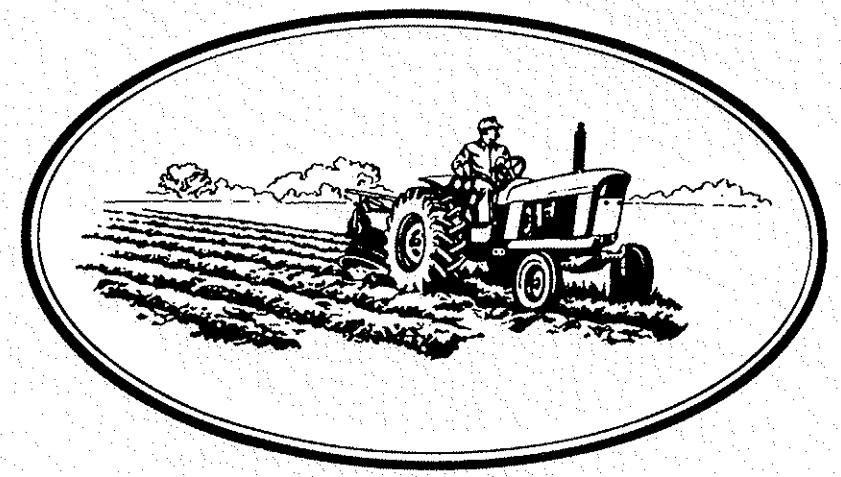
THIRD
ANNUAL

WESTERN DAKOTA

CROPS DAY RESEARCH REPORT



HETTINGER ARMORY
DEC. 11, 1986

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3rd ANNUAL WESTERN DAKOTA CROPS DAY
DECEMBER 11, 1986
HETTINGER ARMORY

MST	9:00 AM	REGISTRATION, Coffee and doughnuts, free time to visit with Ag Industry Program Sponsors
	10:30 AM	Reports of Agronomic Research conducted at the Dickinson Station - Mr. Tom Conlon, Superintendent & Agronomist Dickinson Experiment Station
	11:15 AM	Reports of Agronomic Research conducted at the Hettinger Station - Mr. Jim Jakicic, Agronomist Hettinger Research Extension Center
	12:00 Noon	LUNCH provided by Program Sponsors and free time to visit with Sponsors
	1:30 PM	WELCOME - Dr. H.R. Lund, Director NDSU Agricultural Experiment Station and - Mr. Jim Broten, President North Dakota Crop Improvement Assoc.
	1:45 PM	Developing New Varieties and Plant Breeding Progress for North Dakota - Dr. Jack Carter, Department Chairman Department of Agronomy, NDSU Fargo, ND
	2:30 PM	Crop Diseases in North Dakota in 1986 - Their Implication for 1987 - Dr. Richard Kiesling, Department Chairman Department of Plant Pathology, NDSU Fargo
	3:15 PM	3 AG INDUSTRY REPRESENTATIVES to speak on their agricultural products
	3:45 PM	CONCLUSION - Coffee and opportunity to visit with Ag Industry Program Sponsors
		SOUTHWEST DISTRICT CROP IMPROVEMENT ASSOCIATION MEETING, L ROOM

ACKNOWLEDGEMENTS

The Hettinger Research & Extension Center and Dickinson Experiment Station gratefully acknowledge and thank the following companies and organizations for their financial support of and participation in this year's Western Dakota Crops Day. Those listed below have provided for the noon meal and have sponsored the event in total. We thank them for their past and present commitment and support.

1986 WESTERN DAKOTA CROPS DAY SPONSORS

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Monsanto Ag Products
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Hettinger Area Chamber of Commerce
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TABLE OF CONTENTS

	Page
Growing Conditions - Hettinger	1
Growing Conditions - Dickinson	2
Dollar Return of Hard Red Spring Wheat Varieties	3
Hettinger On-Station Hard Red Spring Wheat Variety Trial	4
Dickinson On-Station Hard Red Spring Wheat Variety Trial	6
Hettinger Off-Station Hard Red Spring Wheat Variety Trial	7
Dickinson Off-Station Hard Red Spring Wheat Variety Trial	8
Hettinger On-Station Durum Variety Trial	10
Dickinson On-Station Durum Variety Trial	11
Hettinger Off-Station Durum Variety Trials	12
Dickinson Off-Station Durum Variety Trials	13
Hettinger Off-Station Hard Red Winter Wheat Variety Trials	14
Dickinson On-Station Hard Red Winter Wheat Variety Trials	15
Hettinger On-Station Winter Rye & Triticale Variety Trials	16
Dickinson Winter Rye & Special Crops Variety Trials	17
Hettinger Off-Station Winter Rye Variety Trials	18
Hettinger On-Station Barley Variety Trial	19
Dickinson On-Station Barley Variety Trial	20
Hettinger Off-Station Barley Variety Trials	21
Dickinson Off-Station Barley Variety Trials	22
Hettinger On-Station Oat Variety Trial	23
Dickinson On-Station Oat Variety Trial	24
Hettinger Off-Station Oat Variety Trials	25
Dickinson Off-Station Oat Variety Trials	26
Hettinger Corn Grain and Silage Trial	27
Regent Corn Grain and Silage Trial	28
Dickinson Corn Hybrid Trial:Grain	29
Dickinson Corn Hybrid Trial: Silage	30
Hettinger Oil Sunflower Variety Trial	31
Dickinson Sunflower Hybrid Trial	32
Hettinger & Dickinson On-Station Safflower Variety Trial	33
Dickinson Grain Sorghum, Flax & Buckwheat Variety Trial	34
Hettinger 1986 Croppak Tillage Demonstration Trial	35
Hettinger Investigations Into the Treflan Fallow Wheat Program	36
Hettinger Chemical vs. Conventional Fallow	38
Hettinger Vitavax-200 Flowable Fungicide Treatment	41
Hettinger Response of Spring Wheat, Barley, Durum and Oats to Carolina Dakota Seed Coating	44

GROWING CONDITIONS
HETTINGER RESEARCH AND EXTENSION CENTER
-1986-

Snowfall during the winter 1985-86 was great enough to add an additional 2 inches of recharge moisture above the normal level of 4.1". Snowcover from early November until the spring thaw provided adequate protection against winter injury for even the relatively non-winterhardy wheats such as Rose and Rita. April was fairly wet with intermitent rains which delayed seeding of small grains and caused numerous soil crusting problems. June however remained relatively dry with above normal temperatures causing some sterility in pollinating small grains. Normal growing conditions for the remainder of the season produced adequate to good small grain yields. Frost free days from May 18th to September 6th provided for an effective frost free growing season of 111 days. Late maturing corn (90 day and greater) suffered frost damage which reduced both yield and test weight.

Leaf and stem rusts caused extensive yield losses on suceptible winter wheat varieties such as Norstar and Sundance. Agassiz winter wheat which possesses resistance to stem rust, yielded 60-65 bushels in many areas while Norstar yields were poor and averaged in the low 20's. September precipitation which was over 3 times above normal caused losses in late season crops due to sprout damage. Especially hard hit was safflower and dry edible beans. Corn and sunflower yields were generally good with some corn varieties in the 70-85 bushel range and sunflowers yielding 1500-2500 pounds per acre.

WEATHER DATA SUMMARY
HETTINGER, 1986

Precipitation	1985-86	30 Year Avg.
Sept.-Dec. 1985	4.03	2.97
Jan.-Mar. 1986	1.91	1.13
April-June	7.40	8.08
July-August	3.11	3.81
Total	16.45	15.99

Average Temperature F	1986 Avg.	30 Year Avg.
April	41.0	42
May	53.5	54
June	66.7	64
July	69.5	70
August	66.3	69

GROWING CONDITIONS - 1986

Fall precipitation during the last four months of 1985 was 2 inches above average and provided good soil water for fall seedings of winter wheat and winter rye, pasture and hayland as well as residual soil water for fallow and recrop stubble. Above average precipitation was well distributed during the growing season except for a dry period starting on May 25 and extending through June. While total precipitation for June was above average, 3.30 inches of that total fell during the last four days of the month.

Insect damage during the 1986 season requiring control included seed weevil on sunflower and blister beetle on lupine and canola. Grasshoppers were a serious pest in some areas in southwestern North Dakota but were not a problem on the station. Sawfly damage seemed to be more prevalent in 1986 in this region than it has been for many years.

Leaf spotting diseases and leaf rust developed under the good moisture conditions which prevailed, but the most severe disease problem occurring was stem rust of both winter and spring wheat. The most stem rust susceptible winter wheat variety in trials at Dickinson was Norstar. Bronze Chief, the most susceptible spring wheat in Dickinson trials produced 15.3 bushels of 56.5 pound wheat compared with 67.6 bushels of 63.0 pound wheat from the highest yielding entry, showing the serious effect of stem rust on susceptible cultivars.

Weather Data Summary
Dickinson - 1986

Precipitation	1985-86	94 year average
Sept. - Dec. 1985	5.19	3.15
Jan. - Mar. 1986	1.35	1.53
April - June	9.44	7.30
July - Aug.	4.46	3.91
Total	20.44	15.89
Average Temperature ^{o}F	1986 Avg.	94 year average
April	40	41
May	52	54
June	65	61
July	65	69
August	64	67

DOLLAR RETURN OF VARIOUS HARD RED SPRING WHEAT VARIETIES GROWN IN SOUTHWESTERN NORTH DAKOTA

The following is a calculation of the gross return per acre for all hard red spring wheat varieties having a minimum of 4 years yield data at three sites in southwestern North Dakota. Yield and protein information was averaged over three sites including Hettinger, Scranton, and Regent. Gross return is based on quoted wheat prices for November 18th, 1986 at Reeder, North Dakota. Returns are from production only and do not include any government farm program payments.

Hard Red Spring Wheat Prices
Reeder, North Dakota
November 18th 1986

% Protein	Dollars/bu
14.00	$2.37
14.25	2.47
14.50	2.57
14.75	2.67
15.00	2.77 + $0.10/bu
15.25	2.86 + 0.10/bu
15.50	2.95 + 0.10/bu
15.75	3.04 + 0.10/bu
16.00	3.13 + 0.10/bu
16.25	3.19 + 0.10/bu
16.50	3.25 + 0.10/bu
16.75	3.31 + 0.10/bu
17.00	3.37 + 0.10/bu

EXERCISE IN GROSS DOLLAR RETURN PER ACRE
FOR SELECTED[1] HRSW VARIETIES

Variety	4 Year Average Yield Over 3 Sites[2]	2 Year Average Protein Over 3 Sites[2]	Gross Income Dollars/ac[3]	Percent of HRSW Acreage In SW ND
Alex	46.1	16.6	$154.44	22.7
Marshall*	46.5	16.2	152.99	9.8
Coteau	43.0	17.1	149.21	9.2
Wheaton*	48.9	15.4	144.74	Nil
Butte	46.3	15.2	137.05	3.5
Len*	43.3	15.2	128.17	26.0

1 All HRSW varieties having 4 year yield averages (1983-86)
2 Sites include Hettinger, Scranton, and Regent
3 Bushels x $/bu at respective average protein contents
* Semi-dwarf

1986 HETTINGER ON-STATION
HARD RED SPRING WHEAT VARIETY TRIAL

Variety	Bushels per Acre~	Test Weight lbs/bu~	Grain Protein` %	Heading Date June
Nordic	47.7	60.8	13.9	23
ND 625	41.4	59.1	15.1	27
ND 624	40.4	58.9	14.9	25
ND 628	40.2	57.6	15.9	26
SD 2956	39.5	59.9	14.4	19
ND 626	38.8	59.1	15.3	20
ND 627	37.8	59.2	16.1	21
Alex	37.4	59.7	16.6	24
ND 622	36.7	60.4	16.1	22
Norak	36.5	59.3	15.1	22
Telemark	35.6	56.9	15.5	23
ND 606	35.4	59.3	16.2	23
Kenyon	35.2	57.5	16.9	22
ND 623	34.5	59.5	15.3	21
ND 629	33.9	57.7	16.2	28
Lancer	33.4	58.9	16.5	22
Challenger	33.2	58.5	14.4	19
Leif	32.1	58.6	15.4	26
Guard	31.9	58.4	15.6	23
Glenman	31.3	56.0	14.3	26
ND 618	31.2	58.3	15.9	26
Butte	30.7	60.4	15.2	18
Cutless	30.5	59.0	16.8	24
Butte 86	30.4	58.8	16.0	22
Apex 83	30.1	58.2	14.6	19
Leo 747	29.8	57.0	15.3	19
Solar	29.1	58.4	14.6	28
Celtic	29.1	59.0	15.5	24
Lew	28.7	59.0	16.1	24
HY 320	28.5	59.0	13.9	22
Wheaton	28.0	56.2	15.1	26
Columbus	27.9	57.1	16.6	28
Olaf	27.7	57.9	15.3	26
ND 617	27.7	61.9	15.7	25
Katepwa	27.6	57.6	16.1	26

~ Yield and test weight at 12% moisture
` % Protein at 14% moisture

1986 HETTINGER ON-STATION
HARD RED SPRING WHEAT VARIETY TRIAL
continued

Variety	Bushels per Acre~	Test Weight lbs/bu~	Grain Protein` %	Heading Date June
2369	27.5	59.7	15.8	23
Stoa	27.2	57.5	16.1	28
Success	25.6	56.8	15.6	28
Marshall	25.3	57.1	15.9	26
Len	25.0	57.9	16.8	26
Norseman	24.8	55.9	15.7	26
SD 8026	23.9	56.2	14.9	19
Waldron	23.3	57.0	16.1	26
Walera	22.8	57.3	14.9	28
Coteau	22.5	57.5	17.3	27
Bronze Chief	19.4	50.2	13.9	18
Highest	47.7 bu	61.9 lbs	17.3%	28
Lowest	19.4	50.2	13.9	18
# of Reps	4	4	1	2
C.V.%	16.7	1.9		
LSD 5%	7.2	1.5		
LSD 1%	9.5	2.0		

~ Yield and test weight at 12% moisture
` % Protein at 14% moisture

Seeding Rate: 1,000,000 live seeds/acre, (approx. 1 bu./ac.)
Seeding Date: April 11th
Fertilizer Applied: 50 lbs./ac. 18-46-0
Yield Goal: 45 bu./ac. (soil residual nutrients + fertilizer applied)
Herbicide Applied: 1 pint/ac Brominal 3+3
18 gal per acre spray volume, 5 MPH
Harvest Date: August 7th

1986 Dickinson Hard Red Spring Wheat Variety Trial

Variety	Bu/A Avg.	Test Wt lbs.	Heading Date	Height in.
ND 628 *	69.8	59.5	26-Jun	27
Nordic *	65.5	63.5	24-Jun	28
Wheaton *	63.8	61.5	24-Jun	26
ND 627 *	62.7	63.0	23-Jun	28
SD 2956 *	62.0	62.0	23-Jun	27
Stoa	61.6	61.0	26-Jun	32
Leif *	60.8	61.0	24-Jun	29
Pioneer 2369 *	60.6	62.5	24-Jun	27
ND 625	59.1	61.5	26-Jun	31
Era *	58.1	60.0	25-Jun	26
Telemark *	58.0	61.5	23-Jun	24
SD 8026	57.5	62.0	20-Jun	28
ND 617 *	56.7	60.5	24-Jun	28
Marshall *	56.5	61.5	26-Jun	25
Lew	56.4	63.0	26-Jun	31
ND 618 *	56.1	61.0	25-Jun	27
HY-320 *	56.1	61.5	24-Jun	27
Walera *	55.9	58.5	26-Jun	27
Glenman *	55.8	60.5	25-Jun	26
Katepwa	55.3	61.0	23-Jun	32
Len *	54.6	61.5	25-Jun	28
ND 624	54.4	62.0	25-Jun	30
Norak *	54.2	62.5	22-Jun	26
ND 606	53.3	57.0	23-Jun	30
ND 629 *	53.0	60.5	28-Jun	29
Kenyon	52.7	60.5	24-Jun	32
Success *	52.5	60.5	27-Jun	31
Butte 86	51.8	63.0	21-Jun	27
ND 622	51.8	62.5	22-Jun	28
Columbus	51.8	61.0	26-Jun	34
Olaf *	51.3	61.0	23-Jun	28
Celtic *	51.2	62.0	23-Jun	27
ND 626 *	51.1	61.5	24-Jun	28
Norseman *	49.2	60.0	26-Jun	25
Leo 747 *	49.2	61.5	20-Jun	25
Waldron	49.2	60.0	22-Jun	32
Cutless *	49.2	62.5	22-Jun	28
Coteau	48.0	60.5	26-Jun	33
Guard *	47.5	62.5	21-Jun	26
Challenger *	46.7	62.0	21-Jun	26
Alex	45.4	60.0	25-Jun	28
Buckshot *	45.4	61.0	23-Jun	26
ND 623 *	44.9	62.5	23-Jun	27
Butte	44.0	63.5	21-Jun	29
Lancer	43.3	61.5	24-Jun	32
Apex 83 *	38.0	62.5	19-Jun	24
Bronze Chief *	15.3	56.5	18-Jun	22

* semidwarf
Seeding Rate: 1,000,000 live seed/acre, (approx. 1 bu/ac.)
Seeding Date: April 24 Harvest Date: Aug. 7
Fertilizer applied: 50 lbs./ac. 18-46-0, 36 lbs./ac. 46-0-0
Herbicide Applied: Hoelon-Buctril tank mix
L.S.D. 5% = 7.9 C.V. = 9.1%

1986 Hettinger Off-Station Hard Red Spring Wheat

Variety	Hettinger	Regent	Flasher	Thunderhawk	Scranton	Average 5-Sites
			Bushels per Acre			
Alex	37.4	31.2	41.6	41.7	53.0	41.0
Apex 83 *	30.1	34.0	37.6	44.6	38.6	37.0
Butte	30.7	44.9	39.0	36.1	45.8	39.3
Butte 86	30.4	52.8	41.5	47.3	47.2	43.8
Coteau	22.5	47.7	36.7	33.4	49.4	37.9
Cutless *	30.5	48.8	42.6	40.6	49.6	42.4
Guard *	31.9	36.0	41.6	30.2	45.5	37.0
Leif *	32.1	52.3	43.3	35.0	57.4	44.0
Len *	25.0	38.9	35.1	26.9	48.2	34.8
Leo 747 *	29.8	31.2	42.0	38.5	44.2	37.1
Marshall *	25.3	38.8	37.6	26.5	47.2	35.1
Norak *	36.5	44.6	45.6	51.4	50.9	45.8
Norseman *	24.8	33.7	41.5	32.1	44.6	35.3
Stoa	27.2	53.0	38.3	42.9	47.7	41.8
Success *	25.6	49.2	46.7	38.1	51.5	42.2
Wheaton *	28.0	44.3	38.2	26.4	45.1	36.4
Pioneer 2369	27.5	44.2	43.5	40.6	41.9	39.5
			Test Wt. lbs./bu.			
Alex	59.7	53.9	57.8	56.8	61.2	57.9
Apex 83 *	58.2	57.4	56.9	57.3	60.1	58.0
Butte	60.4	60.7	58.5	58.5	61.8	60.0
Butte 86	58.8	60.5	58.6	59.9	61.1	59.8
Coteau	57.5	55.8	56.5	56.6	58.5	57.0
Cutless *	59.0	60.1	58.5	58.8	62.2	59.7
Guard *	58.4	54.7	58.3	52.5	60.5	56.9
Leif *	58.6	56.6	57.2	55.5	60.2	57.6
Len *	57.9	54.4	56.7	53.8	58.5	56.3
Leo 747 *	57.0	56.8	56.9	54.2	58.9	56.8
Marshall *	57.1	52.0	56.3	53.8	59.7	55.8
Norak *	59.3	57.5	57.8	59.2	62.1	59.2
Norseman *	55.9	52.1	55.8	52.6	58.6	55.0
Stoa	57.5	57.1	56.2	57.2	59.4	57.5
Success *	56.8	52.7	56.3	54.5	57.8	55.6
Wheaton *	56.2	55.5	54.2	52.8	58.4	55.4
Pioneer 2369	59.7	57.3	57.5	58.7	61.3	58.9

* semidwarf

Seeding Date:	Apr. 21	Apr. 22	Apr. 23	Apr. 23	Apr. 22
Harvest Date:	Aug. 14	Aug. 16	Aug. 17	Aug. 17	Aug. 16
L.S.D. 5% :	7.2	4.3	3.6	5.8	5.5
C.V. % :	16.7	7.1	6.1	11.0	8.1

Fertilizer Applied: according to soil test at each site.
Herbicide Applied: Buctril-Hoelon tank mix
Seeding Rate: 1 bu./ac.

1986 Dickinson Off-Station Hard Red Spring Wheat

Variety	Dickinson	Beulah	Manning	Average 3-Sites	Average 8-Sites
			Bushels per Acre		
Alex	45.4	42.9	47.9	45.4	42.6
Apex 83 *	38.0	39.1	40.4	39.2	37.8
Butte	44.0	44.0	41.3	43.1	40.7
Butte 86	51.8	52.8	43.7	49.4	45.9
Coteau	48.0	58.6	48.1	51.6	43.1
Cutless *	49.2	37.4	42.4	43.0	42.6
Guard *	47.5	54.2	52.0	51.2	42.4
Leif *	60.8	47.0	49.8	52.5	47.2
Len *	54.6	45.7	47.0	49.1	40.2
Leo 747 *	49.2	46.2	41.5	45.6	40.3
Marshall *	56.5	57.8	53.1	55.8	42.8
Norak *	54.2	54.5	50.6	53.1	48.5
Norseman *	49.2	55.0	46.8	50.3	41.0
Stoa	61.6	55.0	55.3	57.3	47.6
Success *	52.5	55.8	55.3	54.5	46.8
Wheaton *	63.8	66.0	50.1	60.0	45.2
			Test Wt. lbs./bu.		
Alex	60.0	60.5	64.0	61.5	59.2
Apex 83 *	62.5	60.0	62.0	61.5	59.3
Butte	63.5	61.5	64.0	63.0	61.1
Butte 86	63.0	61.0	63.5	62.5	60.8
Coteau	60.5	57.5	62.5	60.2	58.2
Cutless *	62.5	59.0	61.5	61.0	60.2
Guard *	62.5	60.0	63.0	61.8	58.7
Leif *	61.0	59.0	63.5	61.2	59.0
Len *	61.5	59.0	64.0	61.5	58.2
Leo 747 *	61.5	58.5	62.0	60.7	58.2
Marshall *	61.5	55.5	63.5	60.2	57.4
Norak *	62.5	59.5	63.5	61.8	60.2
Norseman *	60.0	58.5	62.5	60.3	57.0
Stoa	61.0	60.0	63.0	61.3	58.9
Success *	60.5	57.0	63.5	60.3	57.4
Wheaton *	61.5	58.0	62.0	60.5	57.3

* semidwarf

Seeding Date:	Apr. 24	May 14	May 1	
Harvest Date:		Aug. 19	Aug. 18	
L.S.D. 5% :	7.6	7.5	4.2	6.6
C.V. % :	8.6	14.6	8.7	

Fertilizer Applied: according to soil test at each site.
Herbicide Applied: Buctril-Hoelon tank mix
Seeding Rate: 1 bu./ac.

1986 Hettinger Off-Station Hard Red Spring Wheat

Variety	Hettinger	Regent	Flasher	Thunderhawk	Scranton	Average 5-Sites
			Protein Percent @ 14% Moisture			
Alex	16.6	15.5	15.1	15.6	13.6	15.3
Apex 83 *	14.6	14.2	13.7	14.1	12.7	13.9
Butte	15.2	14.0	13.7	13.8	12.4	13.8
Butte 86	16.0	14.7	14.6	14.9	14.2	14.9
Coteau	17.3	15.0	16.0	15.7	14.7	15.7
Cutless *	16.8	15.0	15.3	15.6	14.8	15.5
Guard *	15.6	15.0	14.1	15.6	13.7	14.8
Leif *	15.4	14.3	15.1	15.7	13.2	14.7
Len *	16.8	15.1	15.7	16.2	13.6	15.5
Leo 747 *	15.3	15.0	14.1	14.5	13.8	14.5
Marshall *	15.9	14.1	13.8	13.9	13.2	14.2
Norak *	15.1	14.2	14.1	14.3	13.0	14.1
Norseman *	15.7	14.8	14.6	15.3	14.3	14.9
Stoa	16.1	14.4	15.1	14.6	13.2	14.7
Success *	15.6	13.7	14.1	14.4	14.0	14.4
Wheaton *	15.1	13.7	13.7	14.1	12.8	13.9
Pioneer 2369 *	15.8	13.9	14.4	14.6	13.2	14.4

1986 Dickinson Off-Station Hard Red Spring Wheat

Variety	Dickinson	Beulah	Manning	Average 3-Sites	Average 8-Sites
		Protein Percent @ 14% Moisture			
Alex	16.0	13.9	13.5	14.5	15.0
Apex 83 *	15.0	13.2	13.6	13.9	13.9
Butte	15.0	14.1	13.4	14.2	14.0
Butte 86	15.0	14.4	12.8	14.1	14.6
Coteau	15.8	14.8	13.8	14.8	15.4
Cutless *	15.9	14.8	15.7	15.5	15.5
Guard *	14.9	13.6	12.5	13.7	14.4
Leif *	15.5	14.6	14.8	15.0	14.8
Len *	15.5	14.8	13.9	14.7	15.2
Leo 747 *	15.6	14.0	14.1	14.6	14.6
Marshall *	14.3	12.5	13.2	13.3	13.9
Norak *	15.1	13.8	14.2	14.4	14.2
Norseman *	15.3	13.4	13.6	14.1	14.6
Stoa	15.5	14.0	14.2	14.6	14.6
Success *	14.3	13.3	12.9	13.5	14.0
Wheaton *	14.5	13.0	13.4	13.6	13.8

1986 HETTINGER ON-STATION
DURUM VARIETY TRIAL

Variety	Bushels per Acre~	Test Weight lbs/bu~	Grain Protein` %	Heading Date June
D8291	48.6	59.4	16.0	29
D8194	48.0	61.8	15.1	26
Monroe	47.7	61.4	14.6	21
D81154	47.7	61.1	15.7	26
D79168	45.2	61.4	14.4	27
Medora	44.5	61.4	14.6	26
D8279	43.4	60.1	14.5	25
D8016	43.3	60.0	15.0	25
D8269	43.1	60.8	16.6	27
HD81-485	41.1	62.2	14.3	25
D8012	41.1	61.0	14.6	25
D81183	39.9	60.6	15.1	28
D8193	39.6	60.2	15.2	26
D8191	39.5	59.6	15.3	27
D8019	38.5	57.5	16.0	25
Laker	38.0	61.9	13.7	24
D81151	36.4	59.1	15.1	28
D8261	36.0	61.0	14.9	23
D82136	35.6	61.5	15.8	23
D8263	35.6	60.7	16.2	22
Vic	35.2	60.9	15.0	28
HD81-466	34.8	61.3	14.1	24
D79209	34.3	60.3	14.2	24
D8172	33.6	59.7	16.1	26
Rugby	33.4	61.3	14.8	28
Ward	31.6	61.1	15.5	21
Lloyd	28.0	60.6	15.0	26
Highest	48.6 bu	62.2 lbs	16.6%	29
Lowest	28.0	57.5	13.7	21
# of Reps	4	4	1	2
C.V.%	25.0	1.6		
LSD 5%	NS	1.4		
LSD 1%	NS	1.8		

~ Yield and test weight at 12% moisture
` % Protein at 14% moisture

Seeding Rate: 1,000,000 live seeds/acre, (approx. 1 bu./ac.)
Seeding Date: April 21st
Fertilizer Applied: 50 lbs./ac. 18-46-0
Yield Goal: 45 bu./ac. (soil residual nutrients + fertilizer applied)
Herbicide Applied: 1 pint/ac Brominal 3+3
18 gal per acre spray volume, 5 MPH
Harvest Date: August 14th

1986 Dickinson Durum Variety Trial

Variety	Bu/A Avg.	Test Wt lbs.	Heading Date	Height in.
D 81151	59.3	61.5	25-Jun	32
D 79168 *	57.3	61.0	26-Jun	27
D 8291 *	52.5	60.5	28-Jun	26
D 81183 *	51.8	61.5	27-Jun	27
NAHD81-466 *	51.2	60.5	26-Jun	27
Lloyd *	51.2	59.5	28-Jun	27
D 8279 *	49.9	61.0	27-Jun	28
Rugby	49.6	60.0	26-Jun	32
D 8016	49.4	59.0	26-Jun	29
Medora	47.8	61.5	25-Jun	30
D 82136 *	47.6	62.0	25-Jun	25
Laker *	45.4	60.5	27-Jun	28
Ward	45.2	59.0	25-Jun	32
D 8012	45.1	56.5	25-Jun	28
D 8172	44.2	59.0	25-Jun	31
Monroe	44.1	59.5	25-Jun	30
D 79209 *	43.8	60.5	26-Jun	27
D 81154	43.5	57.0	25-Jun	29
D 8019	42.5	57.5	26-Jun	30
D 8263 *	40.5	58.0	27-Jun	27
D 8194	40.0	58.0	25-Jun	28
D 8261 *	38.7	60.5	27-Jun	28
NAHD81-485	36.7	58.0	25-Jun	30
Vic	36.5	58.5	27-Jun	32
D 8193	36.4	56.5	25-Jun	29
D 8269 *	35.3	59.0	27-Jun	28
D 8191	33.8	57.5	26-Jun	28

* semidwarf
Seeding Rate: 1,000,000 live seed/acre, (approx. 1 bu./ac.)
Seeding Date: April 29 Harvest Date: August 12
Fertilizer Applied: 50 lbs./ac. 18-46-0
Herbicide Applied: Hoelon-Buctril tank mix
L.S.D. 5% = 6.2 C.V. = 10.1%

1986 Hettinger Off-Station Durum Variety Trials

Variety	Hettinger	Regent	Flasher	Thunderhawk	Scranton	Average 5-Sites
			Bushels per Acre			
Laker *	38.0	42.0	47.8	50.8	62.8	48.3
Lloyd *	28.0	45.1	47.8	45.3	61.6	45.6
Monroe	47.7	42.5	42.8	49.3	55.8	47.6
Vic	35.2	46.3	40.8	51.4	56.7	46.1
Ward	31.6	45.7	44.5	49.3	56.8	45.6
			Test Wt. lbs./bu.			
Laker *	61.9	58.8	58.8	57.1	62.1	59.7
Lloyd *	60.6	58.3	59.6	58.1	61.0	59.5
Monroe	61.4	58.7	58.6	59.1	61.9	59.9
Vic	60.9	58.5	59.0	60.6	62.0	60.2
Ward	61.1	58.2	59.9	60.2	62.0	60.3

* semidwarf

Seeding Date:	Apr. 21	Apr. 22	Apr. 23	Apr. 23	Apr. 22
Harvest Date:	Aug. 14	Aug. 16	Aug. 17	Aug. 17	Aug. 16
L.S.D. 5% :	NS	NS	5.0	NS	3.5
C.V. % :	25.0	8.4	7.2	7.8	3.9

Fertilizer Applied: according to soil test at each site.
Herbicide Applied: Buctril-Hoelon tank mix
Seeding Rate: 1 bu./ac.

1986 Dickinson Off-Station Durum Variety Trials

Variety	Dickinson	Beulah	Manning	Average 3-Sites	Average 8-Sites
			Bushels per Acre		
Laker *	45.4	36.6	50.1	44.0	46.7
Lloyd *	51.2	40.0	50.1	47.1	46.1
Monroe	44.1	55.3	53.2	50.8	48.8
Vic	36.5	45.3	52.6	44.8	45.6
Ward	45.2	55.6	54.8	51.9	47.9
			Test Wt. lbs./bu.		
Laker *	60.5	60.5	63.5	61.5	60.4
Lloyd *	59.5	57.5	63.5	60.2	59.8
Monroe	59.5	61.5	63.5	61.5	60.5
Vic	59.0	59.0	64.0	60.7	60.4
Ward	61.0	61.0	63.5	61.8	60.9

* semidwarf

Seeding Date:	Apr. 29	May 14	May 1	
Harvest Date:	Aug. 12	Aug. 19	Aug. 18	
L.S.D. 5% :	6.2	4.2	8.8	6.7
C.V. % :	10.1	8.4	15.4	

Fertilizer Applied: according to soil test at each site.
Herbicide Applied: Buctril-Hoelon tank mix
Seeding Rate: 1 bu./ac.

1986 HETTINGER OFF-STATION
HARD RED WINTER WHEAT VARIETY TRIALS

REGENT

Variety	Bushels per Acre~	Test Weight lbs/bu~	Grain Protein` %
Rita	72.1	56.7	12.8
Agassiz	66.3	60.1	12.2
Winoka	59.8	59.0	11.2
Centurk	59.3	59.0	11.9
Rose	54.0	57.2	11.5
Roughrider	51.8	57.3	12.2
Froid	50.9	57.1	11.5
Norstar	27.1	50.2	10.2
Sundance	22.5	46.6	11.3
Highest	72.1 bu	60.1 lbs	12.8%
Lowest	22.5	46.6	10.2
C.V. %	9.8	1.9	
LSD 5%	7.4	1.5	
LSD 1%	10.0	2.0	
# of Reps	4	4	Bulk

SCRANTON

Variety	Bushels per Acre~	Test Weight lbs/bu~	Grain Protein` %
Agassiz	46.9	61.6	10.9
Winoka	38.2	61.1	10.7
Froid	37.8	58.8	11.5
Roughrider	33.0	59.1	11.1
Rita	32.5	59.0	12.8
Rose	31.4	58.7	10.6
Norstar	28.6	54.5	10.3
Centurk	25.5	59.4	10.1
Sundance	23.0	49.4	10.2
Highest	46.9 bu	61.6 lbs	12.8%
Lowest	23.0	49.4	10.1
C.V. %	14.0	1.5	
LSD 5%	6.7	1.3	
LSD 1%	9.1	1.7	
# of Reps	4	4	Bulk

THUNDERHAWK

Variety	Bushels per Acre~	Test Weight lbs/bu~	Grain Protein` %
Rita	64.5	56.4	13.5
Centurk	60.9	59.4	12.2
Agassiz	58.5	60.0	12.6
Winoka	51.2	59.5	11.9
Froid	49.2	56.6	12.7
Roughrider	48.9	57.7	12.1
Rose	44.8	56.7	10.8
Norstar	25.4	49.3	9.7
Sundance	17.5	43.3	10.9
Highest	64.5 bu	60.0 lbs	13.5%
Lowest	17.5	43.3	9.7
C.V. %	10.2	2.0	
LSD 5%	7.0	1.6	
LSD 1%	9.5	2.2	
# of Reps	4	4	Bulk

FLASHER

Variety	Bushels per Acre~	Test Weight lbs/bu~	Grain Protein` %
Rita	50.7	56.0	13.2
Rose	50.4	59.6	12.3
Winoka	45.1	59.4	13.3
Norstar	44.8	58.3	11.7
Agassiz	43.5	58.9	13.4
Roughrider	42.8	58.6	14.2
Centurk	42.1	57.6	12.5
Froid	41.7	57.0	12.9
Sundance	37.7	55.1	11.4
Highest	50.7 bu	59.6 lbs	14.2%
Lowest	37.7	55.1	11.4
C.V. %	9.5	0.7	
LSD 5%	6.1	0.6	
LSD 1%	8.3	0.8	
# of Reps	4	4	Bulk

~ Yield and test weight at 12% moisture
` % Protein at 14% moisture

1986 Dickinson Hard Red Winter Wheat Variety Trial

Variety	Fallow Bu/A Avg.	Fallow Test Wt lbs.	No-till Stubble Bu/A Avg.	No-till Stubble Test Wt lbs.
Siouxland	59.4	61.5	29.1	61.5
Agassiz	50.6	62.0	34.0	62.5
Winoka	48.4	62.0	28.0	63.5
Roughrider	46.5	60.5	28.7	61.5
Froid	44.0	60.5		
Norstar	37.8	57.5	21.1	59.5

Seeding Rate: 50 lbs./ac. Seeding Date: September 9
Harvest Date: Fallow, July 28 Stubble, July 29
Fertilizer Applied: 50 lbs./ac. 18-46-0 drill-applied at seeding to both fallow and stubble seedings; 50 lbs./ac. 46-0-0 spring broadcast on stubble only.
L.S.D. 5% = Fallow, 3.8 Stubble, 1.6
C.V. = Fallow, 7.4% Stubble, 5.0%

1986 HETTINGER ON-STATION
WINTER RYE & WINTER TRITICALE
VARIETY TRIALS

WINTER RYE

Variety	Bushels per Acre	Test Weight lbs/bu	Heading Date May
Chaupon	63.8	49.7	29
Hancock	49.1	51.8	27
Fredrick	44.0	52.5	28
Cougar	43.1	52.8	25
Musketeer	39.8	50.7	23
Danko	39.2	52.4	26
Puma	31.5	51.7	21
Highest	63.8 bu	52.8 lbs	29
Lowest	31.5	49.7	21
# of Reps	4	4	2
C.V. %	16.9	1.9	
LSD 5%	11.2	1.4	
LSD 1%	15.3	2.0	

WINTER TRITICALE

Variety	Bushels per Acre	Test Weight lbs/bu	Heading Date May
I18	46.0	47.4	28
239	41.2	46.4	26
Double Crop	24.5	43.7	31
Highest	46.0 bu	47.4 lbs	31
Lowest	24.5	43.7	26
# of Reps	4	4	2
C.V. %	24.1	3.0	
LSD 5%	15.5	2.3	
LSD 1%	NS	NS	

Seeding Rate: 56 lb/ac Winter Rye (Pure Live Seed)
50 lb/ac Winter Triticale (Pure Live Seed)
Seeding Date: September 10, 1985
Fertilizer Applied: None at planting due to dry soil conditions.
Applied 50 lb./ac. 28-29-0 as spring top dress.
Yield Goal: 60 bu/ac (soil residual nutrients + fertilizer applied)
Herbicide Applied: 1 pint/ac Brominal 3+3 applied April 14th
18 gal. per acre spray volume, 5 MPH
Harvest Date: August 3rd

1986 Dickinson Winter Rye and Special Crops Variety Trials

Variety	Bu/A Avg.	Test Wt lbs.
Chaupon	49.1	52.0
Frederick	33.0	56.5
Musketeer	35.4	56.5
Puma	43.2	55.0
Speltz *	86.0	43.5
Gazelle **	48.3	55.0
Triticale	66.0	50.0

* yield based on 43.5 lbs./bu. test weight
** spring rye

---- Winter Rye Statistics ----
Seeding Date: Sept. 23 Harvest Date: July 19
Row Width: 10 inches
Seeding Rate:
Fertilizer Applied: 50 lbs./ac. 18-46-0
L.S.D. 5% : 4.8
C.V.: 10.6%

1986 HETTINGER OFF-STATION
WINTER RYE VARIETY TRIALS

REGENT

Variety	Bushels per Acre~	Test Weight lbs/bu~	Test Weight (Rank)
Danko	82.3	54.3	(1)
Chaupon	72.2	50.8	(6)
Hancock	70.7	53.0	(5)
Musketeer	67.7	53.1	(4)
Puma	64.6	53.5	(2)
Cougar	62.7	53.3	(3)
Fredrick	58.4	53.1	(4)
Highest	82.3 bu	54.3 lbs	
Lowest	58.4	50.8	
C.V. %	11.3	0.8	
LSD 5%	11.5	0.6	
LSD 1%	NS	0.8	
# of Reps	4	4	

SCRANTON

Variety	Bushels per Acre~	Test Weight lbs/bu~	Test Weight (Rank)
Chaupon	69.5	54.6	(5)
Hancock	59.1	56.0	(3)
Danko	57.3	56.7	(1)
Musketeer	56.9	55.9	(4)
Cougar	54.6	55.9	(4)
Fredrick	51.3	56.7	(1)
Puma	41.8	56.5	(2)
Highest	69.5 bu	56.7 lbs	
Lowest	41.8	54.6	
C.V. %	10.6	0.6	
LSD 5%	8.8	0.5	
LSD 1%	12.0	0.7	
# of Reps	4	4	

THUNDERHAWK

Variety	Bushels per Acre~	Test Weight lbs/bu~	Test Weight (Rank)
Chaupon	86.7	52.6	(6)
Danko	79.5	55.9	(1)
Hancock	75.9	55.4	(3)
Fredrick	71.8	55.7	(2)
Musketeer	69.7	54.7	(4)
Cougar	64.7	54.2	(5)
Puma	55.2	54.7	(4)
Highest	86.7 bu	55.9 lbs	
Lowest	55.2	52.6	
C.V. %	6.0	0.7	
LSD 5%	6.4	0.5	
LSD 1%	8.8	0.7	
# of Reps	4	4	

FLASHER

Variety	Bushels per Acre~	Test Weight lbs/bu~	Test Weight (Rank)
Danko	82.9	54.1	(1)
Chaupon	76.6	50.8	(5)
Hancock	69.7	52.8	(4)
Musketeer	68.8	52.8	(4)
Fredrick	67.9	53.5	(2)
Puma	61.6	53.1	(3)
Cougar	59.4	52.8	(4)
Highest	82.9 bu	54.1 lbs	
Lowest	59.4	50.8	
C.V. %	11.0	0.7	
LSD 5%	11.4	0.6	
LSD 1%	15.6	0.8	
# of Reps	4	4	

~ Yield and test weight at 12% moisture

1986 HETTINGER ON-STATION
BARLEY VARIETY TRIAL

Variety	Bushels per Acre~	Test Weight~ lbs/bu	Grain Protein` %	Heading Date June
Bowman	76.1	51.5	14.9	17
Hector	71.4	49.9	14.9	26
ND 6989	68.7	50.4	13.9	26
Gallatin	67.9	49.0	14.9	26
Morex	66.2	47.3	13.8	20
Lewis	64.3	49.4	15.3	28
Azure	59.8	45.9	13.5	23
ND 7691	56.9	49.3	15.5	25
Robust	56.5	46.7	14.7	19
AB6B80-761	55.3	43.2	14.3	19
Ellice	54.4	49.0	14.5	27
ND 8152	54.4	45.5	13.2	20
ND 7309	53.5	45.2	13.7	25
Glenn	53.3	45.6	14.2	18
ND 7265	53.3	45.4	14.1	23
Hazen	52.7	44.9	15.1	25
Highest	76.1 bu	51.5 lbs	15.5%	28
Lowest	52.7	43.2	13.2	17
# of Reps	4	4	1	2
C.V.%	14.0	2.7		
LSD 5%	12.0	1.8		
LSD 1%	16.0	2.4		

~ Yield and test weight at 12% moisture
` % Protein on dry matter basis

Seeding Rate: 750,000 live seeds/acre, (approx. 1.3 bu/ac)
Seeding Date: April 24th
Fertilizer Applied: 105 lbs/ac 18-46-0
65 lbs/ac 46-0-0
Yield Goal: 65 bu/ac (soil residual nutrients + fertilizer applied)
Herbicide Applied: 1 pint/ac Brominal 3+3
18 gal per acre spray volume, 5 MPH
Harvest Date: August 5th

1986 Dickinson Barley Variety Trial

Variety	Bu/A Avg.	Test Wt lbs.	Heading Date	Height in.
Gallatin	99.3	50.0	28-Jun	25
Ellice	96.3	45.0	02-Jul	25
Lewis	95.9	50.0	01-Jul	24
ND 6989	87.7	49.0	02-Jul	25
Hazen *	86.6	46.5	25-Jun	26
Morex *	85.6	49.0	22-Jun	26
ND 7691	85.3	49.0	02-Jul	23
Bowman	82.2	48.0	25-Jun	26
ND 8152 *	81.1	46.0	23-Jun	24
Hector	80.8	50.5	30-Jun	25
Robust *	79.8	49.0	24-Jun	25
ND 7265 *	76.3	43.5	23-Jun	25
Azure *	76.0	45.5	23-Jun	26
Glenn *	75.3	44.0	24-Jun	24
ND 7309 *	75.3	42.5	25-Jun	26
B 1601	72.9	47.0	23-Jun	27

* 6-row
Seeding Rate: 1.3 bu./ac.
Seeding Date: April 28
Fertilizer Applied: 50 lbs./ac. 18-46-0
Herbicide Applied: Hoelon-Buctril tank mix
L.S.D. 5% = 7.3 C.V. = 6.1%

1986 Hettinger Off-Station Barley Variety Trials

Variety	Hettinger	Regent	Flasher	Thunderhawk	Scranton	Average 5-Sites
			Bushels per Acre			
Azure *	59.8	65.9	68.9	79.1	69.2	68.6
Bowman	76.1	84.1	75.6	93.2	69.7	79.7
Hazen *	52.7	77.4	75.4	88.0	66.9	72.1
Hector	71.4	77.5	75.4	88.7	74.6	77.5
Morex *	66.2	68.4	78.1	82.5	65.5	72.1
Robust *	56.5	72.1	68.9	80.5	59.2	67.4
			Test Wt. lbs./bu.			
Azure *	45.9	47.7	48.5	45.4	50.5	47.6
Bowman	51.5	49.2	50.0	49.6	54.1	50.9
Hazen *	44.9	48.0	48.5	46.0	50.7	47.6
Hector	49.9	49.8	49.8	48.2	52.6	50.1
Morex *	47.3	46.7	49.2	46.4	51.2	48.2
Robust *	46.7	48.9	49.6	46.9	51.8	48.8
* 6-row						
Seeding Date:	Apr. 21	Apr. 22	Apr. 23	Apr. 23	Apr. 22	
Harvest Date:	Aug. 14	Aug. 16	Aug. 17	Aug. 17	Aug. 16	
L.S.D. 5% :	12.0	5.1	5.4	5.8	7.6	
C.V. % :	14.0	4.6	4.9	4.5	7.4	

Fertilizer Applied: according to soil test at each site.
Seeding Rate: 1.3 bu./ac.

1986 Dickinson Off-Station Barley Variety Trials

Variety	Dickinson	Beulah	Manning	Average 3-Sites	Average 8-Sites
			Bushels per Acre		
Azure *	76.0	96.4	63.2	78.5	72.3
Bowman	82.2	81.3	61.4	75.0	78.0
Hazen *	86.6	98.3	63.5	82.8	76.1
Hector	80.8	63.5	66.8	70.4	74.8
Morex *	85.6	84.7	65.5	78.6	74.6
Robust *	79.8	101.1	64.5	81.8	72.8
			Test Wt. lbs./bu.		
Azure *	45.5	48.0	45.5	46.3	47.1
Bowman	48.0	50.5	50.0	49.5	50.4
Hazen *	46.5	49.0	46.0	47.2	47.5
Hector	50.5	47.0	50.0	49.2	49.7
Morex *	49.0	44.5	47.0	46.8	47.7
Robust *	49.0	48.5	46.5	48.0	48.5

* 6-row
Seeding Date: Apr. 24 May 14 May 11
Harvest Date: Aug. 19 Aug. 18
L.S.D. 5% : 7.3 9.3 3.4 7.1
C.V. % : 6.1 10.0 5.0
Fertilizer Applied: according to soil test at each site.
Herbicide Applied: Hoelon-Buctril tank mix.
Seeding Rate: 1.3 bu./ac.

1986 HETTINGER ON-STATION
OAT VARIETY TRIAL

Variety	Bushels per Acre~	Test Weight lbs/bu~	Grain Protein` %	Heading Date June
ND 820559	97.1	36.1	15.4	24
Monida	91.5	36.4	13.3	24
Reil	90.2	37.3	15.2	24
Porter	87.1	36.3	15.3	26
Menominee	83.8	38.1	14.9	28
Steele	83.6	36.1	15.8	25
ND 810917	82.6	36.1	15.2	26
Proat	81.8	36.3	13.6	26
Border	81.8	35.2	13.9	24
ND 820294	81.2	34.5	15.1	22
Otana	80.5	37.8	14.8	24
Kelsey	80.5	37.0	12.7	25
ND 820744	78.4	37.0	14.7	24
ND 821534	78.4	35.7	16.5	26
ND 820742	77.7	33.9	14.9	22
ND 820603	75.6	37.3	15.1	18
ND 820877	75.2	37.1	15.7	25
Fidler	74.9	36.2	14.1	25
Moore	70.8	36.9	15.7	24
Hytest	70.3	39.4	16.8	23
Dumont	70.3	37.2	14.4	26
ND 810104	70.3	34.9	14.9	22
ND 830645	70.0	36.9	16.1	25
Sandy	66.8	38.2	15.1	25
Don	61.9	35.7	13.7	22
Highest	97.1 bu	39.4 lbs	16.8%	28
Lowest	61.9	33.9	12.7	18
# of Reps	4	4	1	2
C.V.%	17.9	1.1		
LSD 5%	NS	0.6		
LSD 1%	NS	0.8		

~ Yield and test weight at 12% moisture
` % Protein on as is basis

Seeding Rate: 750,000 live seeds/acre, (approx. 1.5 bu/ac)
Seeding Date: April 21st
Fertilizer Applied: 50 lbs/ac 18-46-0
Yield Goal: 80 bu/ac (soil residual nutrients + fertilizer applied)
Herbicide Applied: 1 pint/ac Brominal 3+3
18 gal per acre spray volume, 5 MPH
Harvest Date: August 5th

1986 Dickinson Oats Variety Trial

Variety	Bu/A Avg.	Test Wt lbs.	Heading Date	Height in.
ND 820559	128.4	34.5	26-Jun	31
Monida	126.8	36.0	29-Jun	32
ND 820603	126.3	36.5	25-Jun	25
ND 810104	124.8	36.0	23-Jun	28
ND 830645	124.3	37.0	25-Jun	32
ND 820744	122.7	36.0	25-Jun	30
ND 820742	120.7	36.5	25-Jun	26
Menominee	120.7	36.5	28-Jun	31
ND 820294	120.7	34.5	25-Jun	28
Dumont	116.5	35.5	27-Jun	32
ND 810917	116.0	35.0	26-Jun	26
ND 820877	115.0	33.5	26-Jun	32
Porter	114.0	36.0	27-Jun	29
Riel	112.4	36.0	25-Jun	31
Sandy	111.9	36.5	25-Jun	34
Moore	109.3	37.0	26-Jun	34
ND 821534	108.8	31.0	28-Jun	32
Steele	106.2	35.0	24-Jun	30
Kelsey	105.2	35.0	24-Jun	31
Otana	101.6	37.5	26-Jun	33
Proat	100.0	34.0	28-Jun	28
Border	100.0	33.5	30-Jun	26
Hytest	99.5	39.0	23-Jun	30
Don	86.6	37.0	20-Jun	24

Seeding Rate: 1.5 bu./ac.
Seeding Date: April 22
Fertilizer Applied: 50 lbs./ac. 18-46-0
Herbicide Applied: Buctril
L.S.D. 5% = 15.5 C.V. = 9.6%

1986 Hettinger Off-Station Oats Variety Trials

Variety	Hettinger	Regent	Flasher	Thunderhawk	Scranton	Average 4-Sites
			Bushels per Acre			
Monida	91.5	125.5	102.8	145.2	lost	116.3
Otana	80.5	115.4	85.6	135.9	to	104.4
Porter	87.1	110.1	72.1	140.2	heavy	102.4
Riel	90.2	107.5	84.4	137.4	wild	104.9
Steele	83.6	106.5	79.2	114.3	oat	95.9
ND 810104	70.3	120.4	75.1	145.5	infestation	102.8
			Test Wt. lbs./bu.			
Monida	36.4	37.7	39.9	36.4		37.6
Otana	37.8	39.4	40.1	38.5		39.0
Porter	36.3	37.6	37.8	40.1		38.0
Riel	37.3	38.5	37.7	39.6		38.3
Steele	36.1	36.4	35.0	38.2		36.4
ND 810104	34.9	35.8	34.3	37.6		35.7

Seeding Date:	Apr. 21	Apr. 22	Apr. 23	Apr. 23
Harvest Date:	Aug. 14	Aug. 16	Aug. 17	Aug. 17
L.S.D. 5% :	NS	8.7	10.2	14.9
C.V. % :	17.9	5.1	8.1	7.3

Fertilizer Applied: according to soil test at each site.
Herbicide Applied: Buctril
Seeding Rate: 1.5 bu./ac.

1986 Dickinson Off-Station Oats Variety Trials

Variety	Dickinson	Beulah	Manning	Average 3-Sites	Average 7-Sites
			Bushels per Acre		
Monida	126.8	117.0	89.2	111.0	99.8
Otana	101.6	121.2	96.9	106.6	92.1
Porter	114.0	112.4	90.2	105.5	90.8
Riel	112.4	109.3	101.1	107.6	92.8
Steele	106.2	111.4	82.0	99.9	85.4
ND 810104	124.8	88.2	73.2	95.4	87.2
			Test Wt. lbs./bu.		
Monida	36.0	32.0	32.0	33.3	35.8
Otana	37.5	37.0	35.5	36.7	38.0
Porter	36.0	37.0	35.5	36.2	37.2
Riel	36.0	35.5	35.0	35.5	37.1
Steele	35.0	32.5	32.5	33.3	35.1
ND 810104	36.0	33.0	33.0	34.0	34.9
Seeding Date:	May 22	May 14	May 1		
Harvest Date:		Aug. 19	Aug. 18		
L.S.D. 5% :	15.5	18.1	9.2	14.7	
C.V. % :	9.6	15.4	7.4		

Fertilizer Applied: according to soil test at each site.
Herbicide Applied: Buctril
Seeding Rate: 1.5 bu./ac.

HETTINGER CORN GRAIN AND SILAGE TRIAL
-1986-

Variety	Bushels Per Acre at 15.5% Moisture	Test Weight lbs/bu~	Silage % Moisture at Harvest	Silage Tons/Acre at 70% Moisture	Days to Silk
Stauffer SB93WX	86.8	52.6	53.8	15.9	68.7
Pioneer 3881	85.6	46.7	58.9	13.6	71.0
Cargill 819	83.4	46.4	62.5	14.2	70.3
Top Farm TF377	83.1	55.0	58.3	11.7	67.0
Keltgen KS80	80.1	51.2	58.9	11.9	68.3
Stauffer S2206	77.9	51.5	43.4	17.4	68.3
Dekalb DK374	76.7	53.4	46.1	14.3	67.0
Dahlgren DC408	75.2	52.5	46.1	14.4	67.7
Keltgen KS88	74.8	52.2	48.7	12.9	69.3
Dekalb DK415	73.1	44.5	61.6	13.1	69.7
Keltgen KS78	72.6	49.2	49.9	14.8	69.7
Top Farm TFSX79	72.1	54.7	54.5	9.5	69.0
Cenex 2085	70.3	53.3	53.0	11.8	68.3
Cargill 822	69.5	53.9	54.9	12.1	69.0
Interstate 232	66.5	52.0	48.3	14.2	68.3
Cargill 809	65.9	49.5	63.7	10.6	68.3
Interstate 198	65.3	54.6	60.3	10.6	69.0
Jacques JX15	64.7	50.0	52.9	13.2	71.3
Pioneer 3790	63.5	46.7	52.6	13.5	69.7
Jacques 4200	58.4	45.1	61.7	11.4	70.3
Top Farm TFSX1087	54.5	50.7	62.7	11.0	69.0
Top Farm TFSX87	53.7	52.3	49.2	13.6	68.7
Top Farm TFSX78	52.4	48.9	42.3	12.1	70.3
Dahlgren DC440	49.6	45.5	60.6	12.3	71.7
Highest	86.8 bu	55.0 lbs	63.7%	17.4 Tons	71.7 Days
Lowest	49.6	44.5	42.3	9.5	67.0
C.V. %	13.3	2.3		12.7	
LSD 5%	13.1	1.6		2.3	
LSD 1%	17.4	2.2		3.1	
# of Reps	4	4	2	4	

~ Test weight at 15.5% moisture

Plant Population: 18,000 plants per acre
Seeding Date: May 16th
Row Spacing: 30"
Planting Site: Wheat stubble (recrop)
Fertilizer Applied: 180 lbs/ac 28-29-0
140 lbs/ac Zinc Sulfate
Yield Goal: 80 bu/ac grain, 13 tons/ac silage
Herbicide Applied: 3 pints/ac Prowl + 1 pint/ac Atrazine 4L, preemergence
Harvest Date: October 29th

REGENT CORN GRAIN AND SILAGE TRIAL
-1986-

Variety	Bushels Per Acre at 15.5% Moisture	Test Weight lbs/bu	Silage % Moisture at Harvest	Silage Tons/Acre at 70% Moisture
Stauffer S2206	76.4	46.0	60.4	14.9
Cargill 809	76.3	48.5	66.9	9.5
Dahlgren DC408	76.0	50.4	62.8	8.3
Keltgen KS80	71.6	51.6	65.3	10.5
Cenex 3088	70.2	46.9	49.7	18.0
Jacques 4200	68.1	48.5	63.0	11.8
Sigco 0852	65.6	46.9	60.9	16.1
Cargill 822	62.4	53.7	64.1	14.3
Sigco 1588	62.4	46.4	56.8	15.1
Cargill 819	62.3	48.0	67.2	12.9
Jacques JX15	57.1	51.8	52.0	13.1
Stauffer SB85	56.7	51.1	61.7	10.7
Keltgen KS78	55.9	48.5	66.2	8.5
Dahlgren DC440	54.4	44.1	63.0	12.8
Highest	76.4 bu	53.7 lbs	67.2%	18.0 Tons
Lowest	54.4	44.1	49.7	8.3
C.V. %	13.9	2.8		10.7
LSD 5%	13.0	1.9		1.9
LSD 1%	17.5	2.6		2.6
# of Reps	4	4	2	4

Test weight at 15.5% moisture

Plant Population: 18,000 plants per acre
Seeding Date: May 20th
Row Spacing: 30"
Planting Site: Fallow
Fertilizer Applied: 120 lbs/ac 28-29-0
40 lbs/ac Zinc Sulfate
Yield Goal: 80 bu/ac grain
13 tons/ac silage
Herbicide Applied: 2.50 quart/ac Bladex 4L + 1 quart/ac Atrazine 4L preplant incorporated
Harvest Date: October 31st

1986 Dickinson Corn Hybrid Trial: Grain

Hybrid	Bu/A Avg.	Test Wt lbs.
PAG SX-123	74.3	52.5
Sigco 1588	73.6	50.0
PAG SX-117	73.0	56.5
Keltgen KS-78	72.9	57.5
Keltgen KS-88	72.3	53.5
Dekalb DK-397	71.8	55.0
Interstate IS-198	71.3	58.5
Jacques 4200	70.9	52.5
Dahlgren DC-408	69.8	57.0
Jacques JX-15	69.4	56.5
Sigco 0852	69.0	52.5
Top Farm SX-87	68.4	56.5
Cargill 822	68.2	56.0
Interstate IS-232	68.0	57.5
Cenex 2085	67.5	56.5
Cargill 809	67.3	54.5
Seedtec 7006	66.6	51.0
Dekalb DK-374	66.1	58.0
Keltgen KS-80	65.4	56.0
Top Farm TF-377	61.3	58.5
Cenex 3088	59.2	54.0
Dahlgren DC-440	56.8	56.0
Cargill 819	53.5	55.0

Yield based on 12% moisture.
Test Weights are from oven-dry samples.

Seeding Rate: 18,000 seeds/ac.
Seeding Date: May 21 Harvest Date: September 26
Row Width: 36 inches
Harvest Population: 13,500 plants/ac.
Herbicide Applied: Prowl
L.S.D. 5% = 11.3 C.V. = 7.2%

1986 Dickinson Corn Hybrid Trial: Silage

Hybrid	Tons/A Avg.	Moisture Avg.
Interstate IS-232	14.0	70.3%
Cargill 822	13.7	73.6%
Interstate IS-198	13.5	69.5%
Dekalb DK-374	13.2	73.3%
Sigco 1588	13.1	73.5%
Dahlgren DC-440	12.8	76.4%
PAG SX-123	12.7	69.0%
Dekalb DK-397	12.5	74.7%
Cenex 2085	12.3	72.2%
Keltgen KS-80	12.3	72.6%
Cargill 809	12.2	72.3%
Keltgen KS-88	12.1	74.6%
Jacques JX-15	12.1	73.7%
Keltgen KS-78	11.8	72.5%
Top Farm TF-377	11.8	69.4%
Cenex 3088	11.8	70.3%
Jacques 4200	11.5	73.3%
PAG SX-117	11.3	74.2%
Cargill 819	11.2	74.3%
Sigco 0852	11.0	72.3%
Seedtec 7006	10.8	71.4%
Dahlgren DC-408	10.8	73.9%
Top Farm SX-87	10.1	76.6%

Yields based on 70% moisture

Seeding Rate: 18,000 seeds/ac.
Seeding Date: May 21 Harvest Date: August 28
Row Width: 36 inches
Harvest Population: 13,200 plants/ac.
Herbicide Applied: Prowl
L.S.D. 5% = 1.7 C.V. = 12.1%

HETTINGER OIL SUNFLOWER VARIETY TRIAL
-1986-

Variety	Lbs/Acre at 10.0% Moisture	Test Weight~ lbs/bu	%~ Oil	Days to Flower
Cargill 207	2551	30.4	40.2	70.7
PAG SF100	2468	28.5	41.9	68.7
Cargill 208	2455	28.4	42.5	67.3
Conti-Seeds Hysun 33	2428	30.5	42.3	67.7
Dahlgren D0730	2406	30.0	49.5	68.7
Sigco 465	2365	29.4	44.5	68.7
PAG SF103	2351	30.4	41.5	71.0
Conti-Seeds Hysun 354	2351	24.8	43.7	69.0
Conti Sunbird (non-oil)	2239	30.2	36.3	69.7
Interstate 7111	2188	27.9	44.6	68.0
Dahlgren D0855	2188	31.1	42.3	65.7
Stauffer EXP8413	2177	28.1	45.3	68.3
Sigco 475	2146	28.2	43.5	68.7
Seedtec 317	2113	28.6	43.7	69.7
Jacques Columbia II	1975	29.9	45.7	67.3
Jacques Challenger	1941	28.7	44.2	67.3
Northrup King Sunbred 277	1908	28.2	42.3	71.7
Sokota 2057	1890	29.1	41.8	66.7
Jacques Voyager	1821	30.9	44.6	68.3
Sokota 5000	1787	28.4	44.3	70.0
Northrup King Sunbred 285	1779	28.9	43.4	72.7
Seedtec 316	1748	26.8	41.0	71.7
Stauffer S1300	1747	31.1	40.7	66.0
Sigco 452	1699	29.7	46.1	68.7
PAG SF102	1648	29.3	46.0	71.0
Stauffer S1296	1607	31.3	40.4	65.7
Cargill 205	1507	31.6	45.3	68.0
Interstate 3007	1499	27.1	45.9	70.0
Seedtec X30084	1476	30.2	42.5	66.7
Seedtec Dakgold	1266	29.7	46.3	68.3
Highest	2551 lbs	31.6 lbs	49.5%	72.7 Days
Lowest	1266	24.8	36.3	65.7
C.V. %	16.3	3.4		
LSD 5%	456	1.4		
LSD 1%	605	1.9		
# of Reps	4	4	Bulk	2

~ Test weight and % oil at 10% moisture

Plant Population: 18,000 plants per acre
Row Spacing: 30"
Fertilizer Applied: 180 lbs/ac 28-29-0
140 lbs/ac ZnSO
Herbicide Applied: 2 pints/ac Sonalan + 3 pints/ac Eptam, preplant incorp.

Seeding Date: May 16th
Planting Site: Wheat stubble
Yield Goal: 2000 lbs/ac
Harvest Date: October 24th

1986 Dickinson Sunflower Hybrid Trial

Hybrid	Lbs/A Avg.	Test Wt lbs.
Interstate IS-3007	1505.6	30.0
Cenex 8101	1504.2	30.5
Stauffer EX-8413	1461.3	32.5
Sigco 452	1454.3	30.0
Seedtec 316	1432.1	29.0
Cenex 6101	1413.5	30.0
Jacques Challenger	1407.6	29.5
Sokota 2057	1351.4	28.5
Northrup King Sunbred 277	1325.7	28.5
Sigco 465	1300.6	29.0
Conti-Seeds Hysun 354	1295.1	29.0
PAG SF-103	1269.5	30.5
Interstate IS-7111	1263.6	30.0
Cargill 208	1262.4	30.5
Sokota 5000	1253.8	30.5
Jacques Voyager	1211.8	30.5
Northrup King Sunbred 285	1202.3	29.5
Cargill 205	1200.2	28.0
Dahlgren DO-705	1177.9	31.0
Seedtec 317	1138.4	30.0
Dahlgren DO-730	1124.0	30.0
Stauffer S-1300	1117.5	31.5
Stauffer S-1296	1116.4	32.0
Conti-Seeds Hysun 33	1110.6	31.5
Dahlgren DO-855	1072.1	28.0
Sigco 475	1049.4	29.0
PAG SF-102	1046.3	31.5
Cargill 207	884.5	29.0
PAG SF-100	846.1	31.5

Yields based on 12% moisture
Test weights on dried samples (3.4% moisture)

Harvest Population: 13,600 plants/ac.
Seeding Date: May 20 Harvest Date: September 30
L.S.D. 5% = 434.2 C.V. = 35.3%

1986 HETTINGER ON-STATION
SAFFLOWER VARIETY TRIAL

Variety	Pounds per Acre 1986	3 Year Average	Test Weight lbs/bu	% Oil 1985
S-541	1686	963	33.0	39.9
S-317	1464		30.3	
Girard	1390	996	31.8	40.1
82B1983	1346		32.0	
S-208	1323	1014	30.4	40.2
A-24	1232	948	32.6	37.7
83B1954	1166		26.6	
Finch	1156	880	32.3	39.4
81B2253	1117		28.7	
Rehbein	967	671	29.0	39.9
Oker	946	709	25.5	38.1
Hartman	771	591	26.1	38.3
Highest	1686 lbs		33.0 lbs	
Lowest	771		25.5	
C.V. %	14.0		4.9	
LSD 5%	245		2.1	
LSD 1%	330		2.8	
# of Reps	4		4	Bulk

Seeding Rate: 25 lbs/ac pure live seed
Seeding Date: May 16th
Fertilizer Applied: 50 lbs/ac 18-46-0
Yield Goal: 2000 lbs/ac (soil residual nutrients + added fert.)
Herbicide Applied: 1 1/2 pint/ac Treflan 4E
Harvest Date: October 22nd
Oil Percentage: Oven dry basis

Notes: Severe sprout damage (80-100%) occurred in all varieties due to above average (6.77") precipitation in September

1986 Dickinson Safflower Variety Trial

Variety	Lbs/A Avg.	Test Wt lbs.
S-208	1635.7	38.0
S-541	1552.0	38.5
Girard	1530.9	37.5
Finch	1484.4	40.5
A-24	1342.1	39.5
Hartman	1087.5	34.5

Seeding Rate: 28.5 lbs./ac.
Seeding Date: May 15 Harvest Date: October 13
Herbicide Applied: Treflan TR-10, preplant incorp.
L.S.D. 5% = 274 C.V. = 14.8%

1986 Dickinson Grain Sorghum Hybrid Trial

Hybrid	Bu/A Avg.	Test Wt lbs.
Dekalb DK-18	52.2	44.0
Dekalb Esquirol	46.2	45.5
Pioneer 894	42.8	44.5
Northrup King 1210	32.8	42.0
Pioneer 8855	29.3	41.5
Fontanelle 2233	22.6	40.5

Seeding Rate: 45,000 plants/ac.
Seeding Date: May 22 Harvest Date: September 30
L.S.D. 5% = 8.0 C.V. = 16.5%

1986 Dickinson Flax Variety Trial

Variety	Bu/A Avg.	Test Wt lbs.	Field Loss Bu/A
Clark	18.3	52.0	8.0
Culbert 79	14.8	52.0	8.0
Flor	11.9	51.0	10.3
Linton	12.7	52.5	8.3

Seeding Rate: 40 lbs./ac.
Seeding Date: May 21 Harvest Date: October 13
L.S.D. 5% = 2.8 C.V. = 13.8%

Field Loss Estimate: Heavy rain and wind in September caused shattering of grain. Loss was calculated after harvest from the amount of grain on the ground within a frame of known area.

1986 Dickinson Buckwheat Variety Trial

Variety	Bu/A Avg.	Test Wt lbs.	Field Loss Bu/A
Mancan	30.0	43.0	15.4
Manor	35.0	43.5	23.1
Windsor Royal	27.9	42.0	13.2

Seeding Rate: 60 lbs./ac.
Seeding Date: May 22 Harvest Date: September 24
L.S.D. 5% = 6.5 C.V. = 13.1%

Field Loss Estimate: Heavy rain and wind in September caused shattering of grain. Loss was calculated after harvest from the amount of grain on the ground within a frame of known area.

1986 CROPPAK TILLAGE DEMONSTRATION TRIAL
HETTINGER RESEARCH EXTENSION CENTER

A demonstration type comparison of various planting methods for spring wheat began in 1984 and continues as a yearly recropping system. Four methods of planting including plow packer pony, conventional seeding (vibrashank & drill), and Haybuster and Lilliston no-till drills are used. Yields are report- for information purposes only. No true differences in yields can be measured since the trial is a non-replicated field demonstration.

Trial Size:

Each cropped strip = 1.38 acres (100' x 600')

Seeding Dates and Rates:

Plow Packer Pony Drill	Seeded:	May 1	70	lb/ac	Stoa HRSW
Conventional		May 1	44	"	"
Haybuster		May 4	80	"	"
Lilliston		May 19	64	"	"

Herbicides Applied:

Entire area was sprayed April 11 with: 40 oz/ac Landmaster
18 gal/ac spray volume

Strips were sprayed May 27 with: 1 pint/ac Brominal 3+3 plus
3 pints/ac Avenge plus surfactant
at 5 oz/ac

The Plow Packer Pony strip was weed free until June 10 and was sprayed for broadleafs only on June 12. No wild oats were present.

The Haybuster strip remained relatively free of wild oats following treatment with Avenge. Wild oats and Green Foxtail (Pigeongrass) were a major problem in both the Lilliston and Conventional strips. Initial populations of these two weed species were severe. Avenge did not provide adequate control.

Fertility:

Plow Packer Pony	52 lb/ac	29-28-0 with the seed at planting
Conventional	50 lb/ac	"
Haybuster	39 lb/ac	"
Lilliston	53 lb/ac	"

Yields @ 12% moisture:

	lbs/bu	bu/ac	% Protein
Plow Packer Pony	57.5	27.2	16.3
Haybuster	56.7	19.6	16.3
Conventional	55.9	18.5	15.2
Lilliston *	54.4	10.8	15.6

* Not comparable due to late planting

INVESTIGATIONS INTO THE TREFLAN FALLOW WHEAT MAKER PROGRAM

J.M. Jakicic

Summary

Applications of Treflan granules were made at three times during the 1985 fallow year in combination with required tillage to control weeds. Treatments were made in May, July, and September for comparison with untreated conventional fallow plots. Stoa hard red spring wheat served as the test crop for the 1986 cropping year. Goals of the study included determining yield differences between Treflan treated plots and conventional fallow and the ability of Treflan to reduce the number of fallow tillage trips. Weed control during the cropping year was also evaluated.

Use of Treflan during the fallow year did not reduce the number of fallow tillage trips compared to conventional fallow. Each treatment required two tillage operations. Each Treflan treatment effectively controlled populations of pigeongrass and broadleaf weeds in the 1986 cropping year while conventional fallow plots had relatively high concentrations of these weeds. Although Treflan treatment reduced weed populations during the cropping year, yields of Stoa spring wheat on Treflan treated plots were similar to conventional fallow ($P<.05$).

Introduction

Reducing the number of summer-time fallow operations and controlling green foxtail (pigeongrass) infestations in the cropping year are chief reasons claimed by Elanco, the maker of Treflan, for applying Treflan granules in the fallow year prior to hard red spring wheat. A field trial was established in 1985 to test the applications of this type of fallow management scheme for the producers of southwestern North Dakota.

Experimental Procedure

Treflan was broadcast applied through a Gandy granular applicator on three separate dates; May 23rd, July 3rd, and September 6th. Application rates decreased with later dates of application from a high of 10 lbs/ac to a low of 5 lbs/ac. Application was made to coincide with tillage required to control weeds in the fallow. A vibrashank field cultivator was utilized for tillage and incorporation.

Stoa hard red spring wheat was planted April 15th along with 50 lbs/ac 18-46-0 with the seed. Urea was applied at a rate of 120 lbs/ac prior to seeding to provide adequate soil nutrients for a 40 bu/ac yield goal. The plots were harvested August 22nd.

Results and Discussion

Results show that although growth of prevalent weed species such as Kochia and Russian Thistle was inhibited by treating with Treflan at all dates, the number of tillages needed throughout the fallow year was not reduced by using Treflan. Each treatment required two summer tillages to control weeds prior to the first fall frost. More than two tillage passes may have been required if precipitation had been at normal levels or above during the fallow months. Less tillage may have been needed under these circumstances on Treflan treated soil.

Yield, weed population ratings, test weight and percent grain protein information is shown in Table 1. Treflan applied during the fallow year had no effect on the yield or test weight of Stoa wheat but markedly reduced the growing season populations of pigeongrass and broadleaf weeds. Grain protein levels remained relatively constant over all treatments.

Table 1. Yield, Test weight, % Grain Protein, and Relative Weed Levels of Fallow Applied Treflan Treatments vs. Conventional Fallow. Hettinger 1986.

Treatment	Yield bu/ac	Test Weight lbs/bu	% Grain Protein	Weed Incidence (0-5)
May 23rd				
10 lbs/ac Treflan	30.1	60.6	16.1	1.5
July 3rd				
7.5 lbs/ac Treflan	33.4	60.3	15.8	1.8
September 6th				
5 lbs/ac Treflan	32.8	59.5	16.3	1.0
Conventional Fallow	28.1	60.5	16.3	4.6
Highest	33.4 bu	60.6 lbs	16.3%	4.6
Lowest	28.1	59.5	15.8	1.0
C.V.%	8.1	1.0		
LSD 5%	NS	NS		
LSD 1%	NS	NS		
# of Reps	4	4	Bulk	4

Although yield of Stoa wheat did not benefit from use of Treflan granules in the fallow year, weed populations were greatly reduced which should translate into reduced weed seed densities within the soil profile. To justify the expense of treatment though, at least in the short run, requires a savings in the number of tillage trips needed during the fallow year or ultimately, a significant increase in yield.

CHEMICAL vs. CONVENTIONAL FALLOW USING ORTHO PARAQUAT/PLUS + GLEAN HERBICIDES

J.M. JAKICIC

Summary

Studies of the agronomic benefits and detriments of chemical fallow vs. conventional fallow for subsequent planting to hard red spring wheat began in 1984 at the Hettinger Branch Experiment Station. As an alternative to three separate summer fallow tillage operations, Ortho "Paraquat/Plus" was tank mixed with Dupont "Glean" and Ortho X-77 Spreader and applied to actively growing weeds at two rates (1 pint "Paraquat/Plus" + 1/3 oz. Glean and 2 pints "Paraquat/Plus" + 1/3 oz. "Glean" per acre). Due to wet soil conditions in June and late acquisition of chemical, spraying was delayed for two weeks beyond the optimum time for chemical application. Burn-down of weeds due to a June 19th application was good to excellent, however regrowth occurred and a second application of 1 pint "Paraquat/Plus" per acre was needed on July 10th. "Paraquat/Plus" + "Glean" controlled Wild Buckwheat, Kochia, Redroot Pigweed, and volunteer wheat but was ineffective in controlling mid-summer growth of Field Bindweed (Creeping Jenny). Stoa hard red spring wheat, a 1984 NDSU release, was planted in 1985. No differences ($P<.05$) in the yield, test weight, or % grain protein of Stoa wheat occurred between conventional fallow and chemical fallow treatments. Soil moisture status just prior to planting was equal across all plots indicating that no additional soil moisture was stored during the fallow year in the chemical fallow plots.

Introduction

Chemical fallow is one alternative to mechanical tillage operations which are frequently performed two to three times or more during a fallow season in southwestern North Dakota. To be a viable alternative though, the cost of chemical fallow must be competitive with the costs incurred in tilling to control weed growth and soil moisture loss. An important cost, but one which is difficult to define is the loss of use and loss of productivity of agricultural lands due to erosion of soil by water and wind. Chemical fallow reduces wind and water erosion and conserves soil moisture by maintaining a cover of straw and stubble throughout the fallow season.

Ortho "Paraquat/Plus" is a non-selective contact herbicide that kills all green plant tissue which comes into contact with the herbicide. "Paraquat" has no soil residual activity which is the reason for adding "Glean" to the tank mix. "Glean" controls most broadleaf weeds and suppresses foxtail and is characterized as having a relatively long soil residual activity (up to 48 months depending on soil organic matter content and soil pH). Tank mixing "Paraquat/Plus" and "Glean" is not a labeled treatment in North Dakota at this time.

Experimental Procedure

Design of the experiment was a randomized complete block with three replications. Plots measured 70 feet by 150 feet (approximately 0.25 acres). The trial site consisted of a level area (approximately 2.5 acres) composed of Belfield-Daglum silt loams which comprise a large portion of Adams county. This soil is relatively difficult to farm due to its formation of a hard crust and cloddy conditions upon dehydration.

"Paraquat/Plus" + "Glean" + "X77 Spreader" was applied to actively growing weeds on June 19th, approximately two weeks late due to wet soil conditions and late acquisition of herbicides. Herbicides were applied at two rates:

PARAQUAT/PLUS		GLEAN		X77 SPREADER
1 pint/acre	+	1/3 oz./acre	+	1 quart/100 gal. spray
2 pint/acre	+	1/3 oz./acre	+	1 quart/100 gal. spray

A second application of "Paraquat/Plus" only, at 1 pint/acre on July 10th was necessary to control a mid-summer emergence of Field Bindweed. Each application was applied with a skid mounted sprayer on a pick-up calibrated at 40 psi and 5 mph with an output of 20.8 gallons spray/acre.

Yield of Stoa hard red spring wheat and any phytotoxicity to the crop will be determined during the 1985 growing season. Soil moisture content of chemical and conventional fallow plots are likely to differ and determinations will be made prior to planting.

Results and Discussion

Prevailing weed species at the time of first herbicide application included: Wild Buckwheat, Kochia, Redroot Pigweed, volunteer winter wheat, and a relatively small amount of Green Foxtail (Pigeongrass). Both herbicide treatments were moderately effective in achieving a burn-down of prevailing weeds though more effective control would have been obtained if the first spraying had been accomplished the first few days of June.

A second treatment of all chemical fallow plots was needed to control emerging Field Bindweed in mid-July. Treatment with 1 pint/acre "Paraquat/Plus" + 1 quart X-77 Spreader/100 gal. spray was ineffective in controlling the bindweed. "Paraquat/Plus" produced a slight burning of bindweed but did not control the weed to any appreciable extent. Field bindweed continued to grow and spread until late September freezing temperatures prevailed.

Applying 2 pints of "Paraquat/Plus" per acre was approximately 20% more effective in controlling weeds than the 1 pint/acre rate. An important factor to consider in "Paraquat/Plus" application rates is its cost. As of January 1985, farmer costs for the above chemicals in Hettinger were as follows:

Paraquat/Plus	Glean	X-77 Spreader	Total Cost
1 pint/acre $5.74/acre	1/3 oz./acre $5.40/acre	1 quart/4.8 acres * $0.81/acre	$11.95/acre
2 pints/acre $11.48/acre	1/3 oz./acre $5.40/acre	1 quart/4.8 acres * $0.81/acre	$17.69/acre

* Rate and cost of X-77 Spreader when spraying approximately 21 gal./acre

The total chemical cost for each treatment plus a second spray treatment of 1 pint "Paraquat/Plus"/acre in July was $17.69/acre at the 1 pint "Paraquat/Plus" rate and $23.43/acre at the 2 pints "Paraquat/Plus" rate.

Data for the cropping year are presented in Table 1. Chemical fallow plots did not contain any additional stored soil water over conventional fallow plots ($P<.05$). As a consequence, no additional soil water was available for crop growth or increased yields in either "Paraquat/Plus" treatment. Grain yield, test weight, and % grain protein did not differ ($P<.05$) across fallow treatments. In this case, no yield advantages were evident for chemical fallow over conventional fallow.

Table 1. Yield, Test Weight, % Grain Protein, and Stored Soil Moisture of Chemical Fallow vs. Conventional Fallow Plots. Hettinger, 1985.

Fallow Treatment	% Soil Water	Yield bu/ac	Test Weight lbs/bu	% Grain Protein
Paraquat 1 pint	12.0~	37.3	59.3	13.1
Paraquat 2 pints	12.0	38.6	59.4	13.6
Conv. Fallow	12.0	37.7	59.5	13.7
C.V. %	1.6	4.49	0.98	3.18

~ Percent moisture in top 2 feet of soil

Conclusions

The "Paraquat/Plus" + "Glean" treatments were moderately effective in controlling all weed species except field bindweed. Control would have been better if the plots were sprayed on or near June 1st while weed development was in its early stages.

First year results suggest no differences in the yield of Stoa spring wheat under chemical fallow vs. conventional fallow. Additional stored soil moisture must accumulate under chemical fallow if yield increases are to be realized. Precipitation during the fallow year and the winter that followed was well below normal. Since snowfall was lacking, the opportunity to catch winter snow in the standing stubble was diminished.

This study will be repeated in 1986 to collect additional data on chemical versus conventional fallowing practices for southwestern North Dakota.

VITAVAX-200 FLOWABLE FUNGICIDE TREATMENT FOR SMALL GRAINS 1984-85

J.M. Jakicic

Summary

A three year investigation began in 1984 to test the response of three small grains, hard red spring wheat, barley, and oats, to seed treatment with Vitavax-200 fungicide. The main objectives were to determine if Vitavax-200 could effectively decrease the incidence of seed-borne and soil-borne fungal diseases and if the treatment had any significant effect on the yield and test weight of three wheat, oat, and barley varieties. Results of this trial showed no differences ($P<.05$) in the yield, test weight, or % grain protein (1985) of wheat, barley, or oats due to the seed treatment. Occurrences of seed-borne fungal diseases were non-existant within the plots, consequently the effectiveness of treatment with Vitavax-200 against these diseases could not be determined.

Introduction

Vitavax-200 is a systemic fungicide applied as a seed treatment to seed prior to planting. The word "systemic" indicates that the fungicide is actively transported into the growing plant via its root system which provides the plant with an immunity or protection against certain diseases. Vitavax-200 has been shown to provide control of various fungi that cause seed and seedling diseases in certain crops. Diseases of wheat, barley, and oats controlled by Vitavax-200 are shown below.

Barley:	False Loose Smut	Wheat:	Common Bunt
	Covered Smut		Flag Smut
	Loose Smut		Loose Smut
	Barley Stripe		Seedling Stage Wheat Scab
			Seedling Stage Black Point
		Oats:	Covered Smut
			Loose Smut

Vitavax-200 is a composition of both carboxin and thiram fungicides which effectively control the above diseases. Fungicidal seed treatments are used to provide protection against: (1) internal seed-borne pathogens such as the loose smuts of cereals; (2) seed surface pathogens such as the covered smuts of barley and oats and common bunt of wheat; and (3) soil-borne pathogens such as seed rots and seedling blights.

Experimental Procedure

Three varieties each of hard red spring wheat, barley and oats were

chosen for study based on acceptable agronomic performance in southwestern North Dakota over previous years. Seed of Len, Stoa, and Marshall wheat; Azure, Bowman, and Morex barley; and Kelsey, Otana, and Steele oats were treated with 3 fluid ounces of Vitavax-200 fungicide per 100 pounds of seed in a small batch lab treater. The fungicide was diluted 2:1 (2 parts water to 1 part chemical) with water prior to application to the seed.

Kernel weights (weight/1000 kernels) and germination percentages were determined in order to calculate seeding rates. All wheat varieties were seeded at a rate of 1,000,000 live seeds per acre while all barley and oat varieties were seeded at 750,000 live seeds per acre. These rates are approximately equivalent to 60 pounds of wheat (1 bushel), 65 pounds of barley (1.3 bushels), and 48 pounds of oats (1.5 bushels) per acre.

The experiment included treated and untreated plots of each variety organized in a randomized complete block design with four replications. The experimental site was a level area composed of Shambo Loam soil type. Fertilization consisted of a broadcast application of 93 pounds per acre of 18-46-0. Applied fertilizer plus soil residual nutrients was adequate for the following yield goals: 55 bu/ac wheat, 80 bu/ac barley, and 100 bu/ac oats. The trial was planted on April 16th and sprayed for broadleaf weeds on May 17th. Herbicide application consisted of 2/3 pint/ac of Brominal ME4 with a sprayer output of 10 gal/ac and a travel speed of 10 MPH. Plots were harvested on August 12th.

Results and Discussion

Table 1 shows yield, test weight, and % grain protein results (1985 & 2 year means) for wheat, barley, and oat varieties which were treated (T) versus untreated (UT) with Vitavax-200. Vitavax-200 fungicide had no effect ($P<.05$) on the yield, test weight, or % grain protein of any variety of wheat, barley, or oat. Differences exist between varieties in yield, test weight, and % grain protein. None of these differences were due to the fungicide treatment. In this case, no benefit was derived from treating the seed with fungicide. It is important to note however that fungal diseases controlled by Vitavax-200 were not present in the trial in either of the two test years. Both treated and untreated plots were free from diseases such as covered and loose smut and common bunt of wheat. This indicates that seed used in the study was relatively free of diseases generally controlled by Vitavax-200 fungicide.

Although these results show no particular benefit from treating seed of wheat, barley, or oats with carboxin type fungicide, seed treatment is a recommended preventative measure, especially with barley and wheat. Smuts on oats have not been a problem in North Dakota but they have caused severe oat losses in other states. Crop varieties differ in their susceptibility to fungal diseases such as loose smut. For example, Alex hard red spring wheat is more susceptible to loose smut than are the majority of wheats. Carboxin seed treatment of Alex is recommended as a routine practice. New races of loose smut fungus may appear in future years. One which has recently appeared in North Dakota infects all barley varieties released prior to 1984. New varieties which possess resistance to this new race will not be available for at least four or five years. The best method of control of fungal diseases such as loose and covered smut is through prevention with carboxin type seed treatment.

Table 1. Yield, Test Weight, and % Grain Protein of HRSW, Barley, and Oats When Treated (T) with Vitavax-200 Fungicide vs. Untreated (UT).

Crop Variety	Yield (bu/ac) 1985	Yield (bu/ac) 2 Yr Mean	Test Weight lbs/bu 1985	Test Weight lbs/bu 2 Yr Mean	% Grain Protein 1985
Wheat					
Marshall UT	23.8	37.4	50.0a~	54.5	16.5a
Marshall T	23.7	37.5	49.1a	53.8	16.4a
Len UT	22.2	35.2	53.0b	55.1	17.4b
Len T	22.8	34.5	52.4b	55.4	17.3b
Stoa UT	23.2	35.3	50.3a	54.8	17.2b
Stoa T	23.7	35.4	50.0a	53.9	17.0b
Barley					
Bowman UT	58.9a	57.6	46.4a	48.4	14.9a
Bowman T	58.6a	57.8	46.6a	48.5	14.8a
Morex UT	40.5b	47.2	39.6b	44.1	16.7b
Morex T	38.4b	46.2	39.6b	43.9	16.3b
Azure UT	44.9b	49.1	40.4b	44.0	14.8a
Azure T	49.1b	50.8	41.5b	44.8	15.0a
Oat					
Otana UT	58.0	80.8	30.1abc	34.5	13.3ab
Otana T	61.5	82.5	30.4ab	34.9	13.7ab
Kelsey UT	46.8	73.6	29.3c	33.3	12.5b
Kelsey T	51.1	76.2	29.8bc	33.7	12.4b
Steele UT	52.8	68.5	30.8a	33.8	14.7a
Steele T	47.2	67.3	30.7ab	33.7	14.6a

~ Means within a column (for each crop) followed by different letters are significantly different ($P<.05$)

RESPONSE OF HARD RED SPRING WHEAT, BARLEY, DURUM, AND OATS TO CAROLINA DAKOTA SEED COATING 1984-1985

J.M. Jakicic

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Mr. Neil Riveland	Williston Branch Station
Mr. Curt Thompson	Minot Branch Station
Mr. Blaine Schatz	Carrington Branch Station

Summary

Carolina Dakota seed coating is a starch based water absorbant material which is suggested to promote germination, improve stands, and increase yield of small grains. This seed coating was tested for two years at Hettinger and Dickinson using Marshall and Stoa wheat, Vic durum, Azure barley, and Steele oat under both unfertilized and fertilized with nitrogen conditions to determine if it had any effect on yield, test weight, or % grain protein of the small grains.

Results at Hettinger showed no differences ($P<.05$) in yield, test weight, or stand establishment of Marshall wheat or Steele oat due to the seed coating or soil nitrogen fertility. Yield of Azure barley decreased ($P<.05$) when treated with the coating in 1984 while test weight and stand establishment remained unchanged. This decrease in barley yield did not occur in 1985. No difference ($P<.05$) in percent grain protein was observed due to the seed coating or addition of nitrogen fertilizer.

Results at Dickinson showed no effect ($P<.05$) on yield or test weight of any small grain due to the seed coating or soil fertility in 1984. Data from Dickinson in 1985 was similar except for a positive ($P<.05$) influence on the yield of Stoa wheat by the seed coating under both soil fertility levels.

Trial locations were added in 1985 to include three additional sites. Trials using Stoa wheat, Vic and Lloyd durum, and Azure and Bowman barley were established at the Williston, Minot, and Carrington branch staions. None of the selected cereal grains responded to treatment with Car-Dak seed coating. Yield, test weight, plant height, and stand establishment were unaffected ($P<.05$) by the coating at all three sites.

Introduction

Carolina Dakota seed coating is composed of a starch based water absorbant material and graphite which promotes adhesion to the seed. The coating has a high affinity for water and draws water from the surrounding soil for concentration around the seed. It is claimed to promote germination

and stand establishment in small grains, especially under relatively dry soil conditions, and thus increase yields. This theory was tested at five North Dakota locations in 1985 on hard red spring wheat, durum, oats, and barley.

Experimental Procedure

A split plot design with four replications was used at Hettinger and Dickinson to test for differences between treated and untreated seed of Marshall and Stoa wheat, Vic durum, Steele oats, and Azure barley at two soil nitrogen levels. Seed was treated at a rate of 1 pound seed coating per 100 pounds of seed. Seeding rates were 1,000,000 live seeds per acre for wheat (approx 1 bu/ac), and 750,000 live seeds per acre for oats and barley (approx 1.5 bu/ac oat and 1.3 bu/ac barley). Sixty pounds of 18-46-0 was broadcast applied to all main plots which served as the fertilizer variable.

Trials at Williston, Minot, and Carrington were designed as randomized complete blocks with 12 replications. These trials tested the response of Stoa wheat, Vic and Lloyd durum, and Bowman and Azure barley to Car-Dak seed coating alone. Seed treatment and planting rates were as previously stated.

All trials were planted with small plot drills having double disk openers. Plots at Hettinger measured 4 feet in width by 20 feet in length. Planting and harvest dates varied with areas according to local weather conditions and optimum times for seeding and harvest. Weed control followed currently acceptable agronomic procedures. All data were analyzed using Analysis of Variance techniques and differences in treatment means were separated with Dunnett's procedure (P=.05).

Results and Discussion

Results of the 1985 trials at Carrington and Williston appear in Table 1 and those for Minot are shown in Table 2. Plots containing seed treated with Car-Dak seed coating performed similarly to the untreated control. No differences (P<.05) were observed in the yield, test weight, plant population, or plant height between treated and untreated plots. None of the selected small grains benefited in terms of an increase in yield by treating the seed with Car-Dak seed coating at these three sites in 1985.

Table 1. Yield, Test Weight, and Plant Densities of Selected Cereal Grains Treated with Car-Dak Seed Coating vs. Untreated Controls at 2 North Dakota Locations. 1985.

Experimental Location	Yield (bu/ac) Control	Yield (bu/ac) Trt	TW (lbs/bu) Control	TW (lbs/bu) Trt	Plants/ac (x 1000) Control	Plants/ac (x 1000) Trt	Crop Variety	
Carrington	61.5	61.3	58.4	58.7	786	774	Stoa	hrsw
"	54.4	52.9	61.1	61.6	765	790	Vic	durum
"	76.3	74.7	44.7	44.8	669	669	Azure	barley
Williston	18.5	18.2	55.8	56.2	686	698	Stoa	hrsw
"	18.1	18.3	59.6	59.0	543	520	Lloyd	durum
"	32.2	32.5	48.8	49.1	650	556	Bowman	barley

Williston test weights are observations from 1 rep only.
All other data are means of 12 replicates.

` Control = seed not treated with Car-Dak seed coating
Trt = seed treated with Car-Dak seed coating

Table 2. Yield, Test Weight, and Plant Height of Selected Cereal Grains Treated with Car-Dak Seed Coating vs. Untreated Controls at 1 North Dakota Location. 1985.

Experimental Location	Yield (bu/ac) Control`	Trt`	TW (lbs/bu) Control	Trt	Plant Ht. (inches) Control	Trt	Crop Variety	
Minot	49.5	49.6	59.4	59.5	30.2	29.9	Stoa	hrsw
"	40.6	38.4	60.5	60.3	32.1	32.3	Vic	durum
"	57.3	54.6	46.0	46.0	24.8	24.4	Azure	barley

` Control = seed not treated with Car-Dak seed coating
Trt = seed treated with Car-Dak seed coating

Data from Dickinson for 1985 and 2 year means are presented in Table 3. Yields and test weights of the tested varieties did not respond to treatment with the seed coating or addition of nitrogen to the soil ($P<.05$), with one exception. Treating Stoa hard red spring wheat with Car-Dak led to an increase ($P<.05$) in the yield of Stoa at Dickinson in 1985. This yield increase was observed at both soil nitrogen fertility levels. While yield of Stoa increased significantly, emphasis is placed on the fact that this is only one occurrence out of 7 station years of testing or a total of only 1 significant yield increase out of 23 individual variety tests. Tests will continue in 1986 at all five sites to further investigate the effects of Car-Dak seed coating on Stoa wheat and any related increases in yield.

Table 3. Yield and Test Weight of Selected Cereal Grains Treated with Car-Dak Seed Coating vs. Untreated Controls at 2 Soil Nitrogen Fertility Levels. Dickinson 1985.

Variety	Treatment		Yield (bu/ac) 1985	Yield (bu/ac) 2 Yr Mean	TW (lbs/bu) 1985	TW (lbs/bu) 2 Yr Mean
Marshall hrsw	N0`	T0`	38.7	36.5	59.5	59.4
	N0	T1	37.5	35.3	59.5	59.3
	N1	T0	37.4	36.0	58.5	58.7
	N1	T1	38.9	36.1	58.0	58.7
Steele oat	N0	T0	71.1	67.9	37.5	36.8
	N0	T1	66.6	66.3	38.0	36.7
	N1	T0	66.0	64.1	37.0	36.5
	N1	T1	64.3	61.8	37.5	38.4
Azure barley	N0	T0	81.0	66.8	46.0	47.0
	N0	T1	79.9	66.9	46.5	47.8
	N1	T0	84.3	67.8	46.0	46.8
	N1	T1	85.3	67.0	46.0	46.3
Vic durum	N0	T0	37.6	--	59.5	--
	N0	T1	39.4	--	59.5	--
	N1	T0	42.2	--	59.0	--
	N1	T1	40.3	--	59.0	--
Stoa hrsw	N0	T0	38.7a~	--	58.5	--
	N0	T1	41.2b	--	58.0	--
	N1	T0	40.4a	--	57.5	--
	N1	T1	42.7b	--	57.5	--

` N0 = No nitrogen fertilizer T0 = Seed not treated
N1 = Fertilized with nitrogen T1 = Seed treated with Car-Dak

~ Means within nitrogen levels followed by different letters are significantly different ($P<.05$)

The data from Hettinger contained in Table 4 shows much the same results as previously discussed. No significant differences were observed in the yield, test weight, or % grain protein of Marshall wheat, Steele oat, or Azure barley between treated and untreated seed or fertilized and unfertilized plots. Droughty conditions throughout the 1985 growing season contributed to relatively low test weights, high % grain proteins, and the inability of the grains to respond to application of nitrogen fertilizer in terms of increased yields. In 1984, Azure barley yielded significantly less when treated with Car-Dak. Such a decrease in yield due to the seed coating did not occur in 1985.

Table 4. Yield, Test Weight, and % Grain Protein of Selected Cereal Grains Treated with Car-Dak Seed Coating vs. Untreated Controls at 2 Soil Nitrogen Fertility Levels. Hettinger 1985.

Variety	Treatment		Yield (bu/ac)		TW (lbs/bu)		% Grain Protein	
			1985	2 Yr Mean	1985	2 Yr Mean	1985	2 Yr Mean
Marshall	N0~	T0~	20.5	28.6	54.1	56.6	17.5	15.9
hrsw	N0	T1	20.3	28.8	53.6	56.5	17.2	15.9
	N1	T0	23.9	33.5	53.8	56.5	17.0	15.6
	N1	T1	20.8	33.4	50.3	54.7	17.7	15.8
Steele	N0	T0	36.6	51.6	32.6	33.6	14.6	14.8
oat	N0	T1	35.8	51.7	32.7	33.7	15.0	15.1
	N1	T0	39.4	57.2	32.2	33.5	15.1	15.1
	N1	T1	37.4	51.8	31.4	33.0	14.8	14.9
Azure	N0	T0	38.7	42.4	41.7	44.1	15.3	14.2
barley	N0	T1	36.0	38.3	41.9	44.0	15.3	14.4
	N1	T0	42.5	50.0	40.6	43.5	15.4	14.4
	N1	T1	41.8	44.1	41.3	43.7	15.4	14.4

~ N0 = No nitrogen fertilizer T0 = Seed not treated
N1 = Fertilized with nitrogen T1 = Seed treated with Car-Dak

Conclusions

The majority of data from these 7 station years of testing on Car-Dak seed coating do not support claims that increased yields will be realized by treating the seed of tested small grains. Except for one instance where the seed coating lead to an increase in yield of Stoa wheat at Dickinson, none of the other variety tests (22 of 23 total) provide statistical significance proving a yield benefit resulting from treating the tested small grains with Car-Dak seed coating. An additional year's field research will be conducted before final conclusions are made as to the product's beneficial use for small grain crops in North Dakota.