.6	68.7	66.1	63.2
July	68.1	66.4	70.4	72.0	76.3	70.1
August	69.5	66.0	69.3	69.0	66.8	68.7
September	62.5	56.4	64.1	60.7	58.2	58.0
Average	**43.0**	**39.6**	**44.3**	**47.0**	**43.0**	**43.0**

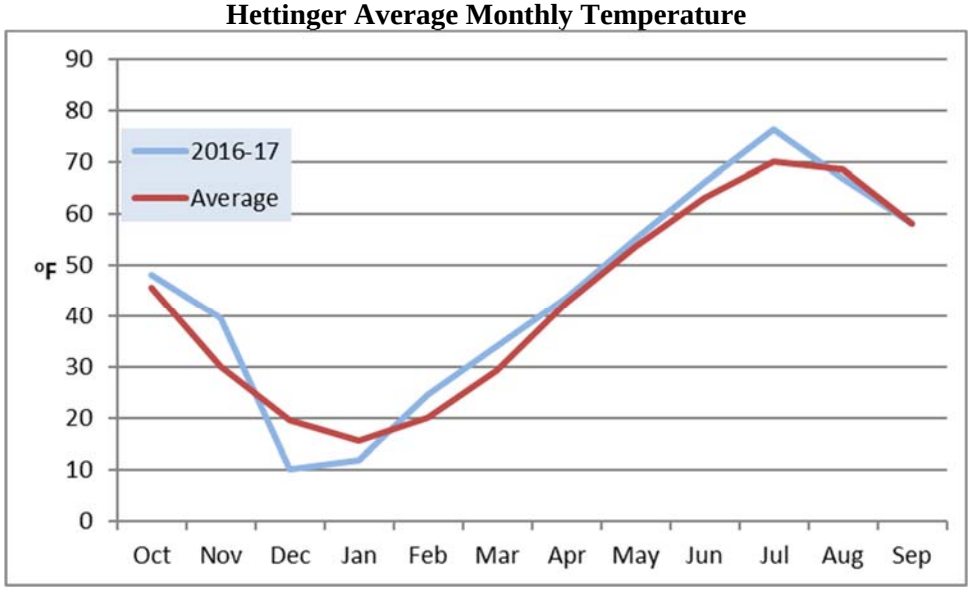
Corn Growing Degree Days (GDD)

Month	2013	2014	2015	2016	2017	45 Year Average
May	266	245	185	298	297	260
June	381	330	444	545	519	422
July	543	526	595	626	699	588
August	553	504	578	568	520	537
September	403	313	462	380	339	325
Total	**2146**	**1918**	**2264**	**2417**	**2374**	**2132**

Hettinger Monthly Precipitation



Hettinger Average Monthly Temperature



Trials Not Published

The following trials were not published in this report because of very poor yields and significant plot variation due to the drought. Trial average yields are reported below.

Trial	Average Yield
Hettinger Roundup Ready Canola VT	300 lb/ac
Hettinger Clearfield Canloa VT	273 lb/ac
Hettinger SU Canola VT	60 lb/ac
Hettinger Flax VT	3.6 bu/ac
Hettinger Lentil VT	355 lb/ac
Hettinger Clearfield Lentil VT	339 lb/ac
Hettinger Chickpea VT	460 lb/ac
Hettinger Safflower	Not harvested, very poor stands from wireworms.

Hard Red Spring Wheat - 2017 **Hettinger, ND**

Variety	Days to Head	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	DAP[1]	inches	0-9[2]	lbs/bu	%	---------- Bushels per acre ----------				
HRS 3419	65	23	0	59.7	13.4	86.8	54.7	41.2	48.0	60.9
Shelly	66	22	0	62.2	13.0	79.9	50.9	43.9	47.4	58.2
LCS Prime	61	24	0	63.2	13.3	80.4	49.1	39.2	44.2	56.2
Redstone	66	24	0	60.7	13.3	80.2	47.0	38.3	42.7	55.2
Faller	64	24	0	60.3	13.8	79.5	43.4	41.5	42.5	54.8
WB9653	64	23	0	61.7	14.4	77.9	45.8	39.4	42.6	54.4
LCS Nitro	64	23	0	59.5	13.1	82.6	44.9	35.4	40.2	54.3
Prevail	60	22	0	62.3	12.6	75.2	49.3	38.3	43.8	54.3
Surpass	59	22	0	61.2	13.1	76.0	49.7	36.7	43.2	54.1
Elgin ND	64	25	0	60.9	13.8	74.5	48.5	38.4	43.5	53.8
MS Chevelle	61	22	0	60.9	13.1	76.1	47.8	37.5	42.7	53.8
HRS 3530	64	27	0	59.8	13.9	79.6	43.7	35.9	39.8	53.1
SY Soren	63	22	0	61.4	14.1	71.9	50.1	36.5	43.3	52.8
SY Rowyn	61	22	0	61.6	13.7	74.3	48.8	33.3	41.1	52.1
SY Valda	61	23	0	61.1	13.8	71.5	49.6	35.1	42.4	52.1
SY Ingmar	64	23	0	62.0	14.4	67.0	48.1	39.9	44.0	51.7
Barlow	61	25	0	62.2	13.6	65.2	48.4	40.1	44.3	51.2
Boost	65	25	0	59.0	14.9	70.5	50.6	31.2	40.9	50.8
Prestige	60	23	0	60.7	13.8	72.6	45.8	32.6	39.2	50.3
Rollag	60	22	0	61.1	13.3	71.8	47.3	31.6	39.5	50.2
Mott	64	26	0	60.3	14.0	66.4	46.4	36.6	41.5	49.8
LCS Breakaway	61	23	0	62.6	13.0	64.1	48.4	34.8	41.6	49.1
Bolles	65	24	0	59.3	15.5	70.5	44.0	32.8	38.4	49.1
Prosper	65	25	0	60.6	12.8	70.4	36.0	39.5	37.8	48.6
Glenn	60	23	0	60.8	14.3	63.1	49.1	32.1	40.6	48.1
ND VitPro	60	24	0	62.1	14.8	64.1	48.1	31.9	40.0	48.0
Linkert	60	22	0	62.4	13.9	63.7	43.6	34.0	38.8	47.1
WB Mayville	60	22	0	61.5	14.2	60.1	45.9	32.6	39.3	46.2
LCS Trigger	67	24	0	61.8	12.1	--	55.7	44.5	50.1	--
TCG Spitfire	65	24	0	60.4	13.7	--	52.0	37.6	44.8	--
LCS Anchor	61	22	0	61.9	13.4	--	52.6	35.7	44.2	--
SY Rockford	65	24	0	59.1	13.6	--	48.7	39.3	44.0	--
HRS 3616	61	24	0	60.4	13.9	--	48.6	38.7	43.7	--
Lang MN	62	24	0	61.1	13.5	--	49.9	36.3	43.1	--
HRS 3504	64	22	0	61.3	14.7	--	48.3	32.7	40.5	--
TCG Cornerstone	63	23	0	60.3	14.3	--	43.2	32.1	37.7	--

Table continued on next page

Hard Red Spring Wheat - 2017 **Hettinger, ND**

Variety	Days to Head	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	DAP[1]	inches	0-9[2]	lbs/bu	%	---------- Bushels per acre ----------				
Table continues from previous page										
WB9719	62	23	0	62.3	13.5	--	--	43.4	--	--
AFK Astro (white)	61	23	0	61.1	11.5	--	--	37.9	--	--
WB9590	60	20	0	61.3	14.6	--	--	37.6	--	--
LCS Rebel	60	25	0	61.9	14.4	--	--	36.8	--	--
Dyna-Gro Ambush	60	25	0	61.6	13.7	--	--	36.3	--	--
HRS 3100	63	22	0	60.6	14.1	--	--	36.3	--	--
SY Rustler	60	22	0	59.6	13.6	--	--	34.9	--	--
TCG Climax	68	23	0	59.9	14.8	--	--	34.5	--	--
WB9479	61	21	0	62.3	15.0	--	--	34.4	--	--
Dyna-Gro Caliber	64	20	0	61.6	14.1	--	--	32.5	--	--
MS Camaro	62	22	0	60.8	13.9	--	--	31.4	--	--
Trial Mean	62	23	0	61.1	13.9	70.1	47.3	35.8	42.2	52.3
C.V. %	1.7	5.4	--	1.6	4.1	4.8	7.1	11.4	--	--
LSD 5%	1.4	1.7	--	1.4	0.8	4.7	4.7	5.7	--	--
LSD 10%	1.2	1.5	--	1.1	0.7	4.0	4.0	4.8	--	--

[1] Days to Head = the number of days from planting to head emergence from the boot.

[2] 0 = no lodging, 9 = 100% lodged.

Planting Date: April 17

Harvest Date: August 3

Previous Crop: Carinata

NDSU Hettinger Research Extension Center

Hard Red Spring Wheat - 2017 **Scranton, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
HRS 3419	24	0	54.0	17.3	68.5	48.5	16.2	32.4	44.4
Prevail	22	0	55.9	15.0	59.5	45.0	19.7	32.4	41.4
LCS Nitro	21	0	54.5	16.0	63.8	42.0	13.7	27.9	39.8
SY Soren	21	0	54.7	16.5	62.6	38.3	18.1	28.2	39.7
Elgin-ND	25	0	52.9	16.2	59.5	41.7	16.4	29.1	39.2
Barlow	25	0	56.7	16.2	59.5	41.1	15.2	28.2	38.6
Glenn	24	0	57.6	16.3	55.2	42.4	16.1	29.3	37.9
SY Rowyn	22	0	56.0	15.9	59.5	37.0	16.0	26.5	37.5
Mott	23	0	55.6	17.0	56.2	36.6	15.4	26.0	36.1
WB9653	21	0	54.7	16.0	--	41.2	16.9	29.1	--
HRS 3530	26	0	54.0	17.1	--	42.8	14.8	28.8	--
LCS Prime	24	0	56.4	15.2	--	41.1	14.4	27.8	--
SY Ingmar	23	0	53.6	16.8	--	38.2	14.1	26.2	--
Shelly	22	0	56.0	15.9	--	--	18.9	--	--
Surpass	22	0	54.9	15.1	--	--	17.9	--	--
TCG-Spitfire	23	0	53.8	16.5	--	--	17.8	--	--
LCS Anchor	20	0	56.9	15.7	--	--	17.4	--	--
Lang-MN	24	0	55.1	17.1	--	--	16.4	--	--
Redstone	23	0	54.3	17.5	--	--	13.9	--	--
LCS Trigger	21	0	53.1	16.7	--	--	13.8	--	--
SY Valda	21	0	55.8	16.7	--	--	13.8	--	--
Boost	24	0	55.0	16.3	--	--	13.7	--	--
ND-VitPro	22	0	55.5	16.6	--	--	13.7	--	--
MS Chevelle	21	0	55.0	15.3	--	--	13.5	--	--
Bolles	25	0	54.1	17.9	--	--	12.5	--	--
Trial Mean	23	0	55.0	16.4	60.6	40.7	15.6	28.6	39.4
C.V. %	5.4	--	2.1	2.3	5.8	9.7	16.5	--	--
LSD 5%	1.7	--	1.7	0.5	5.0	5.6	3.6	--	--
LSD 10%	1.4	--	1.4	0.4	4.1	4.6	3.0	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: April 27

Harvest Date: August 11

Previous Crop: Spring Wheat

NDSU Hettinger Research Extension Center

Hard Red Spring Wheat - 2017 **Regent, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
LCS Nitro	22	0	56.8	14.7	103.4	25.2	18.4	21.8	49.0
HRS 3419	24	0	56.3	15.6	98.8	24.2	15.9	20.1	46.3
SY Rowyn	21	0	57.7	14.9	92.0	31.2	13.8	22.5	45.7
Elgin-ND	25	0	56.5	15.6	82.4	35.3	18.8	27.1	45.5
Prevail	22	0	58.6	14.7	83.8	35.1	17.5	26.3	45.5
Mott	23	0	57.9	15.0	84.3	32.7	16.7	24.7	44.6
Barlow	24	0	60.2	14.6	82.4	31.5	17.7	24.6	43.9
SY Soren	22	0	58.2	15.3	82.5	32.9	15.4	24.2	43.6
Glenn	24	0	61.0	15.6	74.0	29.0	17.2	23.1	40.1
WB9653	21	0	58.3	15.1	--	38.1	20.1	29.1	--
SY Ingmar	24	0	59.5	15.8	--	35.2	19.8	27.5	--
LCS Prime	26	0	60.7	15.1	--	36.0	18.1	27.1	--
HRS 3530	25	0	57.3	15.7	--	36.9	14.5	25.7	--
MS Chevelle	22	0	59.8	15.8	--	--	21.3	--	--
LCS Trigger	22	0	57.7	15.2	--	--	20.7	--	--
Lang-MN	23	0	58.2	15.5	--	--	19.4	--	--
Boost	26	0	58.2	15.3	--	--	19.3	--	--
Surpass	22	0	59.2	15.6	--	--	19.0	--	--
Shelly	22	0	58.6	15.5	--	--	18.9	--	--
SY Valda	22	0	59.4	14.6	--	--	18.7	--	--
LCS Anchor	21	0	59.9	15.4	--	--	17.5	--	--
ND-VitPro	24	0	60.0	14.2	--	--	16.9	--	--
TCG-Spitfire	24	0	57.4	15.9	--	--	16.7	--	--
Bolles	26	0	57.1	14.7	--	--	15.5	--	--
Redstone	23	0	56.8	14.8	--	--	15.4	--	--
Trial Mean	23	0	58.5	15.2	87.2	32.3	17.7	24.9	44.9
C.V. %	4.6	--	1.6	4.8	4.7	7.6	13.5	--	--
LSD 5%	1.5	--	1.3	1.0	4.9	3.5	3.4	--	--
LSD 10%	1	--	1.1	0.9	4.1	2.9	2.8	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: April 27

Harvest Date: August 11

Previous Crop: Spring Wheat

NDSU Hettinger Research Extension Center

Hard Red Spring Wheat - 2017 **Mandan, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
HRS 3419	27	0	52.4	15.2	39.4	73.5	18.3	45.9	43.7
LCS Nitro	23	0	52.0	16.0	33.2	67.6	19.9	43.8	40.2
Prevail	24	0	53.0	14.8	35.3	66.2	15.5	40.9	39.0
SY Rowyn	24	0	53.4	15.4	34.7	61.5	17.7	39.6	38.0
Elgin-ND	28	0	52.1	16.2	30.1	65.3	17.4	41.4	37.6
Mott	26	0	53.5	16.8	31.0	61.3	18.2	39.8	36.8
SY Soren	23	0	54.3	15.5	32.6	59.4	18.3	38.9	36.8
Barlow	27	0	51.4	15.3	31.9	60.9	16.0	38.5	36.3
Glenn	25	0	55.7	16.2	26.1	62.6	11.1	36.9	33.3
WB9653	24	0	52.5	14.3	--	70.1	23.7	46.9	--
HRS 3530	26	0	53.3	15.4	--	70.6	18.3	44.5	--
LCS Prime	24	0	55.0	13.9	--	70.0	18.4	44.2	--
SY Ingmar	23	0	54.1	15.8	--	58.8	20.5	39.7	--
LCS Trigger	26	0	54.6	14.8	--	--	28.7	--	--
TCG-Spitfire	26	0	53.6	15.6	--	--	23.2	--	--
MS Chevelle	24	0	53.8	14.4	--	--	22.6	--	--
Redstone	26	0	53.8	15.7	--	--	22.3	--	--
Lang-MN	25	0	53.8	15.8	--	--	21.1	--	--
LCS Anchor	22	0	53.9	15.6	--	--	19.9	--	--
SY Valda	23	0	53.4	14.7	--	--	19.1	--	--
Surpass	24	0	51.6	15.3	--	--	17.4	--	--
ND-VitPro	25	0	53.4	16.6	--	--	16.2	--	--
Boost	25	0	52.4	16.3	--	--	16.0	--	--
Shelly	22	0	54.6	15.3	--	--	15.0	--	--
Bolles	26	0	54.2	18.1	--	--	7.5	--	--
Trial Mean	25	0	53.4	15.6	32.8	64.2	18.5	41.6	38.0
C.V. %	5.1	--	3.0	4.4	8.9	7.6	15.7	--	--
LSD 5%	1.8		2.3	0.7	4.2	6.9	4.1	--	--
LSD 10%	1.5		1.9	0.6	3.5	5.7	3.4	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: May 3

Harvest Date: August 24

Previous Crop: Spring Wheat

Hard Red Winter Wheat - 2017 **Hettinger, ND**

Variety	Fall Stand	Spring Stand	Heading Date	Plant Height	Plant Lodge	Test Weight	Grain Protein	---- Grain Yield ---- 2015	2016	2017	Average Yield 2 yr	3 yr
	%	%		inches	0-9[1]	lbs/bu	%	---------- Bushels per acre ----------				
SY Wolf	90	90	6/2	32	0	63.4	12.6	96.8	69.0	93.9	81.5	86.6
Overland	90	90	6/1	36	0	64.3	12.1	86.3	72.4	91.7	82.1	83.5
Northern	90	90	6/6	31	0	60.7	12.9	84.0	68.3	78.9	73.6	77.1
Lyman	90	90	6/1	34	0	63.0	13.5	80.4	64.9	84.2	74.6	76.5
Ideal	90	90	6/3	33	0	64.2	12.1	80.8	57.3	88.2	72.8	75.4
Flourish	90	90	6/3	34	0	62.0	12.9	75.9	68.4	80.7	74.6	75.0
Peregrine	90	90	6/5	37	0	62.7	12.0	80.6	63.1	81.1	72.1	74.9
CDC Chase	90	90	6/4	37	0	62.9	12.1	83.7	56.3	81.3	68.8	73.8
WB4614	90	90	6/2	29	0	60.3	12.5	78.1	71.8	71.3	71.6	73.7
AC Emerson	90	90	6/6	33	0	62.2	13.1	86.9	63.0	70.6	66.8	73.5
AC Gateway	90	90	6/3	30	0	62.7	13.1	79.3	64.1	76.5	70.3	73.3
Redfield	90	90	6/2	29	0	63.3	13.0	78.4	60.2	79.2	69.7	72.6
Decade	90	90	6/3	32	0	62.5	12.9	81.1	58.0	76.2	67.1	71.8
AC Broadview	90	90	6/4	31	0	62.6	12.2	71.7	58.4	81.6	70.0	70.6
Moats	90	90	6/5	37	0	61.8	12.8	70.6	60.7	80.2	70.5	70.5
Accipiter	90	90	6/6	32	0	60.8	12.5	77.5	56.1	72.4	64.3	68.7
WB Matlock	90	90	6/5	34	0	62.0	13.2	75.2	55.7	71.1	63.4	67.3
Jerry	90	90	6/4	39	0	62.0	12.6	72.2	51.9	76.1	64.0	66.7
SY Monument	90	90	6/2	33	0	62.5	11.8	--	69.1	99.6	84.4	--
SY Sunrise	90	90	6/1	31	0	61.7	12.8	--	80.2	85.6	82.9	--
Ruth	90	90	5/31	35	0	64.3	12.6	--	63.2	91.0	77.1	--
Loma	90	90	6/7	30	0	57.5	13.5	--	69.7	71.5	70.6	--
Keldin	90	90	6/4	33	0	62.5	11.6	--	--	101.2	--	--
Oahe	90	90	6/1	39	0	63.7	12.3	--	--	83.1	--	--
Trial Mean	90	90	6/3	33	0.0	62.3	12.6	79.5	61.2	82.2	72.4	74.0
C.V. %	--	--	0.5	5.0	--	1.3	4.3	4.9	4.3	9.4	--	--
LSD 0.05	NS	NS	1.1	2.3	NS	1.1	0.8	6.9	4.8	10.8	--	--
LSD 0.10	NS	NS	0.9	2.0	NS	0.9	0.6	5.9	4.0	9.1	--	--

[1] 0 = no lodging, 9 = 100% lodged.

Planting Date: September 14

Harvest Date: July 17

Previous Crop: HRSW Green Fallow

Winter Rye - 2017 **Hettinger, ND**

Variety	Spring Stand	Heading Date	Plant Height	Plant Lodge	Test Weight	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	%		inches	0-9[1]	lbs/bu	---------- Bushels per acre ----------				
Dacold	90	6/1	50	0	54.2	87.8	72.9	76.6	74.8	79.1
ND Dylan	90	5/31	48	0	55.6	84.9	64.6	74.5	69.6	74.7
Hancock	90	5/28	50	0	56.6	73.7	59.9	66.1	63.0	66.6
Aroostok	90	5/25	50	0	57.2	54.3	45.6	53.2	49.4	51.0
Rymin	90	5/31	47	0	56.8	69.8	62.1	85.4	66.0	--
Brasetto	90	5/31	42	0	54.0	--	--	97.8	--	--
Hazlet	90	5/31	46	0	56.7	--	--	84.9	--	--
Spooner	90	5/29	53	0	57.6	64.4	57.3	61.4	--	--
Wheeler	90	6/1	53	0	54.3	--	--	50.8	--	--
Trial Mean	90	5/29	49	0	56.0	72.7	60.5	70.0	64.5	67.8
C.V. %	0	--	4.6	--	0.9	6.9	9.0	6.7	--	--
LSD 0.05	0.0	--	3.3	--	0.7	7.3	8.0	6.8	--	--
LSD 0.10	0.0	--	2.7	--	0.6	6.0	6.7	5.6	--	--

[1] 0 = no lodging, 9 = 100% lodged.
Planting Date: September 14
Harvest Date: July 12
Previous Crop: HRSW Green Fallow

NDSU Hettinger Research Extension Center

Durum Wheat - 2017 **Hettinger, ND**

Variety	Days to Head	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	DAP[1]	inches	0-9[2]	lbs/bu	%	---------- Bushels per acre ----------				
Joppa	71	28	0	56.3	12.9	78.8	41.1	35.7	38.4	51.9
ND Riveland	72	29	0	57.1	13.8	80.6	37.4	37.3	37.4	51.8
VT Peak	70	25	0	58.4	13.5	79.2	35.1	37.2	36.2	50.5
Tioga	70	26	0	57.9	14.4	81.5	34.3	33.8	34.1	49.9
Divide	71	25	0	57.2	13.9	82.6	33.4	33.5	33.5	49.8
Mountrail	71	25	0	57.7	13.2	76.6	31.8	38.9	35.4	49.1
ND Grano	71	26	0	57.4	14.0	75.8	33.8	35.7	34.8	48.4
Strongfield	71	26	0	56.7	14.2	70.7	35.5	38.9	37.2	48.4
Grenora	71	23	0	57.7	13.9	76.3	33.4	33.3	33.4	47.7
Carpio	71	26	0	55.1	13.6	71.6	32.2	36.5	34.4	46.8
CDC Verona	71	26	0	56.7	14.8	66.5	33.7	36.0	34.9	45.4
Alkabo	72	25	0	57.1	13.5	70.0	33.3	32.6	33.0	45.3
Lebsock	69	24	0	58.4	13.0	60.6	35.6	37.8	36.7	44.7
AC Commander	70	24	0	58.4	14.4	59.7	35.0	38.0	36.5	44.2
AC Navigator	71	25	0	59.4	14.3	56.2	36.3	37.3	36.8	43.3
Ben	68	26	0	58.1	14.7	60.5	31.6	35.1	33.4	42.4
Pierce	71	27	0	56.3	13.7	55.3	35.1	34.7	34.9	41.7
Maier	69	25	0	56.7	14.8	59.3	30.4	33.5	32.0	41.1
Rugby	68	27	0	56.3	14.3	59.3	25.5	34.1	29.8	39.6
Alzada	68	25	0	56.3	13.6	41.7	34.4	34.0	34.2	36.7
Trial Mean	70	26	0	57.3	14.0	73.5	35.1	36.1	35.5	46.77
C.V. %	1.1	5.1	--	2.5	3.4	6.2	17.2	9.7	--	--
LSD 5%	1.1	1.9	NS	2.0	0.7	6.4	8.4	4.9	--	--
LSD 10%	0.9	1.6	NS	1.7	0.6	5.3	7.1	4.1	--	--

[1] Days to Head = the number of days from planting to head emergence from the boot.

[2] 0 = no lodging, 9 = 100% lodged.

Planting Date: April 7

Harvest Date: July 24

Previous Crop: HRSW Green Fallow

Durum Wheat - 2017 **Scranton, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	inches	0-9[1]	lbs/bu	%	---------- Bushels per acre ----------				
Mountrail	23	0	*	16.5	63.1	42.7	8.5	25.6	38.1
Tioga	23	0	*	17.3	62.1	42.6	9.6	26.1	38.1
Joppa	22	0	56.8	16.1	60.1	40.8	10.0	25.4	37.0
Divide	24	0	*	16.6	62.0	38.1	8.5	23.3	36.2
Carpio	21	0	53.6	16.9	56.5	38.0	10.3	24.2	34.9
Alkabo	23	0	56.6	16.0	58.4	34.7	8.7	21.7	33.9
Trial Mean	23	0	55.1	16.6	60.4	39.5	9.8	24.4	36.4
C.V. %	4.9	--	--	1.7	6.0	8.4	20.2	--	--
LSD 5%	1.7	NS	--	0.4	5.5	5.0	2.9	--	--
LSD 10%	1.4	NS	--	0.3	4.6	4.1	2.4	--	--

[1] 0 = no lodging, 9 = 100% lodged.

* Not enough sample for a test weight.

Planting Date: April 27

Harvest Date: August 11

Previous Crop: Spring Wheat

Durum Wheat - 2017 **Regent, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	inches	0-9[1]	lbs/bu	%	---------- Bushels per acre ----------				
Divide	25	0	60.4	15.1	89.0	31.3	14.5	22.9	44.9
Tioga	25	0	60.1	15.8	89.2	31.1	13.1	22.1	44.5
Joppa	25	0	60.2	14.6	88.0	29.9	12.9	21.4	43.6
Carpio	23	0	59.1	15.3	88.0	29.3	12.3	20.8	43.2
Mountrail	25	0	59.2	14.8	80.5	32.3	15.6	24.0	42.8
Alkabo	24	0	60.1	14.9	83.0	26.6	9.8	18.2	39.8
Trial Mean	24	0	59.9	15.1	47.4	86.3	13.3	21.6	43.1
C.V. %	3.3	--	1.6	1.9	9.3	2.6	16.5	--	--
LSD 5%	1.2	NS	1.4	0.4	5.5	3.4	3.2	--	--
LSD 10%	1.0	NS	1.1	0.4	4.6	2.8	2.7	--	--

[1] 0 = no lodging, 9 = 100% lodged.

Planting Date: April 27

Harvest Date: August 11

Previous Crop: Spring Wheat

NDSU Hettinger Research Extension Center

Durum Wheat - 2017 **Mandan, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	inches	0-9[1]	lbs/bu	%	---------- Bushels per acre ----------				
Mountrail	26	0	49.5	15.3	24.8	73.6	25.5	49.6	41.3
Joppa	27	0	48.9	15.2	26.2	69.8	24.9	47.4	40.3
Tioga	29	0	51.0	15.8	26.9	72.9	19.9	46.4	39.9
Carpio	27	0	51.9	16.1	26.7	70.2	21.6	45.9	39.5
Divide	28	0	50.9	16.3	28.9	70.7	15.9	43.3	38.5
Alkabo	26	0	49.1	16.0	25.3	62.5	20.2	41.4	36.0
Trial Mean	27	0	50.4	15.9	26.5	70.0	21.3	45.6	39.3
C.V. %	2.9	--	2.6	1.7	9.1	4.8	12.3	--	--
LSD 5%	1.2	NS	2.1	0.4	3.6	5.1	3.9	--	--
LSD 10%	1.0	NS	1.6	0.3	3.0	4.2	3.2	--	--

[1] 0 = no lodging, 9 = 100% lodged.

Planting Date: May 3

Harvest Date: August 24

Previous Crop: Spring Wheat

NDSU Hettinger Research Extension Center

Barley - 2017 **Hettinger, ND**

Variety	Days to Head	Plant Height	Plant Lodge	Plump	Test Weight	Grain Protein	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	DAP[1]	inches	0-9[2]	%	lbs/bu	%	---------- Bushels per acre ----------				
TWO ROW											
CDC Meredith	76	19	0	62	37.7	11.9	110.0	68.2	41.6	54.9	73.3
Pinnacle	75	21	0	79	43.1	11.5	103.5	64.6	49.4	57.0	72.5
ND Genesis	77	22	0	80	43.7	11.2	103.2	69.0	40.0	54.5	70.7
Conlon	71	22	0	85	43.1	11.3	82.6	60.4	24.2	42.3	55.7
ABI Balster	75	21	0	73	43.4	12.3	--	73.2	53.0	63.1	--
LCS Genie	77	21	0	76	45.9	10.9	--	67.0	53.7	60.4	--
Sirish	76	19	0	75	45.6	11.3	--	71.4	48.6	60.0	--
LCS Odyssey	77	19	0	82	46.4	10.5	--	70.7	47.1	58.9	--
AAC Synergy	75	21	0	79	43.5	10.7	--	75.7	41.8	58.8	--
ABI Growler	76	19	0	69	41.9	12.9	--	68.0	34.7	51.4	--
Explorer	74	19	0	82	44.3	11.1	--	--	57.8	--	--
SIX ROW											
Stellar-ND	71	21	0	74	42.2	11.6	86.6	62.5	47.5	55.0	65.5
Lacey	73	21	0	75	44.5	11.5	84.3	59.5	49.9	54.7	64.6
Tradition	74	24	0	77	44.7	11.8	83.9	63.3	46.3	54.8	64.5
Innovation	74	21	0	78	44.5	12.1	87.2	62.1	40.4	51.3	63.2
Celebration	74	21	0	80	43.6	12.4	76.4	61.4	47.9	54.7	61.9
Quest	71	22	0	76	43.3	11.6	66.2	64.4	52.1	58.3	60.9
Trial Mean	74	21	0	77	43.7	11.5	90.7	67.7	45.4	56.3	66.3
C.V. %	1.2	6.9	--	5.2	4.2	6.3	5.4	7.5	15.0	--	--
LSD 5%	1.3	2.0	NS	5.7	2.6	1.0	6.9	7.2	9.6	--	--
LSD 10%	1.1	1.7	NS	4.8	2.1	0.9	5.8	6.0	8.0	--	--

[1] Days to Head = the number of days from planting to head emergence from the boot.

[2] 0 = no lodging, 9 = 100% lodged.

Planting Date: April 7

Harvest Date: July 24

Previous Crop: Carinata

Barley - 2017 **Scranton, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
TWO ROW									
ND Genesis	24	0	29.8	18.3	85.2	66.5	11.3	38.9	54.3
Pinnacle	23	0	41.7	17.0	79.7	56.7	11.0	33.9	49.1
CDC Meredith	22	0	30.2	19.1	--	57.5	9.5	33.5	--
SIX ROW									
Innovation	22	0	35.9	18.3	78.6	60.8	12.1	36.5	50.5
Tradition	23	0	36.3	17.7	--	59.8	12.1	36.0	--
Trial Mean	23	0	34.8	18.1	77.6	60.3	11.2	35.7	51.3
C.V. %	6.0	--	6.4	7.1	8.2	10.2	23.1	--	--
LSD 5%	2.1	NS	3.5	2.0	9.6	9.4	4.0	--	--
LSD 10%	1.7	NS	2.8	1.6	8.0	7.7	3.3	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: April 27

Harvest Date: August 11

Previous Crop: Spring Wheat

Barley - 2017 **Regent, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
TWO ROW									
ND Genesis	23	0	45.2	14.1	112.1	39.7	19.3	29.5	57.0
Pinnacle	23	0	46.5	14.7	106.1	24.5	17.4	21.0	49.3
CDC Meredith	22	0	41.4	16.1	--	44.1	19.1	31.6	--
SIX ROW									
Innovation	22	0	46.3	15.5	84.8	27.4	19.5	23.5	43.9
Tradition	23	0	46.7	15.2	--	30.8	21.1	26.0	--
Trial Mean	23	0	45.2	15.1	93.2	33.3	19.3	26.3	50.1
C.V. %	6.0	--	3.2	2.8	8.0	18.8	27.4	--	--
LSD 5%	2.1	NS	2.2	0.7	11.3	9.6	8.1	--	--
LSD 10%	1.7	NS	1.8	0.5	9.4	7.9	6.6	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: April 27

Harvest Date: August 11

Previous Crop: Spring Wheat

NDSU Hettinger Research Extension Center

Barley - 2017 **Mandan, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
TWO ROW					**	**			
CDC Meredith	22	0	33.3	15.8			22.3	--	--
Pinnacle	23	0	31.1	15.3			20.3	--	--
ND Genesis	25	0	30.2	13.7			19.1	--	--
SIX ROW									
Innovation	24	0	29.1	15.9			6.6	--	--
Tradition	25	0	31.8	15.9			7.2	--	--
Trial Mean	24	0	31.2	15.3			15.1	--	--
C.V. %		--						--	--
LSD 5%		NS						--	--
LSD 10%		NS						--	--

* 0 = no lodging, 9 = 100% lodged.

** Mandan location was destroyed by wildlife in 2015 & 2016

Planting Date: May 3

Harvest Date: August 24

Previous Crop: Spring Wheat

NDSU Hettinger Research Extension Center

Oat - 2017 **Hettinger, ND**

Variety	Days to Head	Plant Height	Plant Lodge	Test Weight	----- Grain Yield ----- 2015	2016	2017	Average Yield 2 yr	3 yr
	DAP[1]	inches	0-9[2]	lbs/bu	---------- Bushels per acre ----------				
AC Pinnacle	72	31	0	34.2	180.4	77.4	79.5	78.5	112.4
Rockford	71	31	0	35.4	186.3	65.3	76.2	70.8	109.3
GM423	74	31	0	29.2	182.0	65.1	75.0	70.1	107.4
CDC Minstrel	73	28	0	31.8	186.3	65.9	66.6	66.3	106.3
CDC Dancer	72	29	0	35.7	177.4	62.4	72.4	67.4	104.1
Deon	72	31	0	34.5	173.0	64.0	70.9	67.5	102.6
Souris	71	28	0	34.3	169.5	64.0	74.2	69.1	102.6
Killdeer	70	27	0	35.0	186.8	61.6	58.2	59.9	102.2
Newburg	68	31	0	33.1	181.6	63.9	57.5	60.7	101.0
Leggett	73	31	0	33.4	174.5	61.5	65.6	63.6	100.5
HiFi	72	30	0	31.3	180.7	61.6	57.5	59.6	99.9
Jury	68	32	0	34.7	175.8	55.5	58.0	56.8	96.4
Otana	72	31	0	34.3	156.2	63.8	67.2	65.5	95.7
Stallion	72	31	0	36.5	160.5	59.6	58.2	58.9	92.8
Beach	73	31	0	34.1	164.8	59.6	50.9	55.3	91.8
Hytest	69	35	0	36.0	144.7	53.7	63.5	58.6	87.3
Paul (hull-less)	74	33	0	34.7	149.4	46.2	39.3	42.8	78.3
Hayden	70	29	0	35.8	--	68.9	75.4	72.2	--
CS Camden	73	31	0	31.5	--	--	73.3	--	--
Trial Mean	71	30	0	33.7	176.5	62.8	62.3	62.9	100.5
C.V. %	1.2	10.8	--	3.6	5.6	9.1	**26.0**	--	--
LSD 5%	1.2	4.6	NS	1.7	13.8	8.0	22.7	--	--
LSD 10%	1.0	3.8	NS	1.4	11.6	6.7	19.0	--	--

[1] Days to Head = the number of days from planting to head emergence from the boot.

[2] 0 = no lodging, 9 = 100% lodged.

Planting Date: April 6

Harvest Date: August 3

Previous Crop: Barley

NDSU Hettinger Research Extension Center

Oil Type Sunflower - 2017 **Hettinger, ND**

Company/Brand	Hybrid	Oil Type & Traits	Days to Bloom	Plant Height	Lodging	Test Weight	Oil Content	Grain Yield 2017	Grain Yield 2-Year	Grain Yield 3-Year
		*	**	inches	%	lbs/bu	%	--------lbs/ac--------		
Croplan	3732	NS	73	38	2	25.7	39.8	1581	--	--
Croplan	3845 HO	HO	73	41	15	25.6	41.8	1944	--	--
Croplan	432 E	NS, EX, DM	66	43	16	25.9	36.5	1893	2121	2128
Croplan	455 E HO	HO, EX, DM	71	38	24	24.9	39.0	1562	2107	--
Croplan	458 E HO	HO, EX, DM	70	38	17	24.7	38.7	1924	2255	2453
Croplan	545 CL	NS, CL, DM	73	43	18	24.9	38.4	1878	2427	2828
Croplan	549 CL	HO, CL, DM	69	48	25	26.3	39.6	1875	2225	2565
Croplan	568 CL HO	HO, CL, DM	75	41	33	25.1	40.0	1820	--	--
Croplan	7717 CL HO	HO, CL	69	49	34	26.2	41.6	1825	2098	2422
Croplan	7919 CL HO	HO, CL, DM	73	47	14	25.0	41.4	2467	2698	--
Mycogen	8D310CL	TR, CL	74	47	18	24.0	35.7	1692	1857	2254
Mycogen	8H449CLDM	HO, CL, DM	72	38	16	28.4	42.8	2011	2441	2906
Mycogen	E83529CL	HO, CL, DM	80	47	6	24.6	39.4	1994	--	--
Mycogen	MY8H456CL	HO, CL, DM	74	43	15	25.2	42.9	2132	--	--
Nuseed	Badger DMR	NS, CL, DM	69	45	9	25.5	35.2	2172	2136	2196
Nuseed	Camaro II	NS, CL, DM	72	45	18	26.6	40.0	2065	2239	2585
Nuseed	Falcon	NS, EX	72	42	6	25.2	39.5	1996	2144	2477
Nuseed	Hornet	HO, CL, DM	74	44	26	25.0	42.1	2260	2764	3240
Nuseed	N4HM340	HO, CL, DM	75	43	14	23.8	38.6	1993	--	--
Nuseed	N4HM354	NS, CL, DM	70	42	15	26.2	42.1	2111	2550	--
Nuseed	N4HP470	HO, CLP, DM	73	47	8	26.2	44.2	2535	--	--
Nuseed	N5LM307	NS, CL	68	44	10	23.8	36.0	1803	2008	--
Nuseed	NHK12S111	HO, EX	69	43	10	24.8	39.8	1884	--	--
Proseed	12G25 CL	HO, CL	71	41	11	26.1	43.8	1806	2304	--
Proseed	E 50016 CL	NS, CL	74	38	26	24.5	39.3	1547	--	--
Proseed	E-21 CL	NS, CL, DM	73	47	34	23.5	35.8	1602	--	--
Proseed	E-31 CL	NS, CL, DM	71	46	23	23.4	35.9	1967	2181	2229
Proseed	E-362436	NS, CL, DM	70	49	13	26.8	40.3	1919	--	--
Proseed	E-71 CL	NS, CL, DM	74	45	14	22.6	35.3	1585	--	--
Proseed	E-72	NS	76	52	13	24.1	41.8	1881	--	--
Proseed	E-73 CL	NS, CL, DM	74	41	14	22.3	37.9	1763	--	--
Thunder Seed	11N94	NS, CL, DM	74	44	9	26.2	40.3	1817	--	--
Thunder Seed	12N92	NS, CL, DM	69	42	5	25.2	40.5	2010	--	--
Thunder Seed	35H92	HO, CL, DM	70	44	14	25.7	41.0	1823	--	--
Thunder Seed	42H94	HO, CL, DM	76	48	15	25.3	42.5	2343	--	--
USDA (CK)	Honeycomb NS	NS	62	41	4	25.7	36.6	791	1154	1368
USDA (CK)	894	TR	71	46	9	24.9	38.8	1897	2083	2394
Croplan (CK)	450 E HO	HO, EX, DM	72	41	11	24.7	38.9	1996	--	--
Croplan (CK)	559CL	NS, CL, DM	73	47	23	25.4	40.5	2162	2261	--
Mycogen (CK)	8N270CLDM	NS, CL, DM	64	40	25	25.9	40.5	1659	1908	2103
Trial Mean			72	44	16	25.1	39.6	1900	2188	2410
C.V. %			5.3	9.4	9.7	3.1	4.1	20.6	--	--
LSD 5%			2.3	5.8	13.6	1.1	2.3	547	--	--
LSD 10%			1.9	4.8	11.3	0.9	1.9	458	--	--

* Type: TR-Traditonal, NS-NuSun, HO-High Oleic, CL=Clearfield, EX=ExpressSun, DM=Downy Mildew Resistant

** Days after planting.

Planting Date: May 31 Harvest Date: October 27 Previous Crop: Wheat

Dry Bean - 2017 **Hettinger, ND**

Variety	Type	Maturity	Plant Height	Plant Lodge	Test Weight	Grain Yield 2015	Grain Yield 2016	Grain Yield 2017	Average Yield 2 yr	Average Yield 3 yr
		DAP[1]	inches	0-9[2]	lbs/bu	lbs per acre	lbs per acre	lbs per acre	lbs per acre	lbs per acre
LaPaz	Pinto	105	21	5	58.4	2024	1318	1507	1413	1616
Lariat	Pinto	110	23	7	58.4	2021	1252	1140	1196	1471
Maverick	Pinto	102	21	5	58.7	1714	1070	1386	1228	1390
Monterrey	Pinto	102	21	4	59.1	--	1454	1496	1475	--
ND-307	Pinto	102	21	5	55.9	1735	1122	1214	1168	1357
Palomino	Pinto	111	20	5	57.7	1809	1099	1282	1191	1397
Stampede	Pinto	105	22	5	56.6	2028	1382	1415	1399	1608
Windbreaker	Pinto	104	18	5	57.2	1699	1069	1110	1090	1293
HMS Medalist	Navy	104	19	2	64.2	1597	1282	1466	1374	1448
T9905	Navy	104	18	3	62.5	1744	1438	1652	1545	1611
Merlot	Sm Red	104	23	4	60.2	1802	1230	1449	1340	1494
Rosetta	Pink	101	22	3	61.6	--	1261	1597	1429	--
Eclipse	Black	102	18	2	62.8	1791	1429	1451	1440	1557
Loreto	Black	104	18	3	64.5	1618	1284	1298	1291	1400
Zorro	Black	106	17	2	62.3	1986	1333	1391	1362	1570
Powderhorn	Great Northern	100	18	2	58.6	--	--	1900	--	--
Trial Mean		105	20	4	60.0	1746	1226	1427	1329	1478
C.V. %		1.5	6.2	18.1	1.6	7.3	9.8	13.1	--	--
LSD 5%		2.7	1.8	0.9	1.4	181	170	266	--	--
LSD 10%		2.2	1.5	0.8	1.2	151	142	222	--	--

[1] Days after planting.

[2] 0 = no lodging, 9 = lying flat on ground.

Planting Date: June 2

Harvest Date: October 4

Previous Crop: Soybean

Field Pea - 2017 **Hettinger, ND**

Variety	Days to Flower	Flower Duration	Days to Mature	Canopy Height	Seed Protein	1,000 Seed Wt.	Seeds Lb	Test Weight	Seed Yield 2017	Seed Yield 2-Yr. Avg.	Seed Yield 3-Yr. Avg.
	DAP[1]	days	DAP[1]	inches	%	gm	seeds	lb/bu	bu/a	bu/a	bu/a
Yellow Cotyledon Type											
Agassiz	48	18	78	15	29.4	170	2668	*	12.1	16.3	27.8
Bridger	47	16	74	13	26.2	158	2872		12.7	15.6	26.8
DS Admiral	49	16	76	14	27.9	177	2569		13.0	16.0	30.0
Durwood	48	17	76	15	27.9	172	2640		14.0	18.1	--
Gunner	50	16	77	16	29.2	165	2756		12.6	18.4	27.4
Hyline	51	13	75	12	28.3	170	2675		11.9	14.7	26.2
Korando	45	18	74	12	26.3	200	2268		14.4	--	--
LG Amigo	47	17	75	12	26.3	158	2883		13.8	--	--
LGPN4906	48	17	76	15	28.2	171	2660		12.7	15.7	--
LGPN4908	45	18	74	12	26.4	179	2537		11.6	--	--
LGPN4909	45	18	74	12	27.3	192	2366		14.0	--	--
LGPN4910	50	15	76	14	27.7	165	2750		10.4	--	--
Majestic	50	15	76	14	27.9	172	2644		10.7	--	--
Mystique	50	15	76	14	27.8	167	2715		13.1	16.7	--
Navarro	45	18	74	12	26.6	189	2398		14.5	17.3	--
Nette 2010	46	18	75	15	26.1	168	2710		14.4	17.1	30.7
PUSA 0628	45	18	74	13	25.8	215	2110		14.4	--	--
Salamanca	49	16	76	14	27.8	178	2556		14.7	17.8	28.2
Spider	51	16	78	16	29.2	178	2546		10.7	13.5	26.9
SW Midas	50	15	76	13	28.5	145	3133		14.6	15.1	28.4
Green Cotyledon Type											
Aragorn	46	18	75	12	26.2	151	3001		11.7	--	--
Arcadia	47	16	75	12	26.6	143	3182		12.4	15.0	--
Bluemoon	48	16	75	14	28.1	184	2461		11.5	--	--
CDC Striker	48	17	76	13	26.6	147	3087		13.1	14.5	26.8
Cruiser	48	17	76	13	26.8	148	3057		13.1	14.0	25.3
Ginny	47	17	75	13	26.9	153	2970		10.6	--	--
Greenwood	46	19	76	13	25.9	146	3116		12.0	--	--
LG Koda	51	13	75	13	27.3	170	2667		12.7	--	--
LGPN1125	50	13	74	13	27.4	184	2466		12.4	--	--
LGPN1904	51	15	77	15	28.6	166	2737		13.4	17.3	--
LGPN1906	45	18	74	14	26.2	188	2417		13.4	--	--
Shamrock	52	14	77	13	26.8	153	2964		11.3	--	--
Viper	46	17	74	15	27.1	172	2647		13.2	15.5	--
Marrowfat Type											
Orka	47	16	74	14	26.3	253	1795		11.4	--	--
Trial Mean	48	16	75	13	27.3	172	2677		12.7	15.8	27.7
C.V. %	1.1	6.2	1.1	12.8	1.5	3.2	3.2		14.8	--	--
LSD 5%	0.7	1.4	1.2	2	0.6	8	121		2.6	--	--
LSD 10%	0.6	1.2	1.0	2	0.5	6	101		2.2	--	--

[1] Days after planting.

* Not enough sample for a test weight.

Planting Date: April 28

Harvest Date: July 26

Previous Crop: Spring Wheat

NDSU Hettinger Research Extension Center

Soybean - Roundup Ready - 2017 **Hettinger, ND**

Company/Brand	Variety	Maturity	Mature Date	Plant Height	Test Weight	Seed Oil	Seed Protein	Yield 2017	Average Yield 2-Yr	Average Yield 3-Yr
				inches	lbs/bu	%	%			
Proseed	40-07	0.07	9/6	18	52.8	17.1	30.1	17.4	--	--
Proseed	50-10	0.1	9/14	23	53.5	18.0	31.1	25.1	--	--
Proseed	30-20	0.2	9/13	23	52.3	17.9	32.6	26.3	26.6	35.1
Integra	20300	0.3	9/17	21	54.3	16.2	33.9	25.2	26.1	34.2
Integra	50319N Xtend	0.3	9/17	21	53.9	16.9	32.3	21.9	--	--
REA Hybrids	RX0327	0.3	9/17	21	53.4	17.9	31.4	23.5	--	--
Proseed	40-50	0.5	9/21	23	54.9	16.1	34.1	24.5	--	--
Proseed	50-60	0.6	9/23	22	54.5	16.2	33.7	24.5	--	--
Integra	20617N	0.6	9/23	22	55.0	16.4	33.3	26.0	--	--
Integra	50629N Xtend	0.6	9/25	22	55.2	16.3	32.8	22.8	--	--
REA Hybrids	RX0628	0.6	9/23	22	54.5	16.3	33.2	23.4	--	--
REA Hybrids	RX1027	1	9/26	20	55.8	17.3	31.4	21.3	--	--
Trial Mean			9/19	21	54.2	16.9	32.5	23.5	26.3	34.7
C.V. %			0.1	6.2	1.2	2.4	2.6	11.0	--	--
LSD 5%			1.2	1.9	0.9	0.6	1.2	3.7	--	--
LSD 10%			1.0	2	0.8	0.5	1.0	3.1	--	--

Planting Date: May 23
Harvest Date: September 28, October 4
Previous Crop: Canola

Hettinger Soybean Planting Date Study

John Rickertsen, HREC, Hettinger, ND, 2017

Soybean acreage has increased over the years in North Dakota (ND) but mostly in the East. A recent realization that there is limited data on soybean production research in Western ND, amidst growing interest from farmers and stakeholders to start or expand production in Western, Central, and Northern, ND, has highlighted research needs to focus as well on areas often considered, marginally productive. Soybean is a profitable crop, useful in diversifying rotations and for use in later planting when wet conditions have not permitted timely small grain planting. Two critical decisions that farmers make each year that greatly affect yield potential and economic returns are, when to plant, and variety selection (maturity class). It is important to assess the performance of soybean maturity classes and planting west of the Missouri River, as the climate and soils are very different than the tradition soybean growing regions in eastern North Dakota. The objectives are therefore to facilitate the farmer's planting decisions, by assessing the performance of three soybean maturity classes in response to three planting dates and three plant populations across locations. Growth stages, and yields will be assessed for three varieties, three planting populations, across three planting dates in Hettinger, (Adams County), and Minot (Ward County, and Carrington (Foster County).

Three soybean varieties of three maturity classes were be planted in 2015, 2016 and 2017 at Hettinger (dryland), Minot (dryland), and Carrington (dryland and irrigated) to assess growth performance and grain yields. For Hettinger the planting dates were May 4, May 19 and June 2. In 2017, three planting densities of 200,000, 175000, and 150,000 plants/ac were evaluated for each variety. Data was recorded on flowering, height, maturity date, yield, test weight, seed protein and seed oil content.

The results in the following tables shown May19 to have the highest yields followed my May 4 then June 2. In 2015 and 2016 planting date had no impact on test weight, oil or protein. In 2017 test weights and protein increased and oil decreased with later planting dates. Seeding rates had no effect on yields. From the results so far, our recommendations is to plant soybean the second to third week of May for best yields and to allow soybeans to mature before fall freeze.

Soybean Planting Date - 2017 **Hettinger, ND**

Treatment	Mature Date	Harvest Date	Plant Height	Test Weight	Seed Oil	Seed Protein	Grain Yield
			inches	lbs/bu	%	%	bu/ac
Planting Date							
May 4	9/8	9/27	20	51.7	18.1	32.8	26.6
May 19*	9/20	10/3	22	53.4	17.3	33.8	26.3*
June 2	9/27	10/3	23	54.7	17.0	34.7	21.7
LSD 5%	1	--	1	0.7	0.3	0.3	2.7
Variety							
Proseed 30-20 (0.2)	9/14	10/1	21	52.6	17.8	34.2	19.9
Proseed 30-80 (0.8)	9/23	10/1	22	54.0	17.1	33.3	21.7
LSD 5%	1	--	1	0.6	0.2	0.2	2.3
Population							
150,000	9/18	10/1	22	53.3	17.4	33.8	21.2
175,000	9/18	10/1	22	53.1	17.6	33.8	20.0
200,000	9/18	10/1	22	53.4	17.4	33.7	21.1
LSD 5%	1	--	1	0.7	0.3	0.3	2.7
Trial Mean	9/18	--	22	53.3	17.5	33.8	20.8
C.V. %	0.1	--	7.8	2.4	2.6	1.5	22.3

*May 19 date had very poor stands from pheasant damage right after planting, which reduced yields for that date.

Subsituted yields for variety 30-20 from nearby soybean yield trial planted on May 19.

Soybean Planting Date Three Year Averages - 2015 - 2017 **Hettinger, ND**

Treatment	Mature Date	Harvest Date	Plant Height	Test Weight	Seed Oil	Seed Protein	Grain Yield
			inches	lbs/bu	%	%	bu/ac
Planting Date							
May 4	9/5	9/16	24.7	52.5	17.4	33.0	27.0
May 19*	9/14	9/22	24.3	53.2	17.2	33.3	31.0
June 2	9/19	9/27	24.3	52.8	17.0	33.6	26.3

* Used vareity 30-20 yield (26.3 bu/ac) from nearby soybean yield trial in 2017.

NDSU Hettinger Research Extension Center

Corn - 2017 **Hettinger, ND**

Company	Hybrid	Traits[1]	Relavtive Maturity[1]	Plant Height	Ear Height	Stalk Lodge	Moisture Content	Test Weight	Grain Yield 2017	Grain Yield 2-Yr
			days	inches	inches	%	%	lbs/bu	------bu/ac------	
Integra	2803	RR2, VT2P	78	69	19	0	12.8	46.1	40.9	--
Integra	3142	RR2, VT2P	81	66	17	0	13.4	45.4	43.1	--
Integra	3325	RR2, AV-3010A	83	64	17	0	25.2	44.9	58.7	95.2
Integra	3537	RR2, VT2P	85	69	18	0	16.3	42.1	56.0	93.2
Legacy	L-2314	RR2, VT2P	83	64	17	0	12.1	44.0	49.5	--
Legacy	L-2516	RR2, VT2P	85	67	19	0	12.4	44.8	65.5	101.5
Legacy	L-2643	RR2, VT2P	86	69	21	0	13.5	43.2	54.8	--
Legacy	L-2817	RR2, VT2P	87	71	17	0	14.6	42.4	51.9	--
Legacy	L-2847	RR2, VT2P	87	70	19	0	21.0	42.2	57.5	--
Proseed	1278	GT	78	72	19	0	15.0	45.4	40.1	--
Proseed	1480	RR2, VT2P	80	68	17	0	10.7	46.3	47.0	--
Proseed	1383	GT	83	70	16	0	11.6	44.1	46.1	90.1
Proseed	1483	RR2, VT2P	83	67	19	0	10.4	44.7	58.9	--
Proseed	1384	RR2, VT2P	84	71	17	0	11.3	46.5	53.7	85.9
Proseed	1185	RR2	85	75	22	0	12.7	41.6	54.6	--
Proseed	PX 787	RR2, VT2P	87	75	20	0	13.8	44.5	63.1	--
Trial Mean				69	18	0	14.2	44.3	52.6	93.2
C.V. %				5.3	14.6	--	21.1	3.0	15.3	--
LSD 5%				5.2	3.8	--	4.3	1.9	11.4	--
LSD 10%				4.3	3.2	--	3.6	1.6	9.5	--

[1] Traits and relavtive maturity provided by company.

Planting Date: May 19

Harvest Date: October 27

Previous Crop: Spring Wheat

Weed Control Trials in 2017

Caleb Dalley, HREC, Hettinger, ND, 2017

During the 2017 growing season, weed control trials were established in spring wheat, durum, barley, oats, canola, field pea, lentils, chickpea, faba bean, flax, and safflower, as well as several trials that were conducted postharvest. Unfortunately, due to the lack of rainfall, most of these trials offered limited amounts of useful information. During the months of May and June, there was less than one inch of total rainfall. Many of the trials were conducted to evaluate the potential use of preemergence applied herbicides for weed control in the previously mentioned crops. Lack of rainfall resulted in poor incorporation and activation of these herbicides and in no case did any of the tested herbicide treatments result in herbicide injury to the crops in which they were applied. Most preemergence herbicides require a minimum of a half-inch of rainfall to adequately incorporate and activate the herbicide. This activation is best when this rainfall comes as a single event, rather than accumulation of lesser amounts of rainfall spread over several days or weeks. Lack of rainfall also limited weed emergence and growth, limiting the amount of data that could be collected from trials evaluating postemergence applied herbicides. With the extreme drought conditions, most crop yields in trials were extremely low and variable. However, due to July and August rainfalls, that encouraged weed growth in fields that had already been harvested, several trials were conducted to evaluate post-harvest weed control. Trials being reported this year include a trial evaluating preemergence and early postemergence herbicides that have potential utility in oats, and evaluation of fall and spring applied herbicides for downy brome control prior to planting field peas, and the evaluation of herbicides that can be used to control kochia and Russian thistle post-harvest.

Postharvest Control of Kochia and Russian Thistle

Caleb Dalley, HREC, Hettinger, ND, 2017

Three field trials were conducted to evaluate herbicide options for controlling kochia following harvest. During 2017, drought conditions led to many small grain fields to be harvested for forage rather than grain. Following forage harvest kochia, Russian thistle and other weeds populations rapidly flourished in the absence of any crop cover. Herbicide options were explored in an effort to control these weeds. Three trials were conducted near Hettinger North Dakota. Two trials were located on a fields that had been planted to barley and harvested for hay forage, the other had been planted to cereal rye and had been grazed. All three fields had high populations of kochia, although one of the fields was primarily infested with Russian thistle. Results at all three location differed considerably.

Location previously planted to rye. Herbicide treatments were applied on August 18, 2017 to kochia that ranged from 2 to 18 inches in height with an average height of 4 inches. Weeds present at this site were kochia, redroot pigweed, common lambsquarter, and common mallow. At 7 DAT, all treatments containing Gramoxone control kochia 97 to 99%, regardless of addition of adjuvant or 2,4-D. The next best treatment was Sharpen which provided 81% control. These are both quick acting contact types of herbicides. Glyphosate alone controlled kochia 77% at 7 DAT and improved to 80% or more at later evaluations. The addition of dicamba (Sterling Blue) and 2,4-D or Starane Ultra did not significantly improve control. Starane Ultra alone controlled kochia 68 to 77%. The addition of 2,4-D or dicamba improved control. Other treatments provided fair control of kochia, and reduced continued growth.

Table 1. Kochia control in field planted to cereal rye and grazed.

	Treatment	Rate	Kochia control				
			7 DAT	14 DAT	21 DAT	30 DAT	45 DAT
			%				
1	Untreated		0 f	0 f	0 d	0 f	0 h
2	Glyphosate + AMS	48 oz/a	55 e	78 bcd	82 b	85 b	85 bcd
3	Glyphosate +AMS	24 oz/a	77 bc	80 b	82 b	84 b	84 d
	Sterling Blue	0.5 pt/a					
	2,4 D LV6	1 pt/a					
4	Glyphosate	24 oz/a	73 cd	71 e	78 b	76 cd	71 g
	Sharpen + MSO + AMS	2 oz/a					
5	Sharpen+ MSO + AMS	2 oz/a	74 cd	74 cde	75 bc	70 de	70 g
6	Sharpen	2 oz/a	81 b	76 b-e	81 b	74 cde	70 g
	Aim + MSO + AMS	2 oz/a					
7	Glyphosate	24 oz/a	76 bcd	79 bcd	80 b	80 bc	81 de
	Starane Ultra + AMS	0.7 pt/a					
8	Starane Ultra	0.7 pt/a	71 d	77 bcd	76 bc	68 e	75 efg
9	Starane Ultra	0.7 pt/a	78 bc	80 bc	80 b	79 bc	84 cd
	2,4 D LV6	1 pt/a					
10	Starane Ultra	0.7 pt/a	76 bcd	79 bcd	79 b	79 bc	85 bcd
	Sterling Blue	0.5 pt/a					
11	Bison+ MSO + AMS	2 pt/a	73 cd	73 de	70 c	73 cde	81 de
12	Carnivore + MSO + AMS	2 pt/a	78 bc	80 b	83 b	79 bc	79 def
13	Distinct + MSO + AMS	8 oz/a	76 bcd	78 bcd	81 b	77 cd	79 def
14	Glyphosate	24 oz/a	78 bc	79 bcd	79 b	85 b	81 de
	Distinct + MSO + AMS	8 oz/a					
15	Widematch	1.33 pt/a	71 d	75 b-e	69 c	66 e	72 fg
16	Gramoxone SL	48 oz/a	98 a	96 a	97 a	95 a	92 ab
17	Gramoxone SL + NIS	48 oz/a	97 a	98 a	98 a	95 a	91 abc
18	Gramoxone SL + HSCO	48 oz/a	99 a	97 a	98 a	95 a	96 a
19	Gramoxone SL + MSO	48 oz/a	98 a	96 a	98 a	97 a	97 a
20	Gramoxone SL	48 oz/a	98 a	97 a	97 a	97 a	96 a
	2,4 D LV6 + NIS	1 pt/a					
	LSD P=0.05		6.9	5.9	8.4	8.3	7.3
	Standard Deviation		2.8	4.2	5.9	3.7	5.2
	CV		4.58	5.38	7.5	5.9	6.6
	Treatment F		158	95	49	84	62
	Treatment Prob(F)		0.0001	0.0001	0.0001	0.0001	0.0001

Abbreviations: DAT, days after treatment; AMS, ammonium sulfate; MSO, methylated soybean oil; HSOC, high surfactant oil concentrate; NIS, non-ionic surfactant.

Location previously planted to barley. Herbicide treatments were applied on July 26, 2017 to kochia ranging from 2 to 12 inches averaging 6 inches. This location was primarily infested with kochia and volunteer barley. The best treatment at all evaluation dates was Gramoxone, which controlled kochia 92% at 14 DAT. Glyphosate alone, even at 48 oz/A provided poor control of kochia. The only other treatments providing good kochia control were Distinct (dicamba + diflufenzopyr) or WideMatch (clopyralid + fluroxypyr). This field will need to be monitored for possible resistance to glyphosate.

	Treatment	Rate	Kochia control		
			7 DAT	14 DAT	21 DAT
			%		
1	Untreated		0 i	0 l	0 k
2	Glyphosate	24 oz/a	15 h	0 l	0 k
3	Glyphosate + AMS	24 oz/a	25 g	20 k	10 j
4	Glyphosate + AMS	32 oz/a	26 g	28 ijk	15 j
5	Glyphosate + AMS	48 oz/a	27 g	33 hij	28 hi
6	Glyphosate + AMS	24 oz/a	31 g	20 k	15 j
	Sharpen	2 oz/a			
7	Sharpen + COC + AMS	2 oz/a	71 bc	60 de	36 fg
8	Sharpen + MSO + AMS	2 oz/a	70 bc	61 cde	50 bcd
9	Glyphosate + AMS	24 oz/a	46 f	25 jk	13 j
	Aim	2 oz/a			
10	Aim + MSO + AMS	2 oz/a	58 de	40 ghi	25 i
11	Sharpen	2 oz/a	71 bc	67 bcd	43 def
	Aim + MSO + AMS	2 oz/a			
12	Glyphosate + AMS	24 oz/a	58 de	53 ef	53 bc
	Starane Ultra	0.5 pt/a			
13	Starane Ultra	0.5 pt/a	54 ef	38 ghi	36 fg
14	Starane Ultra	1 pt/a	65 cd	47 fg	36 fg
15	Starane Ultra	0.5 pt/a	58 de	43 fgh	45 cde
	2,4 D LV6	0.5 pt/a			
16	Starane Ultra	0.5 pt/a	64 cd	53 ef	55 b
	Sterling Blue	0.25 pt/a			
17	Glyphosate + AMS	24 oz/a	69 bc	65 cde	40 efg
	Bison	2 pt/a			
18	Bison	2 pt/a	68 bc	63 cde	28 hi
19	Carnivore	2 pt/a	68 bc	53 ef	34 gh
20	Glyphosate + AMS	24 oz/a	63 cde	54 ef	42 d-g
	Carnivore	2 pt/a			
21	Distinct + MSO + AMS	8 oz/a	71 bc	72 bcd	80 a
22	Glyphosate + AMS	24 oz/a	75 b	73 bc	81 a
	Distinct + MSO	8 oz/a			
23	WideMatch	1.33 pt/a	65 cd	78 b	78 a
24	Gramoxone SL	48 oz/a	88 a	92 a	85 a
LSD P=0.05			7.6	13.2	8.7
Standard Deviation			4.0	8.0	6.1
CV			8.5	17.2	16.2
Treatment F			56	26	62
Treatment Prob(F)			0.0001	0.0001	0.0001

Russian thistle location. Herbicide treatments were applied on August 22, 2017. Weeds present at this location included Russian thistle, kochia, common lambsquarters, and green foxtail. The primary weed, Russian thistle was 12 to 18 inches in height, which was greater than an ideal height. Other weeds were not as tall, but were above ideal heights for good control. At 7 DAT, as with the other locations, Gramoxone, with and without adjuvants or 2,4-D provided the greatest control of kochia, Russian thistle and common lambsquarters. Glyphosate alone or tank-mixed with dicamba and 2,4-D or Starane Ultra or Sharpen or Distinct provided excellent control of kochia, Russian thistle and common lambsquarters at 14 DAT and thereafter. Other treatments provide only fair or poor control of these three weeds. Weeds were above ideal height and it was encouraging that control was still possible with both glyphosate and Gramoxone tank-mixes.

Treatment	Rate	Kochia				Russian thistle				Lambsquarters
		7 DAT	14 DAT	21 DAT	28 DAT	7 DAT	14 DAT	21 DAT	28 DAT	21 DAT
		control (%)								
1 Untreated		0 g	0 d	0 c	0 d	0 h	0 g	0 e	0 e	0 f
2 Glyphosate + AMS	48 oz/a	54 c-f	95 ab	97 a	100 a	54 fg	100 a	100 a	100 a	100 a
3 Glyphosate +AMS	24 oz/a	51 def	96 a	99 a	99 ab	63 ef	97 a	99 a	100 a	100 a
Sterling Blue	0.5 pt/a									
2,4 D LV6	1 pt/a									
4 Glyphosate	24 oz/a	67 bc	100 a	100 a	100 a	79 bc	100 a	100 a	100 a	100 a
Sharpen + MSO + AMS	2 oz/a									
5 Sharpen+ MSO + AMS	2 oz/a	44 ef	66 c	70 b	71 c	76 bcd	81 bc	79 b	79 b	71 cd
6 Sharpen	2 oz/a	45 def	69 c	66 b	65 c	72 cde	78 cd	75 bc	77 bc	68 cd
Aim + MSO + AMS	2 oz/a									
7 Glyphosate	24 oz/a	60 cd	96 ab	98 a	99 ab	65 def	98 a	100 a	100 a	99 a
Starane Ultra + AMS	0.7 pt/a									
8 Starane Ultra	0.7 pt/a	46 def	69 c	69 b	73 c	56 fg	61 ef	58 d	68 cd	54 de
9 Starane Ultra	0.7 pt/a	45 def	68 c	68 b	67 c	53 fg	59 ef	63 d	64 d	66 cde
2,4 D LV6	1 pt/a									
10 Starane Ultra	0.7 pt/a	58 cde	70	68 b	70 c	64 def	64 ef	64 cd	69 cd	61 cde
Sterling Blue	0.5 pt/a									
11 Bison+ MSO + AMS	2 pt/a	40 f	61 c	63 b	65 c	46 g	68 de	65 cd	69 cd	64 cde
12 Carnivore + MSO + AMS	2 pt/a	45 def	69 c	64 b	69 c	46 g	58 ef	58 d	60 d	69 cd
13 Distinct + MSO + AMS	8 oz/a	50 def	70 c	66 b	73 c	58 fg	55 f	56 d	63 d	59 de
14 Glyphosate	24 oz/a	46 def	86 b	92 a	96 ab	63 ef	95 a	99 a	98 a	97 a
Distinct + MSO + AMS	8 oz/a									
15 Widematch	1.33 pt/a	52 c-f	65 c	61 b	69 c	56 fg	63 ef	60 d	66 d	49 e
16 Gramoxone SL	48 oz/a	95 a	98 a	99 a	98 ab	99 a	100 a	100 a	100 a	97 a
17 Gramoxone SL + NIS	48 oz/a	99 a	98 a	99 a	100 a	99 a	100 a	100 a	100 a	95 ab
18 Gramoxone SL + HSCO	48 oz/a	97 a	98 a	97 a	98 ab	99 a	100 a	100 a	100 a	96 a
19 Gramoxone SL + MSO	48 oz/a	97 a	98 a	96 a	98 ab	99 a	100 a	100 a	100 a	95 ab
20 Gramoxone SL	48 oz/a	80 ab	91 ab	90 a	90 b	88 ab	91 ab	91 a	93 a	78 bc
2,4 D LV6 + NIS	1 pt/a									
LSD P=0.05		19.9	9.8	12.7	9.0	13.4	11.2	11.5	9.3	17.7
Standard Deviation		0.07	6.9	8.9	6.4	9.4	7.9	8.1	10.0	12.5
CV		10.0	8.8	11.5	8.0	14.2	10.1	10.4	8.2	16.5
Treatment F		29.2	47.8	28.9	55.3	25.7	41.8	40.8	56.8	16.4
Treatment Prob(F)		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Herbicide Options for Weed Control in Oats

Caleb Dalley, HREC, Hettinger, ND, 2017

A field trial was conducted to evaluated herbicides with potential utility for weed control in oats. None of the herbicides tested in this trial are registered for use in oats at this time. Oats 'High Test' were planted on May 12, 2017 at a rate of 80 lbs/A and a depth of 2 inches using a 10-ft John Deere 1590 no-till drill with 7.5 inch row spacing. Starter fertilizer (18-46-0) was applied at 40 lbs/A at planting. Prior to planting, urea fertilizer (46-0-0) was applied at a rate of 40 lbs/A, and the field was treated with glyphosate (Cornerstone Plus @ 24 oz/A + AMS) on April 29 to control existing weeds. PRE treatments were applied on May 12 using a tractor mounted research sprayer at a spray volume of 10 gal/A. Oats emerged on May 21. EPOST application of Armezon + COC (Trt 12) was applied on May 23 when oats were at the 1-feaf stage. POST application of Armezon + COC (Trt 13) was applied on June 13 when oats were at the 4-leaf stage measuring 10.5 inches to the longest extended leaf. Oats were evaluated for injury at 3, 4, and 6 weeks after emergence. At 4 WAE, the only treatment resulting in injury was the application of Armezon at the 4-leaf stage. At the 6 WAE evaluation, injury was also observed when Armezon was applied at both the 1-leaf (8%) and 4-leaf (28%) stages. None of the other herbicide treatments resulted in visual injury. However, Hettinger was extremely dry in 2017 and daily rainfall never exceeded 0.25 inches in either May or June. This limited incorporation and activation of PRE herbicides which may have had different results in a year with average precipitation. Oat height was measured at 7 weeks after planting. No differences in oat height were observed. Oats were harvested on August 17. No differences in yield were observed. Yields were very low, ranging from 4 to 10 bu/A, and were highly variable due to the extreme drought conditions. Further evaluations are needed under more ideal growing conditions in order to come to a conclusion on the safety of these herbicides.

Treatment	Rate	Timing	Injury			Height	Yield
			34 DAPRE	7 DAPOST	21 DAPOST		
				——%——		cm	bu/A
1 Untreated			0 a	0 b	0 c	40.8 a	8.0 a
2 Zidua	3 oz/a	PRE	0 a	0 b	0 c	38.4 a	6.8 a
3 Warrant	1.5 qt/a	PRE	0 a	0 b	0 c	37.5 a	3.9 a
4 Dual II Magnum	1.67 pt/a	PRE	0 a	0 b	0 c	37.6 a	7.4 a
5 Prowl	3 pt/a	PRE	0 a	0 b	0 c	37.5 a	6.3 a
6 Outlook	18 oz/a	PRE	0 a	0 b	0 c	37.5 a	5.8 a
7 Zidua	3 oz/a	PRE	0 a	0 b	1 bc	37.3 a	5.3 a
8 Warrant	1.5 qt/a	PRE	0 a	0 b	0 c	37.6 a	7.5 a
9 Dual II Magnum	1.67 pt/a	PRE	0 a	0 b	0 c	37.3 a	7.4 a
10 Prowl	3 pt/a	PRE	0 a	0 b	0 c	37.8 a	7.1 a
11 Outlook	18 oz/a	PRE	0 a	0 b	0 c	37.8 a	9.7 a
12 Armezon	1 fl oz/a	1-leaf	0 a	0 b	8 b	36.1 a	6.3 a
COC	1 % v/v						
13 Armezon	1 fl oz/a	3-leaf	0 a	14 a	28 a	38.2 a	3.8 a
COC	1 % v/v						
LSD P=0.05			NS	1.8	6.9	2.72	4.21
Standard Deviation			0	1.2	4.8	1.89	2.93
CV			0	111.44	173.72	5.01	44.66
Treatment F			0	41.739	10.298	1.214	1.223
Treatment Prob(F)			1.000	0.0001	0.0001	0.3122	0.3059

Abbreviations: DAPRE, days after preemergence application; DAPOST, days after postemergence application; COC, crop oil concentrate.

Fall and Spring Application of Dual and Broadaxe for Downy Brome Control in Spring Field Peas

Caleb Dalley, HREC, Hettinger, ND, 2017

Fall POST treatments were applied on October 28, 2016 to a fallow field heavily infested with downy brome. These fall treatments were evaluated for downy brome control 13 days after treatment and again in the spring on May 2, 2017 before planting (186 DAT). At 13 DAT, glyphosate tank-mixed with Dual II Magnum (metolachlor) or Broadaxe XC (sulfentrazone + metolachlor) controlled downy brome 89 to 94%, compared to 80 to 82% with glyphosate alone. When evaluated in the spring before planting, downy brome control was 95 to 99% with glyphosate tank-mixed with Dual II Magnum or Broadaxe, compared to 64 to 66% with glyphosate alone. Field pea were planted and then spring POST treatments were applied on May 5, 2017. Downy brome control was evaluated 21 and 28 DAT (spring POST). At 28 DAT, fall POST tank-mixes of glyphosate with Dual II Magnum or Broadaxe continued to provide 92 to 100% control of downy brome, compared to 48% control for glyphosate alone in the fall. Spring POST tank mixes of glyphosate with Duall II Magnum or Broadaxe controlled downy brome 93 to 97% compared to 86% for a spring only glyphosate application or 90% for a fall and spring application of glyphosate. Extremely dry conditions occurred at Hettinger in 2017. Less than an inch of rainfall occurred during the months of May and June. Due to the dry conditions, pea germination and survival was very low. Stand counts were taken on June 9. Plots treated with fall POST tank-mixes had stand counts of 34 to 38 peas plants per square meter compared to 12 to 25 plants per square meter for spring POST treatments. The desired stand counts was 75 to 80 plants per square meter. Pea height was measured on June 21. Pea heights ranged from 20 to 23 cm for fall POST tank-mixes compared to 17 to 22 for spring POST treatments. Dry conditions persisted for the remainder of the cropping season and did not allow for harvesting the peas due to low population and low seed set. However, it was very apparent that fall POST allowed for better establishment of field pea, even when control of downy brome was similar for fall and spring treatments. It was also apparent that fall application of metolachlor provided much better control than glyphosate alone.

Treatment	Rate	Timing	Downy Brome Control			Injury	Stand	Height
			13 DAF	At Spring	28 DAS	14 DAS	21 DAE	33 DAE
			——————%——————				plants/m^2	bu/A
1 Untreated			0 d	0 c	0 d	0 a	0 d	0 e
2 Glyphosate	32 oz/a	Fall	94 a	99 a	98 a	0 a	34 a	20 abc
Broadaxe XC	25 oz/a							
3 Glyphosate	32 oz/a	Fall	91 ab	96 a	92 ab	0 a	34 a	21 ab
Broadaxe XC	19 oz/a							
4 Glyphosate	32 oz/a	Fall	92 ab	99 a	95 ab	0 a	36 a	22 a
Broadaxe XC	19 oz/a							
Dual II Magnum	10 oz/a							
5 Glyphosate	32 oz/a	Fall	92 ab	97 a	100 a	0 a	36 a	22 a
Broadaxe XC	19 oz/a							
Dual II Magnum	26 oz/a							
6 Glyphosate	32 oz/a	Fall	89 b	95 a	94 ab	0 a	38 a	23 a
Dual II Magnum	32 oz/a							
7 Glyphosate	32 oz/a	Fall	80 c	64 b	48 c	0 a	10 cd	18 cd
8 Glyphosate	32 oz/a	Fall+Spring	82 c	66 b	90 ab	0 a	32 ab	22 a
9 Glyphosate	32 oz/a	Spring	0 d	0 c	96 ab	0 a	16 bcd	17 cd
Broadaxe XC	25 oz/a							
10 Glyphosate	32 oz/a	Spring	0 d	0 c	93 ab	0 a	9 cd	19 bcd
Broadaxe XC	19 oz/a							
11 Glyphosate	32 oz/a	Spring	0 d	0 c	96 ab	0 a	23 abc	18 cd
Broadaxe XC	10 oz/a							
Dual II Magnum	16 oz/a							
12 Glyphosate	32 oz/a	Spring	0 d	0 c	97 a	0 a	13 cd	21.8 a
Broadaxe XC	10 oz/a							
Dual II Magnum	23 oz/a							
13 Glyphosate	32 oz/a	Spring	0 d	0 c	94 ab	0 a	12 cd	18.7 bcd
Dual II Magnum	32 oz/a							
14 Glyphosate	32 oz/a	Spring	0 d	0 c	86 b	0 a	25 abc	20.4 abc
LSD P=0.05			4.7	7.9	10.1	NS	17.6	2.7
Standard Deviation			3.3	5.5	7.1	0	12.3	1.8
CV			7.5	12.5	8.4	0	54.7	9.1
Treatment F			775	289	60.2	0	4.2	4.1
Treatment Prob(F)			0.0001	0.0001	0.0001	1.0000	0.0002	0.0032

Abbreviations: DAF, days after fall application; DAS, days after spring application; DAE, days after emergence
Granular Ammonium Sulfate (AMS) was added to all treatments at a rate of 8.5 lbs/100 gallons spray solution.

Expanding pre-emergence weed control options in safflower (*Carthamus tinctorius*)

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Abstract

Safflower is an oil seed crop well suited to the semi-arid Northern Great Plains of western North Dakota. Safflower adds diversity to crop rotations dominated by small grains. A major factor limiting safflower production is the lack of herbicide options that offer consistent weed control and crop safety. An experiment was conducted at two locations in 2016 in western North Dakota to review pre-emergent herbicide options for weed control efficacy and crop safety. A randomized complete block design with four replications was used to evaluate injury and weed control in safflower variety Cardinal. Herbicide treatments included Prowl H2O (pendimethalin), Zidua (pyroxasulfone), three rates of Zidua SC, two rates of Outlook (dimethenamid), Spartan (sulfentrazone), and Spartan Charge (sulfentrazone + carfentrazone-ethyl). Visual ratings of injury were generally higher at Williston than at Hettinger. The only significant difference in injury at 5 weeks after emergence (WAE) was Spartan Charge showing greater injury than all other treatments at Hettinger. Plant heights were similar across treatments at Williston and Hettinger, with the exception of the weedy check having shorter plants at Hettinger at 6 WAE. At both sites, stand counts at 5 WAE were similar across herbicide treatments and were only reduced in the weedy check at Hettinger. Only the weedy check plots had lower yields than all other treatments at both sites. Results demonstrate that Cardinal safflower can recover from early-season injury that may result from the herbicides tested without yield loss. Regarding weed control, the highest rate of Zidua SC provided the best control at Williston. At Hettinger, weed control was poor regardless of herbicide tested due to lower than normal rainfall May through August. However, wild oat control was better with Zidua (either formulation) and Outlook compared to either Prowl H2O or Spartan.

Site description

Williston and Hettinger North Dakota are in the Northern Great Plains of North America and are characterized by a continental, semi-arid climate. Total annual precipitation at both locations averages approximately 25 to 30 cm, with spring and summer rainfall being the major form of precipitation. Soils at the Williston location are a Williams-Bowbells loam with pH of 6.5 and elevation above sea level of 649 m (2,132 ft). Soils at the Hettinger location are a Belfield-Savage-Daglum complex silt loam with a pH of 5.1 at an elevation of 824 m (2,703 ft) and have been in continuous no-till for more than 10 years.

Figure 1. Map of North Dakota depicting study locations. North Dakota is in the north central United States and borders the Canadian provinces of Saskatchewan and Manitoba.

Methods

At Williston, the study site was prepared with a burndown application of glyphosate and a broadcast application of urea fertilizer (46-0-0) at a rate of 90 kg ha^{-1} (80 lbs ac^{-1}) N 2 weeks prior to planting. Safflower was seeded at 31 kg ha^{-1} (28 lbs ac^{-1}) on May 13, 2016 and herbicide treatments were applied 3 days later with a backpack CO_2 sprayer at 93 L ha^{-1} (10 gal a^{-1}).

At Hettinger, urea fertilizer was broadcast applied at a rate of 45 kg ha^{-1} (35 lbs ac^{-1}) N approximately 2 weeks prior to seeding. A starter fertilizer (18-46-0) at a rate of 45 kg ha^{-1} (40 lbs ac^{-1}) was applied at planting through the planting drill. On May 4, 2016 safflower was seeded at 31 kg ha^{-1} (28 lbs ac^{-1}) and herbicide treatments were applied the next day using a tractor-mounted research sprayer at 93 L ha^{-1} (10 gal a^{-1}). All herbicide treatments were mixed with glyphosate at 1.6 L ha^{-1} (22 oz ac^{-1}) plus AMS at 70 g L^{-1} (0.6 lbs gal^{-1}).

Table 1. Visual injury rating, plant height, population, and yield metrics for safflower in response to pre-emergence herbicide treatments in 2016 at Williston and Hettinger. ANOVA was conducted by site and letters indicate the effect of herbicide treatment within a column ($P < 0.05$ Tukey test).

Treatment	Rate		Crop injury 5 WAE†		Plant height 6 WAE		Crop population		Yield‡	
	metric	US	Williston	Hettinger	Williston	Hettinger	Williston	Hettinger	Williston	Hettinger
	kg ai ha^{-1}	oz a^{-1}	-------- % --------		------- cm -------		----- # m^{-2} -----		---- kg ha^{-1} ----	
Prowl H2O (pendimethalin)	1.064	32	4a	0b	48a	34a	72a	69a	1290a	1360a
Zidua (pyroxasulfone)	0.119	2	11a	0b	47a	35a	69a	59a	1480a	1500a
Zidua SC (pyroxasulfone)	0.119	3.25	8a	0b	48a	34a	68a	66a	1490a	1370a
Zidua SC	0.255	7	12a	0b	45a	35a	74a	66a	1650a	1440a
Zidua SC	0.387	10.6	16a	5b	46a	35a	70a	67a	1450a	1320a
Outlook (dimethenamid)	0.526	10	4a	0b	49a	34a	76a	67a	1370a	1490a
Outlook	1.05	20	11a	0b	43a	35a	65a	57a	1360a	1500a
Spartan (sulfentrazone)	0.123	3.5	12a	5b	50a	35a	67a	57a	1360a	1340a
Spartan Charge (sulfentrazone+carfentrazone-ethyl)	0.135	4.4	12a	16a	49a	33a	76a	60a	1460a	1240a
Weed free check§			4a	0b	49a	34a	71a	59a	1670a	1360a
Weedy check			0a	0b	44a	24b	60a	19b	560b	190b

†WAE = weeks after emergence.
‡As a reference, 1000 kg ha^{-1} = 890 lb ac^{-1}.
§Weed free check was treated with 2.14 kg ai ha^{-1} (32 oz a^{-1}) of Dual II Magnum (S-metolachlor) and maintained with hand weeding.

Table 2. Visual assessment of weed control at 5 weeks after safflower emergence in 2016 at Williston and Hettinger. ANOVA was conducted by site and letters indicate the effect of herbicide treatment within a column ($P < 0.05$ Tukey test).

Treatment	Rate		Weed control	
	metric	US	--------- % ---------	
	kg ai ha^{-1}	oz a^{-1}	Williston†	Hettinger‡
Prowl H2O (pendimethalin)	1.064	32	58 c	0 c
Zidua (pyroxasulfone)	0.119	2	69 abc	21 b
Zidua SC (pyroxasulfone)	0.119	3.25	80 abc	26 b
Zidua SC	0.255	7	85 abc	38 b
Zidua SC	0.387	10.6	88 ab	34 b
Outlook (dimethenamid)	0.526	10	65 bc	34 b
Outlook	1.05	20	78 abc	38 b
Spartan (sulfentrazone)	0.123	3.5	66 abc	0 c
Spartan Charge (sulfentrazone + carfentrazone-ethyl)	0.135	4.4	67 abc	0 c
Weed free check§			100 a	100 a
Weedy check			0	0

†Dominate weed species at Williston included kochia (*Kochia scoparia*), Russian thistle (*Salsola tragus*), and green foxtail (*Setaria viridis*).
‡Dominate weed species at Hettinger was wild oat (*Avena fatua*).
§Weed free check was treated with 2.14 kg ai ha^{-1} (32 oz a^{-1}) of Dual II Magnum (S-metolachlor) and maintained with hand weeding.

Figure 2. Safflower seedlings 3 WAE with Spartan Charge injury at Williston. Safflower grew out of injury and yield was not reduced compared to the weed free check.

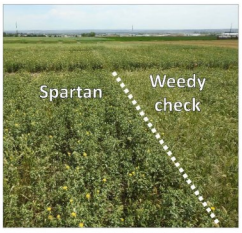


Figure 3. Safflower plots 9 WAE at Williston. Left of the dotted line, plot was treated with Spartan herbicide; to the right, no herbicide was used.

Conclusions

Based on 2016 data, Zidua, Spartan, and Outlook herbicide products have the potential to be used safely for pre-emergence weed control in safflower. However, both sites received little rainfall after planting and the authors caution that years with greater precipitation may pose greater risk for crop injury. Soils at both locations were acidic and herbicide injury to safflower may be greater when applied to safflower growing in alkaline soils. Use of preemergence herbicides for weed control in western North Dakota can often result in poor weed control due to unreliable rainfall. However, weed emergence is also reduced in years with low rainfall and the value of preemergence herbicides is greatest when average or above average rainfall is received soon after planting. Further, the lack of postemergence herbicides for weed control in safflower necessitates the application of preemergence herbicides to protect the safflower crop from weed competition.

Safflower Variety Susceptibility to Sulfentrazone Injury

Clair Keene[1] and Caleb Dalley[2]

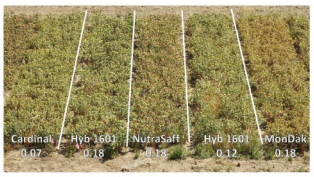
[1]Williston Research Extension Center, Williston, ND; [2]Hettinger Research Extension Center, Hettinger, ND

Background

Safflower (*Carthamus tinctorius*) is an oil seed crop well adapted to the semi-arid conditions of western North Dakota. Growing safflower in this region can increase water use efficiency and reduce disease pressure in small grain rotations. Despite these benefits, safflower production is limited by a lack of herbicides that control broadleaf weeds while offering consistent crop safety. Previous trials have indicated that sulfentrazone may be a viable option for broadleaf weed control in safflower; however, observed injury levels seem to vary by safflower variety. To determine the suitability of sulfentrazone as a pre-emergence herbicide for safflower, we conducted field experiments using 5 safflower varieties and 3 sulfentrazone rates at 2 locations in western North Dakota in 2016 and 2017.

Seedlings of safflower Hybrid 1601 treated with 0.18 kg ai ha^{-1} sulfentrazone in 2016 at Williston. Note necrotic true leaves and chlorosis of cotyledons.

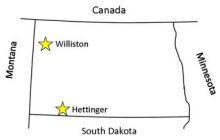
Seedlings of safflower Hybrid 9049 treated with 0.07 kg ai ha^{-1} sulfentrazone in 2016 at Williston. Note the light chlorosis on cotyledons and unaffected true leaves.



Safflower varieties with sulfentrazone rates in kg ai ha^{-1} below. Hybrid 1601 exhibited reduced stands with increasing sulfentrazone rate across sites. In this photo taken in 2016 at Williston, holes in the Hybrid 1601 stand have been filled in by weeds, especially green foxtail.

Site descriptions

Williston and Hettinger North Dakota are located in the Northern Great Plains and are characterized by a continental, semi-arid climate. Total annual precipitation at both locations averages approximately 25 to 30 cm, with spring and summer rainfall normally providing the majority of annual precipitation. The Williston site is at an elevation of 649 m above sea level and is characterized by Williams-Bowbells loam soils with 6.5 pH and 1.7% OM. The Hettinger site is at an elevation of 824 m and is characterized by Belfield-Savage-Daglum complex clay loam soils with 5.2 pH and 4.1% OM. In 2017, western North Dakota experienced an extreme drought and Williston and Hettinger received less than 3 cm of precipitation between safflower planting in May and mid-July. Data were not collected at Hettinger in 2017 due to the drought and uneven crop emergence.



Map of North Dakota depicting study locations.

Methods

The experiments were conducted using a factorial design with 4 replications organized in a randomized complete block. The two factors tested were variety and sulfentrazone (Spartan 4F®) rate. Safflower varieties used were Cardinal, MonDak, NutraSaff, Hybrid 9049, and Hybrid 1601. Sulfentrazone rates were 0.07, 0.12, and 0.18 kg ai ha^{-1} (2.0, 3.5, and 5.0 fl oz ac^{-1}), and a weed free control was established with 2.15 kg ai ha^{-1} s-metolachlor (32 fl oz a^{-1}) and hand-weeding. Small plot equipment was used to plant the studies and CO_2 backpack sprayers were used to apply herbicide treatments at 94 L ha^{-1}. Safflower planting rate was adjusted to 28 kg ha^{-1} pure live seed based on germination rates of each variety. At Williston in 2016, safflower was planted May 4 and herbicides sprayed May 5; in 2017, safflower was planted May 8 and herbicides sprayed May 11. At Hettinger in 2016, safflower was planted April 22 and herbicides sprayed April 23.

Results

Visual ratings of safflower injury and stand counts. Letters appear within a column when the interaction of variety and herbicide treatment was significant ($p < 0.05$) using Tukey-Kramer means comparison. See ANOVA table below for significance of main effects in these data.

			Williston						Hettinger		
			2016			2017			2016		
Variety	Herbicide	Rate	Injury 3 WAE†	Injury 5 WAE	Stand	Injury 4 WAE	Injury 6 WAE	Stand	Injury 2 WAE	Injury 4 WAE	Stand
		kg ai ha^{-1}	%	%	no. m^{-1}	%	%	no. m^{-1}	%	%	no. m^{-1}
Cardinal	sulfentrazone	0.07	9	0de	52	2	0	46	4defg	1c	51
Cardinal	sulfentrazone	0.12	21	9cde	43	3	1	54	8bcdefg	4c	48
Cardinal	sulfentrazone	0.18	26	10cde	46	2	1	50	12abc	10bc	43
Cardinal	Weed free check‡	--	0	0de	52	0	0	50	0g	0c	48
MonDak	sulfentrazone	0.07	12	1cde	42	4	4	64	4defg	1c	39
MonDak	sulfentrazone	0.12	25	5cde	41	3	2	65	9bcde	9bc	42
MonDak	sulfentrazone	0.18	43	17bcd	35	5	3	60	11abcd	10abc	31
MonDak	Weed free check	--	0	0de	43	1	1	62	0g	0c	39
NutraSaff	sulfentrazone	0.07	0	3de	46	2	1	69	8cdefg	3c	41
NutraSaff	sulfentrazone	0.12	14	10cde	56	2	1	66	11abc	10bc	45
NutraSaff	sulfentrazone	0.18	22	28bc	48	2	1	67	8bcdef	8bc	47
NutraSaff	Weed free check	--	0	0de	53	0	0	66	0g	0c	56
Hybrid 9049	sulfentrazone	0.07	26	15cde	41	2	2	89	3efg	0c	46
Hybrid 9049	sulfentrazone	0.12	37	25bcd	42	3	2	77	11abcd	10bc	44
Hybrid 9049	sulfentrazone	0.18	50	43ab	37	7	2	72	15ab	18ab	36
Hybrid 9049	Weed free check	--	0	0e	45	1	0	91	0g	0c	41
Hybrid 1601	sulfentrazone	0.07	10	8cde	36	1	2	70	1fg	0c	31
Hybrid 1601	sulfentrazone	0.12	33	35ab	27	2	1	60	8bcdef	8bc	35
Hybrid 1601	sulfentrazone	0.18	39	51a	22	5	1	50	17a	22a	27
Hybrid 1601	Weed free check	--	0	0 de	47	0	0	70	0g	0c	40

†WAE = weeks after emergence
‡Weed free check treated with 2.15 kg ai ha^{-1} s-metolachlor, maintained with hand-weeding

ANOVA results for the effects of variety, herbicide treatment, and their interaction (V x H) on safflower injury and stand. * indicates $p < 0.05$; ** indicates $p < 0.01$; and ns indicates $p > 0.05$.

	Williston						Hettinger		
	2016			2017			2016		
	Injury 3 WAE	Injury 5 WAE	Stand	Injury 4 WAE	Injury 6 WAE	Stand	Injury 2 WAE	Injury 4 WAE	Stand
Variety	**	**	**	ns	**	**	ns	ns	**
Herbicide	**	**	**	**	**	ns	**	**	ns
V x H	ns	**	ns	ns	ns	ns	**	*	ns

Safflower yield by main effect of variety and herbicide treatment. Letters indicate when a main effect was significant ($p < 0.05$) using Tukey-Kramer means comparison.

	Williston		Hettinger
	2016	2017	2016
	---------- kg ha^{-1} ----------		
Variety			
Cardinal	1951a	816a	2545ab
MonDak	1658bc	595bc	2332ab
NutraSaff	1309d	464c	2110b
Hybrid 9049	1766ab	830a	2690a
Hybrid 1601	1510cd	791ab	2319ab
Herbicide			
0.07 kg ai ha^{-1}	1510b	643a	2292a
0.12 kg ai ha^{-1}	1536b	682a	2328a
0.18 kg ai ha^{-1}	1563b	709a	2513a
Weed free check†	1947a	763a	2464a

†Weed free check treated with 2.15 kg ai ha^{-1} s-metolachlor, maintained with hand-weeding

ANOVA results for the effects of variety, herbicide treatment, and their interaction (V x H) on safflower yield. * indicates $p < 0.05$; ** indicates $p < 0.01$; and ns indicates $p > 0.05$.

	Williston		Hettinger
	2016	2017	2016
	Yield	Yield	Yield
Variety	**	**	*
Herbicide	**	ns	ns
Var x Herb	ns	ns	ns

Conclusions

Safflower varieties Hybrid 1601 and Hybrid 9049 exhibited higher injury levels with reduced stands in response to increasing sulfentrazone rate compared to other varieties tested; however, this injury did not consistently result in yield loss. Cardinal and NutraSaff exhibited the lowest levels of sulfentrazone injury. MonDak exhibited injury but not reduced stands or yield. The lack of yield response at Hettinger in 2016 was likely influenced by soil conditions (low pH and high OM). We caution that these results may underestimate sulfentrazone risk to safflower in high pH, low OM soils. Sulfentrazone solubility increases under these conditions and crop injury is more likely to occur. For growers needing to control problematic broadleaf weeds in safflower, selecting variety Cardinal will reduce the risk of sulfentrazone injury.

- Observed injury was higher in Williston in 2016 than 2017. We attribute this to higher rainfall in 2016 and more opportunity for herbicide activation and crop uptake.
- Sulfentrazone reduced safflower yield at Williston in 2016 compared to the weed free check but did not reduce yield in a manner proportional to rate. In the other two site-years, no yield response to herbicide treatment was observed.
- Hybrid 1601 exhibited the highest levels of early season injury and reduced stands with increasing rates of sulfentrazone. However, Hybrid 1601 did not show a consistent yield response to sulfentrazone rate.
- Cardinal exhibited the lowest injury levels across site-years and no stand loss with sulfentrazone use.

Controlling Japanese Brome During Prairie Restoration in North Dakota

Caleb D. Dalley, Daniel G. Abe
North Dakota State University, Hettinger Research Extension Center

INTRODUCTION

The native grasslands in North Dakota, located in the Northern Great Plains, have become degraded due to conversion to agricultural or urban lands, overgrazing, suppression of wildfires, and invasion of exotic species. These grasslands not only provide forage for grazing animals, but also habitat for wildlife, a sink source for organic carbon, improved soil stability, and recreation. Attempts to reclaim disturbed grasslands are often impeded by invasive annual weeds that reduce establishment and growth of desired perennial grasses and forbs. In southwest North Dakota, Japanese brome (*Bromus japonicus)* is a weed that often impedes reclamation efforts. Japanese brome is a winter annual grass native to Europe that has steadily increased in the Northern Great Plains during the past 30 years. It is an aggressive competitor for water, nutrients, and space and can outcompete desirable forage species reducing biodiversity. It readily germinates within the thatch layer allowing it to invade undisturbed grasslands.

OBJECTIVES

Evaluate herbicides and application timing during grassland restoration for:

1. Control Japanese brome
2. Measure impacts of herbicides on grass and forb production.

MATERIAL AND METHODS

- Experiment was conducted in a native grassland prairie restoration site near Hettinger, ND
- The site was naturally infested with Japanese brome that had become established over years
- The site had been planted with a native plant seed mixture in the fall of 2012 using a Truax Flex II grass drill using a mix containing five native grasses and five native forbs
- Competition from Japanese brome was impeding establishment and productivity of desired grasses and forbs
- Treatments were applied to evaluate impact on Japanese brome and desired forages (Table 1)
- Treatments were arranged in a randomized complete block with four replications
- Plot size was 2.4 by 12.2 m
- Treatments were applied with a backpack hand boom sprayer equipped with TeeJet® 8001XR flat fan nozzles calibrated to deliver 94 L/ha at 276 kPa using CO_2 as a propellant
- A non-ionic surfactant (0.5% v/v) was included in all herbicide treatments except treatment 5, which included an HSOC (1% v/v)
- Fall treatments were applied on 30 October 2015
- Spring treatments were applied on 16 May 2016
- Visual evaluations of Japanese brome control were conducted 2 weeks after fall application, 1 week prior to spring applications and at 3, and 5 weeks after spring treatments
- Total forage biomass was harvest on 18-19 July by collecting all forage within two 0.5 m^2 quadrants from each plot.
- Fresh and dry weights of grass and forbs biomass were recorded.
- Data were subjected to ANOVA
- Visual rating were transformed by arcsine square root percent.
- Means separation was performed using Fisher's Protected LSD at P=0.05.

Table 1. Herbicides treatments, timing of application and rates utilized to evaluate Japanese brome control.

Trt #	Herbicide	Rate (g ai/ha)	Application
1	untreated	-	-
2	sulfosulfuron	39	Fall Post
3	sulfosulfuron	53	Fall Post
4	sulfosulfuron	70	Fall Post
5	flumioxazin + pyroxasulfone	106+134	Fall Post
6	imazapic	105	Fall Post
7	imazapic + paraquat	105+560	Fall Post
8	paraquat	560	Spring Post
9	sulfosulfuron	39	Spring Post
10	sulfosulfuron	53	Spring Post

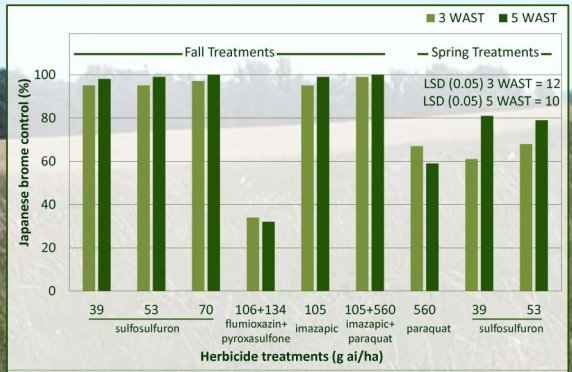


Figure 1. Effect of fall and spring herbicide applications on Japanese brome control 3 and 5 weeks after spring treatments (WAST) were applied to a prairie restoration site.

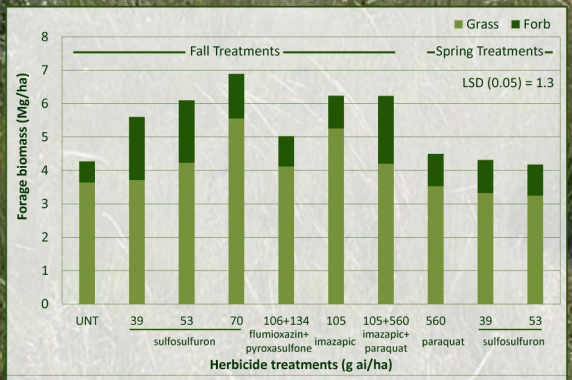


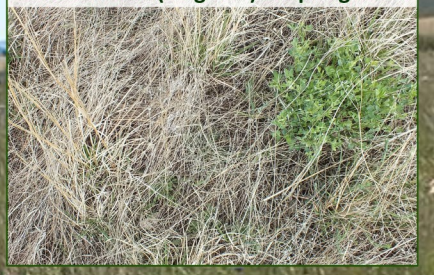
Figure 2. Effect of fall and spring herbicide applications on forage yield at a prairie restoration site in southwest North Dakota. Forage was harvested July 18-19, 2016.

RESULTS

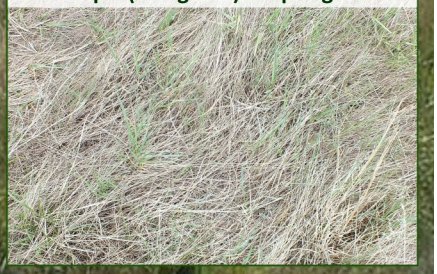
- Japanese brome was controlled 95 to 97% 3 weeks after spring treatment (WAST) and 98 to 99% 5 WAST with fall applications of sulfosulfuron, with no differences in control due to rate (Figure 1)
- Fall application of imazapic controlled Japanese brome 96 to 100% 5 WAST and control was similar with and without paraquat
- Fall application of flumioxazin + pyroxasulfone provided poor control of Japanese brome
- Spring application of sulfosulfuron controlled Japanese brome 79 to 81% 5 WAST with no difference due to rate
- Spring applied paraquat controlled Japanese brome 59% 5 WAST, poor coverage due to existing thatch likely reduced control
- Forage yield increased with fall application of sulfosulfuron, with yield increasing as rates increased (Figure 2)
- Imazapic increased forage yield with and without paraquat
- Spring application of sulfosulfuron and paraquat did not increase forage yield

Untreated at spring POST

Sulfosulfuron (70 g ha^{-1}) at spring POST



Imazapic (105 g ha^{-1}) at spring POST



DISCUSSION AND IMPLICATIONS

Fall applications sulfosulfuron and imazapic were effective at controlling Japanese brome in a native prairie restoration site. Controlling Japanese brome allowed for increased growth of desired perennial grasses and forbs. Flumioxazin plus pyroxasulfone did not provide adequate control with a late-fall application. As Japanese brome had emerged prior to application, perhaps an earlier application timing would have improved results. Spring application was less effective than fall application for controlling Japanese brome and did not result in increased growth of desired grasses and forbs. For rangeland sites infested with Japanese brome, a late-fall application of imazapic or sulfosulfuron should provide a benefit of Japanese brome control and increased productivity of desired forages.

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Mangold, J.A., Parkinson, H., Duncan, C., Rice, P., Davis, E. 2013. Downy brome (*Bromus tectorum*) control with imazapic on Montana grasslands. Inv. Plant Sci. Manag. 6:554-558

Wick, A.F., Geaumont, B.A., Sedivec, K.K., Hendrickson, J. 2016. Grassland Degradation. In: Shroder, J.F., Sivanpillai, R. (Eds.), Biological and Environmental Hazards, Risks, and Disasters. Elsevier, pp. 257–276. Available:https://www.researchgate.net/publication/292132533_Grassland_Degradation [accessed Jan 5, 2017]

Presentations, Outreach and Publications

Christopher Schauer, Hettinger REC Director and Animal Scientist

Presentations and Outreach

Dickinson State University Sheep Lab
Hettinger Research Extension Center, Hettinger, ND
February 16, 2017

Rambouillet Ram Test Results.
Ram Test Field Day, Hettinger, ND
March 11, 2017

ND State Fair Sheep Carcass Ultrasound Competition
ND State Fair, Minot, ND
July 25, 2017

OFDA demonstration
Newell Ram Sale, Newell, SD
September 14-15, 2017

Sheep Nutrition for Beginners
Starter Flock Sheep School, Hettinger, ND
September 16, 2017

Carcass and Reproductive Ultrasound
BSC Animal Science Lab, Bismarck, ND
October 27, 2017

NDSU Shearing School
Hettinger, ND
November 18-20, 2017

NDSU and ASI Wool Classing School
Hettinger, ND
November 18-20, 2017

Nutritional Impacts on Ram Fertility
NDLWPA and MNLWPA 2017 Annual Convention, Fargo, ND
November 2, 1017

Publications

Crane, A.R., R.R. Redden, K.C. Swanson, B.M. Howard, T.J. Frick, K.R. Maddock-Carlin, and **C.S. Schauer***. 2017. Effects of dried distiller's grains with solubles and lasalocid on feedlot lamb growth, carcass traits, nutrient digestibility, ruminal fluid volatile fatty acid concentrations, and ruminal hydrogen sulfide concentration. J. Anim. Sci. 95:3198-3205. doi: 10.2527/jas2017.1369

Geaumont, B.A., K.K. Sedivec, and **C.S. Schauer*.** 2017. Ring-necked pheasant use of post-conservation reserve program lands. Rangeland Ecol. Manage. 70:569-575. doi: 10.1016/j.rama.2017.04.003

Van Emon, M.L., K.A. Vonnahme, S.R. Eckerman, P.T. Berg, K.R. Maddock Carlin, and **C.S. Schauer***. 2017. Effects of metabolizable protein supplementation to ewes during late gestation on wether lamb feedlot performance, carcass characteristics, and nitrogen balance. Small Ruminant Res. 150:118-125. doi: 10.1016/j.smallrumres.2017.03.014

Swanson, T.J., L.A. Lekatz, M.L. Van Emon, G.A. Perry, **C.S. Schauer**, K.R. Maddock Carlin, C.J. Hammer, and K.A. Vonnahme. 2017. Supplementation of metabolizable protein during late gestation and fetal number impacts ewe organ mass, maternal serum hormone and metabolite concentrations, and conceptus measurements. Dom. Anim. Endo. 58:113-125. doi: 10.1016/j.domaniend.2015.08.002

Crane, A.R., R.R. Redden, M.S. Crouse, J.D. Kirsch, J.E. Held, and **C.S. Schauer**. 2017. Influence of dried distiller's grains with solubles on spermatozoa morphological abnormalities of ram lambs. J. Anim. Sci. Proc. 68:304-309.

Mansour, H.H., A. Reyaz, V.A. Valkov, L.A. Lekatz, M.L. VanEmon, **C.S. Schauer**, and K.A. Vonnahme. 2017. Effects of metabolizable protein supply and fetal number on placental vinucleate cells in pregnant sheep during late gestation. J. Anim. Sci. Proc. 68:63-65.

Mansour, H.H., A. Reyaz, V.A. Valkov, L.A. Lekatz, M.L. VanEmon, **C.S. Schauer**, A.T. Grazul-Bilska, and K.A. Vonnahme. 2017. Effects of metabolizable protein level on mammary gland vascularity, proliferation, and alveoli size during late gestation in sheep. J. Anim. Sci. 95(Supp. 2).

Wildlife and Range Science Program

Benjamin Geaumont, Research Assistant Professor and
Daniel Graham, Research Specialist

Projects Conducted

i. On-Farm Crop and Livestock Integration – Third year of an integrated livestock-crop project that incorporates winter wheat and annual forages into a grazing regime. This project has many response variables with pollinators being a major emphasis. I have worked to integrate all HREC scientists into the project. Research is ongoing.

ii. Food Plot Establishment for Wildlife and Pollinators. Third year of a small scale collaborative project with Pheasants Forever and ND Game and Fish Department with the goal of improving food plots in Adams county. In addition to providing cover for pheasants and opportunity for sportspeople, the project is focused on pollinators and annual forage production. Research is ongoing.

iii. Patch-Burn Grazing to Improve Ecosystem Services on Post-Conservation Reserve Program Grasslands. Second year of our patch-burn grazing study on post-CRP lands to evaluate the response of livestock, plants, pollinators and birds to such a system. Pastures were fenced, fire lines established, and baseline data were collected. Burns were conducted in summer 2016 and fall 2017. One PhD and one masters student were added to the project to aid in pollinator and livestock research. This project is being done in collaboration with the Range Science Faculty at North Dakota State University. Research is ongoing.
    a. Initiated an overseeding project within the patch-burn grazing study. Each year we will overseed 5, 1-acre plots in the patch burned the previous year. Plots were seeded in march with a mix of 15 different forbs. Our hypothesis is that reseeding following burning will produce greater plant diversity then burning alone.

iv. Annual Forage Plots for Forage, Soil Health, and Pollinators. Initiated an annual forage/pollinator project. The goal of this project is to establish forage plots that can maximize biomass production for livestock while providing surrogate feeding sites for pollinators. The project was done on a 14 acre site where each of 5 treatments (mixtures) were replicated 3 times each in 0.5 acre plots during 3 planting dates. Research is ongoing.

v. Monitoring native pollinator communities throughout North Dakota: Status and Management considerations for bees and butterflies. (CO-PIS: R. Limb, T. Hovick, and J. Harmon). Conducting statewide pollinator surveys. Evaluate land use, floristic resources and pollinator associations. Funded by ND Department of Agriculture.

Presentations

i. Lakey, M., J. Spiess, D. McGranahan, **B. Geaumont**, T. Hovick, R. Limb, and K. Sedevic. 2017. Heterogeneity in forage quality and vegetation structure determines rangeland livestock use under patch burn-grazing. State Society for Range Management, Annual Meeting, Bismarck, ND.

ii. Cutter, J., T. Hovick, **B. Geaumont**, R. Limb, D. McGranahan. 2017. Promoting Pollinators through Patch-burn Grazing and Overseeding of Native Forbs. State Society for Range Management, Annual Meeting, Bismarck, ND.

iii. **Geaumont, B**., C. Schauer, T. Hovick, R. Limb, and D. McGranahan. 2017. Restoring disturbance to old CRP fields to promote Ecosystem Services. NDSU-REC Spring Conference. Fargo, ND.

iv. **Geaumont**, B, D. Graham, and J. Stackhouse. 2017. Sharp-tailed grouse cover selection and brood survival on the Grand River National Grassland. Prairie Grouse Technical Council, 2017 Meeting, Dickinson, ND.

v. **Geaumont, B.A**. 2017. Pheasant Habitat. ND Pheasants Forever State Meeting, Bismarck, ND. *Invited Speaker*.

vi. **Geaumont, B.A**. 2017. Habitats for bees and butterflies. Adams County 4H Youth Days, Hettinger, ND.

vii. **Geaumont, B**., C. Schauer, T. Hovick, R. Limb, and D. McGranahan, D. Graham, J. Cutter, and J. Spiess. 2017. Patch-burn grazing in North Dakota. NDSU Extension/REC Fall Conference, Fargo, ND.

Publications

i. **Geaumont, B.A**., Schauer, C.S., and K.K. Sedivec. 2017. Ring-necked pheasant use of post-Conservation Reserve Program lands. Rangeland Ecology and Management 70:569-575.

John Rickertsen, Hettinger REC Research Agronomist

Presentations and Outreach

New Varieties Update
West River Breeders, Reeder, ND
January 31, 2017

New Varieties and Research Update
Hettinger County Crop Imp. Asso., Regent, ND
February 8, 2017

New Varieties and Research Update
Taylor Farm Institute, Taylor, ND
February 8, 2017

Spring Wheat Varieties, Soybean Research
Hettinger REC Crop Tour, Hettinger, ND
July 11, 2017

Small Grain Varieties
Hettinger County Crop Tour, Regent, ND
July 20, 2017

Small Grain Varieties
Bowman County Crop Tour, Scranton, ND
July 26, 2017

HREC Booth
USDA-ARS Northern Plains Friends & Neighbors Day, Mandan, ND
July 27, 2017

New Varieties and Research Updates
33rd Western Dakota Crops Day, Hettinger, ND
December 14, 2017

Publications

North Dakota Alternative Crop Variety Trial Results for 2016. January 2017. NDSU Extension Service circular A1105-16.

2016 Research Results, Area 4 SCD Cooperative Research Farm & USDA-NGPRL. Spring Wheat, Durum Wheat and Barley Variety Performance Results. In Proc. March 2017.

North Dakota Hard Winter Wheat Variety Trial Results for 2017. September 2017. NDSU Extension Service circular A1196-17.

North Dakota Canola Variety Trial Results for 2016 and Selection Guide - A1124-17. October 2017. NDSU Extension Service circular A1124-17.

North Dakota Dry Pea Variety Trial Results for 2017. October 2017. NDSU Extension Service circular A1469-17.

North Dakota Durum Wheat Variety Trial Results for 2017. November 2017. NDSU Extension Service circular A1067-17.

North Dakota Dry Bean Variety Trial Results for 2017. November 2017. NDSU Extension Service circular A654-17.

North Dakota Flax Variety Trial Results for 2017. November 2017. NDSU Extension Service circular A1105-17.

North Dakota Hard Red Spring Wheat Variety Trial Results for 2017. December 2017. NDSU Extension Service circular A574-17.

North Dakota Barley, Oat and Rye Variety Trial Results for 2017. December 2017. NDSU Extension Service circular A1049-17.

North Dakota and South Dakota Sunflower Hybrid Trial Results for 2017. December 2017. NDSU Extension Service circular A652-17.

North Dakota Soybean Variety Trial Results for 2017. December 2017. NDSU Extension Service circular A843-17.

North Dakota Corn Hybrid Trial Results for 2017. December 2017. NDSU Extension Service circular A793-17.

34th Annual Western Dakota Crops Day Research Report. December 2017. NDSU Hettinger Research Extension Center Ag. Report No. 34.

No-till Weed Science Research Program

Caleb Dalley, Weed Scientist
Daniel G. Abe, Research Specialist

Presentations and Outreach

Weed Control Program in Southwest North Dakota
Wild World of Weeds Workshop
January 17, 2017

Weed Control in Wheat
Best of the Best in Wheat Conference
Dickinson, ND, February 6, 2017
Minot, ND, February 8, 2017

Preemergence Herbicides for Weed Control in Southwest, ND
CHS Winter Agronomy Meeting
Dickinson, ND
February 13, 2017

Weed Control Updates for Southwest North Dakota
Hettinger REC Crop Tour, Hettinger, ND
July 11, 2017

Weed Control Updates and Herbicide Resistance Management
34th Western Dakota Crops Day, Hettinger, ND
December 14, 2017

Publications

2017 North Dakota Weed Control Guide. January 2017. Richard Zolliger, ed. NDSU Publication W-253.

34th Annual Western Dakota Crops Day Research Report. December 2017. NDSU Hettinger Research Extension Center Ag. Report No. 32.

Dalley, CD and DG Abe (2017) Controlling Japanese Brome During Prairie Restoration in North Dakota. Poster at the Western Society of Weed Science, Coeur d'Alene, ID, March 13-16, 2017.

Keene, CL and CD Dalley (2017) Expanding pre-emergence weed control options in safflower (Carthamus tinctorius). Poster at the Asian Pacific Weed Science Society, Kyoto, Japan, 19-22 September, 2017. http://www.apwss.org/documents/Proc-26-APWSS-2017-Japan.pdf

Keene, CL and CD Dalley (2017) Safflower variety susceptibility to sulfentrazone injury. Poster at the North Central Weed Science Society, St. Louis, MO, 4-7 December 2017. https://ncwss.org/wp-content/uploads/2017-North-Central-Weed-Science-Society-Proceedings-w_attendees.pdf

Ostlie, MH, KA Howatt, CD Dalley (2017) Cover Crop Safety Following Wheat Herbicide Application. Poster at the Western Society of Weed Science, Coeur d'Alene, ID, March 13-16, 2017

Janna Kincheloe, Hettinger REC Extension Livestock Specialist

Presentations and Outreach

Beef Days
Killdeer, Buffalo Gap, Rhame, and Hettinger, ND
January 17-19, 2017

Cover Crops Roundtable
Hettinger, ND
February 2, 2017

ABS Global Meetings
Bowman and Elgin, ND
February 7-8, 2017

Agri-International Trade Show Educational Booth
Bismarck, ND
February 14, 2017

Southwest District Extension Agent/Producer Planning Meetings
February 27-31, 2017

Adams County Youth Activity Day
Hettinger, ND
April 1, 2017

Corn Silage In-Service Training for Extension Agents
Fargo, ND
April 20-21, 2017

Badlands Genetics AI School
Bowman, ND
April 25, 2017

Range In-Service Training for Extension Agents
Streeter, ND
May 25, 2017

Tuberculosis Update
Bowman, ND
May 30, 2017

4-H Livestock Camp – Quality Assurance and Animal Nutrition Workshops
Washburn, ND
June 5-6, 2017

Producing Profits with Stockmanship and Stewardship
Harvey and Carson, ND
June 26-27, 2017

Nitrate QuikTest Training & Certification Workshop for Extension Agents
Dickinson, ND
June 28, 2017

Dealing with Drought Workshop
Hettinger, ND
July 11, 2017

Hettinger County Fair Livestock Interview Judging
Mott, ND
July 12, 2017

Drought Management for Livestock Producers
New Salem, ND
July 14, 2017

Nitrate QuikTest Training & Certification Workshop for Extension Agents
Langdon, ND
August 1, 2017

Adams County Fair Livestock Interview Judging
Hettinger, ND
August 3, 2017

Grant County 4-H Livestock Ultrasound & Carcass Quality Workshop
Carson, ND
August 17, 2017

Nitrate QuikTest Training & Certification Workshop for Extension Agents
Edgeley, ND
August 22, 2017

Cow Cost Roundtable Discussion
Dickinson, ND
August 31-September 1, 2017

Crop/Livestock In-Service for Extension Agents
Washburn, ND
September 6-7, 2017

Grant County 4-H Leader Training
Carson, ND
September 17, 2017

Ration Balancing & Alternative Feeds Workshop
Amidon, ND
September 28, 2017

Backgrounding and Winter Cow Feeding Series
Center, Dickinson, and Bowman, ND – October 10, 2017
Linton, Streeter, and Napoleon, ND – October 11, 2017
Cooperstown, Rugby, and Minot, ND – October 12, 2017

Nitrate Management Workshop
Beulah, ND
November 1, 2017

Multi-State Cow Nutrition Workshop Series
Hulett, WY and Ekalaka, MT – November 14, 2017
Baker and Miles City, MT – November 15, 2017

Dakota Cattlemen's Conference
Minot, ND
December 6-7, 2017

Publications

Webb, M. J., A. A. Harty, R. R. Salverson, **J. J. Kincheloe**, S.M.S. Zuelly, K. R. Underwood, M. K. Luebbe, K. C. Olson, and A. D. Blair. 2017. Effect of nursing-calf implant timing on growth performance and carcass characteristics. J. Anim. Sci. 95:5388-5396.

2017 Advisory Board Minutes

Hettinger Research Extension Center
Advisory Board Meeting- February 23, 2017

Advisory Board members present: Kat Weinert, Ethan Andress, Chuck Christman, Lyle Warner, Duaine Marxen, Cody Jorgenson, Dave Ollila, Jeremy Huether, Matt Neiderman, Sean Seamands, Jamie Enerson and Tom DeSutter (via IVN). Guests present: Ken Grafton (via IVN), Dean Wehri, Tim Faller and Jim Gray. Staff present: Chris Schauer, Ben Geaumont, Janna Kincheloe, Caleb Dalley, John Rickertsen and Cassie Dick.

Kat Weinert called the meeting to order at 12:40 pm.

Kat Weinert asked for a motion to approve the minutes from the previous meeting, Lyle Warner moved to accept the minutes and Matt Neiderman seconded. The motion passed, no opposing.

Kat Weinert then asked for a motion to approve the agenda, Chris Schauer explained that Dr. Grafton would be joining via IVN and we would let him speak to the board once he came on, as his schedule only allowed him to connect for a short time. Chuck Christman moved to accept the agenda and Jeremy Huether seconded. The motion passed, no opposing.

Legislative Update and Director's Report- Chris Schauer, handout provided
Dr. Grafton joined via IVN:
- Prepared for 10% budget cut last fall
- Governor Burgum 13.5% budget cuts
- REC's received $3 million budget cut and Extension received $4 million budget cut
- There will be cuts in programing
- Budget cuts will be made by the REC Director's/administration

Chris Schauer:
- Went over funding/hiring issues with budget cuts
- Scientists writing more grants to pay for tech salaries (soft-funding)
- Hoping to use college interns for the summer field season to help fill agronomy and animal science needs
- Goal for next biennium- get back to base budget
- Asked advisory board members that are interested to testify for funding

Lyle Warner (SBARE rep.):
- 2017-2019 Biennium will probably not be back to base budget
- Using the money to keep employees is most important

Range and Wildlife Report- Benjamin Geaumont, handout provided
Agronomy Report- John Rickertsen, handout provided
Weed Science Report- Caleb Dalley, handout provided
Animal Science Report- Chris Schauer, handout provided
Janna Kincheloe, Introduction and presentation- "Building a Livestock Extension Program for Southwest North Dakota"
Strategic Plan- Working at each discipline (four points- each scientist and one multi-discipline)
Open Discussion-
Dave Ollila- Grant writing opportunities? Chris S- Ben G is working on a federal grant. John and Caleb are writing and looking for the next five-year project. We can hopefully maintain.
Tim Faller- Review grant opportunities? Chris- Highly competitive right now. Ben's position is unique and helps tie everything together, pollinators ties with livestock.
Tom DeSutter- Soil health opportunities with summer tour. John Rickertsen- definite possibility, work on a plan.
Election of Board Members- After discussion Kat Weinert asked for a motion nominating Ethan Andress and Duaine Marxen to serve another three-year term and Dustin Laufer to replace Chuck Christman as the County Commissioner representative and Curt Stanley to replace Lyle Warner as the sheep representative. Tom DeSutter moved and Jeremy Huether seconded. The motion passed, no opposing.

The next meeting will be July 11 in conjunction with the summer Crop Tour.

Staff dismissed at 2:20 pm for Executive Session

Hettinger Research Extension Center
Advisory Board Meeting- July 11, 2017

Board members present: Kat Weinert, Dustin Laufer, Curt Stanley, Duaine Marxen, Ashley Sabin, Cody Jorgenson, Wade Henderson, Tom DeSutter, Dave Ollila, Jeremy Huether, Matt Neiderman, Dustin Freitag, Sean Seamands and Jamie Enerson. Guests present: Tim Faller, Chris Boerboom, Dean Wehri and Mike Belts. Staff present: Chris Schauer, Ben Geaumont, Caleb Dalley, John Rickertsen, Janna Kincheloe, Cassie Dick, Alison Crane, Amanda Long, Jasmine Cutter and Devin Faller.

Kat W called the meeting to order at 12:45 pm.

Kat W asked for a motion to approve the minutes from the previous meeting. Matt N moved to accept the minutes and Wade H seconded. The motion passes, no opposing.

Kat W then asked for a motion to accept the agenda. Tom D moved to accept agenda and Wade H seconded. The motion passes, no opposing.

Chris S introduced new board members and also informed the board members, staff and guest that we would be adding information to our Advisory Board section of the webpage.

Legislative Update
Mike Belts, SBARE Rep- asked board members to talk to their legislators about supporting the REC's and Extension programming. Drought situation.
Chris Boerboom, Extension- Tough drought situation, weekly drought calls for county agents and extension specialist. Extension has made water and nitrate testing available for county offices, and drought meetings for producers have been happening in effected areas. Extension budget cuts for the current biennium, handling with hiring freezes and not replacing leaving/retiring personnel.
Tim Faller- during times of drought our REC's and Extension are even more important, providing services and support for producers.
Director's Report/Strategic Plan- Chris Schauer, handout provided. The station is doing all right, budget cuts made mostly through not hiring/rehiring positions, careful spending and grant writing.
Agronomy Report- John Rickertsen, handout provided. No technician this year. Dropped the New Leipzig plots/tour for budget savings. Even with the drought, everything seems to be doing well and moving along.
Weeds Report- Caleb Dalley, handout provided. Difficulties doing herbicide research with the drought.
Range & Wildlife Report- Ben Geaumont, handout provided. Drought is effecting everything, even the birds and insects. PowerPoint presentation "Pollinators" by Jasmine Cutter (MS graduate student).
Animal Science- Chris Schauer. Amanda Long spoke, (MS graduate student) quick overview of upcoming fertility/male reproductive trial starting July 12, 2017. Alison Crane spoke,(graduated Ph.D. student) quick overview of her past lamb trials.
Extension Livestock Specialist- Janna Kincheloe. Traveled around the area to meet county extension staff and producers. Started local radio spots for the HREC scientist for more community exposure and talk about their projects. Working to revamp extension livestock website. Drought programming/trainings for this summer- water and nitrate testing for area county extension offices.
Capital Requests- Chris Schauer, handout provided. HREC needs to continue being progressive for support in the next session. The strength of our program is our diversity, especially with the wildlife component in agriculture research. SBARE will take testimony this fall. Wade H makes a motion to continue support for Capital Requests and funding for the two open positions (agronomy tech and animal science research specialist). Dustin L seconded. The motion passes no opposing.
Open discussion- Tim Faller- need to be voice full for agriculture, it is still number one in ND. Tom D- everyone needs to be a champion for agriculture and research.

Winter meeting- TBA

Staff dismissed for executive session at 2:15.

2017 Personnel

Hettinger Research Extension Center

Christopher Schauer	Director and Animal Scientist
Janna Kincheloe	Area Extension Specialist, Livestock Systems
Benjamin Geaumont	Research Assistant Professor/Wildlife and Range Science
John Rickertsen	Associate R/E Center Specialist/Agronomy
Caleb Dalley	Research Weed Scientist
Daniel Graham	Wildlife and Range Technician
Daniel Guimaraes Abe	Weed Science Technician
Terri Lindquist	Finance Paraprofessional
Cassie Dick	Administrative Secretary
Don Stecher	Manager of Ag Operations
David Pearson	Research Technician/Shepherd
Donald Drolc	Research Technician/Livestock
Stephanie Schmidt	Research Technician/Livestock

Range and Wildlife Graduate Students
Wyatt Mack, Craig Marshall and Jasmine Cutter
Animal Science Graduate Students
Alison Crane and Amanda Long

The Hettinger Research Extension Center hires individuals on a part-time basis to help in the research effort. Many of these are students as well as local residence. We would like to acknowledge the following people who helped at some time during the past year: John White, Devin Faller, Zach Rickertsen, Rebecca Knutson, Ben Dalley, Katie Graham, Kaitlin Jahner and Matthew Wagner.

Advisory Board Members

Kat Weinert, Chair	Hettinger, ND	Tom DeSutter	Fargo, ND
Ethan Andress	Hettinger, ND	Dave Ollila	Rapid City, SD
Dustin Laufer	Hettinger, ND	Jeremy Huether	Mott, SD
Curt Stanley	Bismarck, ND	Matt Neiderman	Morristown, SD
Duaine Marxen	Mott, ND	Dustin Freitag	Bowman, ND
Ashley Sabin	Elgin, ND	Sean Seamands	Lemmon, SD
Cody Jorgenson	Hettinger, ND	Jamie Enerson	Hettinger, ND
Wade Henderson, Vice Chair	Lodgepole, SD	Dean Wheri, SBARE Rep.	Mott, SD

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