

TWENTY FIRST
ANNUAL

AG. REPORT NO. 21



WESTERN DAKOTA

CROPS DAY RESEARCH REPORT



**HETTINGER ARMORY
DECEMBER 16, 2004**

Pat Carr, Agronomist

Glenn Martin, Research Specialist II

Burt Melchoir, Ag. Technician II

Lee Tisor, Research Specialist I

**DICKINSON RESEARCH
EXTENSION CENTER**

North Dakota State University

Dickinson, ND 58601

e-mail: pcarr@ndsuxext.nodak.edu

www.ag.ndsu.nodak.edu/dickinson/

NDSU

North Dakota State University

**ND Agricultural
Experiment Station**

Eric Eriksmoen, Agronomist

Rick Olson, Ag. Technician III

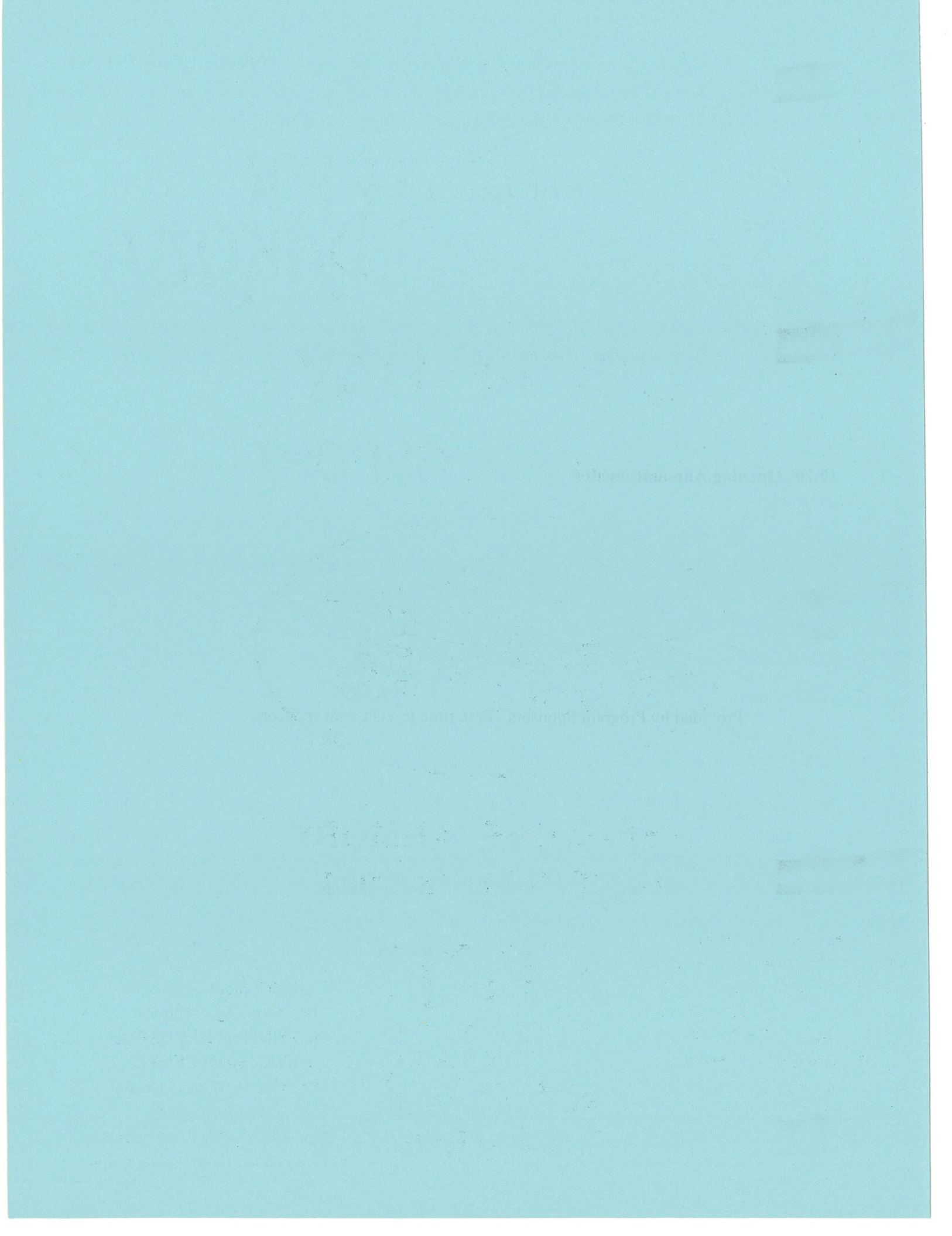
**HETTINGER RESEARCH
EXTENSION CENTER**

North Dakota State University

Hettinger, ND 58639

e-mail: eeriksmo@ndsuxext.nodak.edu

www.ag.ndsu.nodak.edu/hettinger/



21st Annual Western Dakota Crops Day

December 16, 2004

Hettinger Armory

MST

9:00 am Registration

Coffee and doughnuts. Free time to view exhibits and visit with Ag. Industry Program Sponsors.

10:00 Earlybird Drawing

10:20 Opening Announcements

10:30 Crop Variety Updates and Highlights of Ongoing Crop Production Research

Roger Ashley, Extension Agronomist, Dickinson

Dr. Pat Carr, Agronomist, Dickinson Research Extension Center

Eric Eriksmoen, Agronomist, Hettinger Research Extension Center

12:00 Lunch

Provided by Program Sponsors. Free time to visit with sponsors.

1:00 Ag Industry Update

1:30 Red Trail Energy - Regional Impacts, Mark Erickson, Scranton

**1:45 Dryland Cropping Systems: Effects of Crop Diversity, Dr. Perry Miller, Assoc.
Professor, Montana State University, Bozeman**

2:30 Conclusion

Drawing for door prizes, coffee and opportunity to visit with sponsors.

Acknowledgments

The Hettinger and Dickinson Research Extension Centers gratefully acknowledge and thank the following companies and organizations for their financial support 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 commitment and support.

2004 Western Dakota Crops Day Sponsors

| | |
|------------------------------------|---------------------|
| Hettinger Area Chamber of Commerce | Mycogen Seed |
| Hettinger Farmers Union Coop | Monsanto |
| Minn-Dak Growers Ltd. | AgriPro Wheat |
| Technology Crops International | ND State Seed Dept. |
| ND Crop Improvement Assn. | BASF |
| Farm Credit Services of Mandan | ND Barley Council |
| ND Dry Pea & Lentil Assn. | REA Hybrids |
| Pioneer Hi-bred International | Pulse USA |

We also acknowledge and thank the following individuals for their willingness to cooperate with us at off-station plot sites and in providing us with materials for this publication. Their participation has enabled us to compile the enclosed information which would not otherwise be possible.

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Roger Rosenow, Ralph, SD
Gary Wunder, Bison, SD
Dick Rolland, Legume Logic, Wilton

We also thank area County Extension Services and area County Crop Improvement Associations for their financial assistance in the printing costs of this publication.

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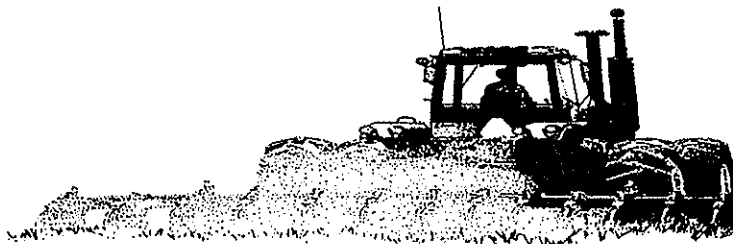
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Interpreting Statistical Analysis

Field research involves the testing of one or more variables such as crop varieties, fertilizers, tillage methods, etc. Field testing of such variables are conducted in order to determine which variety, tillage method, or fertilizer etc. is best for the particular area of production. The main objectives of crop production research are to determine the best means of producing the crop and how to maximize yield and economic return from farming.

Agricultural researchers use statistics as a tool to help differentiate production variables so that real and meaningful conclusions can be drawn from a relatively large amount of data.

One of these tools is the Coefficient of Variability (C.V.). This statistic gives an indication of the amount of variation in an experimental trial and is a measure of the precision or effectiveness of the trial and the procedures used in conducting it. Attempts are made to control human error and some environmental conditions such as soil variability by replicating the variable in question. For example, there were four plots (replications) of the variety Reeder grown in the Hettinger HRSW variety trial. The plots are mixed and dispersed throughout the trial to help eliminated differences that might be a result of soil or other variations. The numbers that you see in the tables are an average of all four replications. The C.V. for yield in the 2004 Hettinger HRSW trial was 8.5 meaning that there was a 8.5 percent average variation between high and low yields among replications. In summation, a trial with a C.V. of 6 is more precise and more can be concluded from it than a trial with a C.V. of 16.

Another important statistical tool is the Least Significant Difference or LSD. If the yield of variety A exceeds variety B by more than the LSD value, you can conclude that under like environmental conditions, variety A is expected to significantly out-yeild variety B. The LSD value allows you to separate varieties, tillage practices, or any other variable and determine whether or not they are actually different. The LSD 1% value is always larger and gives you more precision than the LSD 5% value. Little confidence can be placed in variety or treatment differences unless the results differ by more than the LSD value.

Table . 2004 Weather Summary for the Dickinson Research Extension Center, Dickinson, ND.

| Month | Maximum temp. ----- | | Minimum temp. ----- | | Precipitation ----- | | Small grains GDD ¹ ----- | | Corn GDD ² ----- | |
|---------------|--------------------------|-----------------|--------------------------|-----------------|--------------------------|-----------------|-------------------------------------|-----------------|-----------------------------|-----------------|
| | Long Term 1897 - 2003 | Current year | Long Term 1897 - 2003 | Current year | Long Term 1897 - 2003 | Current year | Long Term 1897 - 2003 | Current year | Long Term 1897 - 2003 | Current year |
| | °F ----- | | °F ----- | | inches ----- | | | | | |
| November - 03 | 39.8 | 32.5 | 16.8 | 9.0 | 0.52 | 0.18 | | | | |
| December - 03 | 27.7 | 35.1 | 5.7 | 11.5 | 0.39 | 1.03 | | | | |
| January | 22.7 | 20.0 | -0.1 | -3.2 | 0.51 | 0.90 | | | | |
| February | 27.0 | 29.4 | 3.8 | 7.2 | 0.41 | 0.63 | | | | |
| March | 37.7 | 45.3 | 14.7 | 20.6 | 0.73 | 1.28 | | | | |
| April | 54.5 | 59.7 | 28.4 | 27.8 | 1.44 | 0.97 | 344 | 436 | 254 | 221 |
| May | 66.3 | 63.0 | 39.2 | 35.1 | 2.29 | 1.42 | 645 | 565 | 381 | 338 |
| June | 75.0 | 72.3 | 49.0 | 43.2 | 3.61 | 0.54 | 899 | 775 | 583 | 563 |
| July | 83.4 | 83.1 | 54.1 | 54.4 | 2.22 | 2.42 | 1141 | 1135 | 529 | 452 |
| August | 82.4 | 78.0 | 51.6 | 49.2 | 1.75 | 0.89 | 1084 | 979 | 318 | 369 |
| September | 71.2 | 74.2 | 41.0 | 44.3 | 1.38 | 1.53 | 724 | 816 | | |
| October | 57.7 | 57.8 | 30.0 | 30.2 | 0.95 | 2.78 | | | | |
| Mean | 53.8 | 54.2 | 27.8 | 27.4 | 16.18 | 14.57 | 4837 | 4704 | 2066 | 1941 |
| Total | | | | | | | | | | |

¹ Small grains GDD, is growing degree days calculated with 95°F as the maximum temperature and 32°F as the base temperature.

² Corn GDD, is growing degree days calculated with 86°F as the maximum temperature and 50°F as the base temperature.

Dates between May 15 and October 1 where temperatures were less than 32°F: May 18 @ 31°F; June 18 @ 30°F; and Sept 7 @ 31°F.

Dates between May 15 and October 1 where temperatures were equal to or exceed 100°F: July 19 @ 102°F and Sept 2 @ 100°F.

Number of days between May 15 and October 1 equal to or exceed 90°F: Jun = 1 day, Jul = 9 days, Aug = 3 days, Sep = 2 days.

Source: Dickinson Research Extension Center. Data compiled by Jeff Kubik, Research Technician; John Urban, Range Technician; James Nelson, Animal Scientist; Roger Ashley, Extension Agronomist; Sheri Schneider, Information Processing Specialist; and Lisa Vance, Information Processing Specialist.

Growing Conditions

Hettinger Research Extension Center

2004

The 2004 growing season was again challenging with cool temperatures and little precipitation. More than 5 inches of rainfall was received in September, 2003, providing much needed soil moisture recharge and terrific Fall growing conditions for winter wheat. Snow cover throughout the winter months provided adequate insulation resulting in little winter kill. Relatively mild and dry early Spring conditions allowed for seeding to begin during the first part of April, about 2 weeks earlier than normal, and continued with few weather related interruptions. Hard frosts on May 1, 13 and 14 caused some crop damage, especially in canola, flax and alfalfa. Small grain crops looked very nice through heading (mid-June) and then rapidly went down hill from there with a lack of rainfall. Another hard frost (25 F) on June 18 caused considerable crop injury, as many small grain and cool season broadleaf crops (canola, buckwheat, field pea) were flowering. A 3 inch rain during the first week of July basically saved the small grain crop. The Regent plot site was completely hailed out on July 7. Small grain harvest began in mid-August with relatively good yields and excellent grain quality. A light frost on August 19 killed the dry bean trial and caused additional injury to corn, buckwheat and other sensitive crops. A hard frost on September 7 terminated corn growth.

Insect infestations were minimal again this year, although there were some localized areas with severe grasshopper, cutworm and alfalfa weevil damage. Plant diseases were generally minor with reports of tan spot, septoria, and wheat streak mosaic virus.

All trials at the Hettinger Research Center were planted with a no-till drill. Broadleaf crop trials were planted into small grain stubble and small grain trials were planted into soybean stubble. Residual soil fertility was determined and fertilizer was applied according to specific yield goals for each crop. Urea (46-0-0) was the primary nitrogen fertilizer source and was applied with a no-till drill prior to planting. Monoammonium phosphate (11-52-0) was applied directly with most seed at planting.

All HRSW, durum and barley trials were treated post-emergence for both grassy weeds (foxtails and wild oats) and for broadleaf weeds (kochia, Russian thistle and wild buckwheat). Most broadleaf crops were treated with a pre-emergence burn down, and with either a pre-emergence or a post-emergence treatment for grassy weeds and broadleaf weeds when possible.

Weather Data Summary - Hettinger

| Frost Free Days | | | |
|---------------------|---------|---------|-------------|
| | 28 F | 32 F | Normal 32 F |
| Date of last frost | May 14 | May 18 | May 18 |
| Date of first frost | Sept. 7 | Sept. 7 | Sept. 20 |
| Frost free days | 116 | 112 | 125 |

Weather Data Summary - Hettinger

| Precipitation | | | | |
|------------------------|-----------|-----------|-----------|-----------------|
| Precipitation (inches) | 2001 - 02 | 2002 - 03 | 2003 - 04 | 49 Year Average |
| Sept. - Dec. | 1.69 | 1.49 | 6.88 | 3.29 |
| Jan. - March | 1.11 | 3.83 | 1.83 | 1.40 |
| April | 1.14 | 1.38 | 0.54 | 1.67 |
| May | 0.80 | 3.18 | 1.00 | 2.62 |
| June | 1.34 | 1.99 | 0.46 | 3.37 |
| July | 1.36 | 0.37 | 3.43 | 2.05 |
| August | 1.11 | 0.44 | 1.13 | 1.64 |
| Total | 8.55 | 12.60 | 15.27 | 16.04 |

| Air Temperature | | | | | |
|-----------------------|------|------|------|------|-----------------|
| Average Temperature F | 2001 | 2002 | 2003 | 2004 | 49 Year Average |
| April | 43.0 | 40.2 | 46.7 | 45.4 | 42.6 |
| May | 55.2 | 49.6 | 52.9 | 51.3 | 54.1 |
| June | 62.7 | 65.4 | 60.2 | 59.5 | 63.4 |
| July | 71.6 | 76.2 | 72.4 | 69.2 | 70.0 |
| August | 73.0 | 67.5 | 73.7 | 63.4 | 69.0 |
| September | 59.1 | 61.1 | 57.6 | 60.2 | 57.4 |

| Growing Degree Units - Corn | | | | | |
|--------------------------------|------|------|------|------|-----------------|
| Growing Degree Units (50 - 86) | 2001 | 2002 | 2003 | 2004 | 32 Year Average |
| May | 285 | 245 | 212 | 242 | 265 |
| June | 401 | 476 | 349 | 371 | 422 |
| July | 652 | 707 | 612 | 558 | 582 |
| August | 631 | 549 | 655 | 441 | 537 |
| September | 357 | 387 | 294 | 335 | 310 |
| Total | 2326 | 2364 | 2186 | 1947 | 2116 |

2004 North Dakota hard red spring wheat variety description table, agronomic traits.

| Variety | Agent or Origin ¹ | Year Released | Beard | Height | Straw Strength | Maturity | Reaction to Disease ² | | | | |
|---------------------|------------------------------|---------------|------------|-------------|----------------|----------------|----------------------------------|-----------|----------------|-----------|--------------|
| | | | | | | | Stem Rust | Leaf Rust | Foliar Disease | Root Rot | Head (Scab) |
| 2375 | NDSURF | 1990 | yes | sdwf | med | m.early | R-MR | S | S | M | MS* |
| AC Intrepid | Canterra | 1999 | no | med | med | med | R | MR | MS | M | S |
| AC Amazon | Can | 2001 | no | med/tall | med | med | R | S | MS | NA | MS |
| AC Superb | Can | 2001 | yes | sdwf | strg | m.early | R | S | S | M | S |
| AC Abbey | Canterra | 1999 | yes | med | med | m.early | R | NA | NA | M | S |
| Alsen | ND | 2000 | yes | sdwf | strg | m.early | R | MR | S | M | MR |
| Amidon | ND | 1988 | yes | med | med | med | R | MR | M | MR | S |
| Argent ³ | ND | 1998 | yes | sdwf | strg | early | R | S | S | M | S |
| Aurora | N. Star G. | 1999 | yes | sdwf | strg | m.early | R | NA | S | NA | S |
| Banton | Trigen | 2004 | yes | sdwf | strg | m.early | NA | NA | NA | NA | NA |
| Briggs | SD | 2002 | yes | sdwf | strg | m.early | R-MR | R | MS | S | S |
| Butte 86 | ND | 1986 | yes | med | m.strg. | early | R | MS | MS | MS | MS |
| Choteau | MT | 2004 | yes | sdwf | NA | m.early | NA | NA | NA | NA | NA |
| Dandy | N. Star G. | 1998 | yes | sdwf | v.strg. | early | R | S | MS | M | S |
| Dapps | NDSU | 2003 | yes | sdwf | med | m.early | R | R | S | M | MS |
| Forge | SD | 1997 | yes | sdwf | m.strg. | early | R | S | MR | MS | MS |
| Freyr | AgriPro | 2004 | yes | sdwf | strong | med | NA | MR | NA | NA | NA |
| Giupro | ND | 1995 | yes | tall | med | m.late | R | MS | S | NA | VS |
| Grandin | ND | 1989 | yes | sdwf | strg. | early | R | S | S | M | S |
| Granger | SD | 2004 | yes | sdwf | m.strg. | m.early | NA | R | NA | NA | NA |
| Granite | WestBred | 2002 | yes | sdwf | v.strg. | m.late | R-MR | MR | S | NA | MS |
| Gunner | AgriPro | 1995 | yes | med | m.strg. | med | R-MR | S | M | S | M |
| Hagar | AgriPro | 1998 | yes | sdwf | strg. | med | R | MS/MR | M | M | S |
| Hanna | AgriPro | 2002 | yes | med | med | m.early | MRM | MS/MR | MS | MS | MS |
| HJ98 | MN | 1998 | yes | sdwf | strg. | m.early | R | S | MS | MR | S |
| Ingot | SD | 1998 | yes | sdwf | med | early | R | S | S | M | MS* |
| Ivan | AgriPro | 1999 | yes | sdwf | v.strg. | med | R | MR | S | M | S |
| Keystone | WPB | 2001 | yes | med | med | m.early | R | MR | S | S | MS |
| Knudson | AgriPro | 2001 | yes | sdwf | strg | med | MRM | MR | M | MS | M |
| Laser | Canada | 1997 | yes | med | NA | m.early | NA | NA | NA | NA | NA |
| McKenzie | Cenex | 1998 | yes | med | med | m.early | R | MR | S | M | S |
| McNeal | MT | 1995 | yes | med | strg. | m.early | MS | S | M | M | VS |
| McVey | MN | 1999 | yes | med | med | med | R | MS | S | M | M |
| Mercury | N. Star G. | 1999 | yes | sdwf | strg | m.early | R | MS | S | S | S |
| Norpro | AgriPro | 1999 | yes | sdwf | strg | med | R | MS/MR | M | M | MS |
| Oklee | MN | 2003 | yes | sdwf | med | m.early | R | MS | MR | NA | NA |
| Oxen | SD | 1996 | yes | sdwf | strg. | m.early | MR | MS | S | MS | S |
| Parshall | ND | 1999 | yes | med | strg. | m.early | MR | MS | M | MS | M |
| Polaris | N. Star G. | 2003 | yes | med | strg. | late | NA | NA | NA | NA | NA |
| Prodigy | Sask. Wht | 1999 | yes | med | med | med | MR | MS | S | M | MS |
| Reeder | ND | 1999 | yes | sdwf | strg. | m.early | R | MS | M | M | S |
| Russ | SD | 1995 | yes | med | med | m.early | R | MS | S | MS | S* |
| Saturn | N.Star G. | 2003 | yes | med | NA | m.late | NA | NA | S | NA | NA |
| Steele-ND | ND | 2004 | yes | sdwf | med | med | R | R | NA | MS | MR/MS |
| Trenton | ND | 1995 | yes | med | med | med | R | MS | MS | S | S* |
| Trooper | WestBred | 2004 | yes | sdwf | strong | m.early | RA | MS | NA | NA | NA |
| Walworth | SD | 2001 | yes | sdwf | med | m.early | R | S | S | M | S |

1 Refers to agent or developer: NDSURF = North Dakota State University Research Foundation; CDC = Crop Development Center, University of Saskatchewan; Can = Agriculture Canada.; N. Star G.= North Star Genetics. 2 R = resistant; MR = moderately resistant; M = intermediate; MS = moderately susceptible; S = susceptible; VS = very Susceptible. * Yield and/or quality often higher than expected based on visual head blight symptoms. 3 Argent is a hard white wheat with good bread making qualities. 4 MR in artificially induced epidemics. 5 M in artificially induced epidemics. 6 MS in artificially induced epidemics. **Bold varieties are those released in 2004.**

2004 Hard Red Spring Wheat in the West River Region

Combined Means

| Variety | Days to Head | Plant Height inches | Seeds / Pound | Test Weight lbs/bu | Protein % | Grain Yield | | | Avg. Yield | |
|----------------|--------------|------------------------|---------------|-----------------------|--------------|-------------|------|------|------------|--------|
| | | | | | | 2002 | 2003 | 2004 | 2 year | 3 year |
| Mercury | 74 | 25 | 17,060 | 58.8 | 15.5 | 29.1 | 46.5 | 42.1 | 44.3 | 39.2 |
| Keene | 77 | 32 | 17,053 | 59.5 | 16.3 | 30.4 | 43.1 | 43.6 | 43.4 | 39.0 |
| Oxen | 74 | 27 | 14,585 | 58.7 | 15.9 | 27.1 | 45.6 | 43.9 | 44.8 | 38.9 |
| Reeder | 78 | 28 | 20,028 | 58.6 | 16.5 | 28.6 | 43.5 | 42.8 | 43.2 | 38.3 |
| Briggs | 74 | 30 | 15,967 | 59.0 | 16.3 | 26.3 | 42.0 | 41.9 | 42.0 | 36.7 |
| Parshall | 76 | 32 | 16,406 | 59.4 | 16.5 | 25.9 | 40.7 | 41.6 | 41.2 | 36.1 |
| Alsen | 76 | 29 | 16,669 | 59.2 | 16.5 | 25.6 | 40.6 | 40.2 | 40.4 | 35.5 |
| Steele ND | 76 | 30 | 17,049 | 59.2 | 16.3 | | 41.2 | 42.8 | 42.0 | |
| Granite | 79 | 27 | 18,385 | 59.5 | 17.0 | | 41.8 | 40.1 | 41.0 | |
| Dapps | 76 | 32 | 16,068 | 58.2 | 17.5 | | 38.2 | 35.3 | 36.8 | |
| # of locations | 2 | 10 | 3 | 10 | 10 | 9 | 13 | 10 | 23 | 32 |

Locations: 2004 = Hettinger, Dickinson, Scranton, Selfridge, New Leipzig, Mandan, Hannover, Glen Ullin, Ralph SD and Bison SD.
 2003 = Hettinger, Dickinson, Scranton, Regent, Selfridge, New Leipzig, Mandan, Beulah, Hannover, Glen Ullin, Richardton (organic), Ralph SD and Bison SD.
 2002 = Hettinger, Dickinson, Scranton, Regent, Selfridge, New Leipzig, Beulah, Hannover and Glen Ullin.



2004 Hard Red Spring Wheat – Continuously Cropped - No-till Hettinger

| Variety | Days to Head | Plant Height | Test Weight | Grain Protein | ---- Grain Yield ---- | | | Average Yield | |
|------------|--------------|--------------|-------------|---------------|------------------------------|------|------|---------------|------|
| | | | | | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| | | inches | Lbs/bu | % | ----- Bushels per acre ----- | | | | |
| Reeder | 77 | 26 | 61.5 | 16.2 | 22.7 | 49.8 | 49.3 | 49.6 | 40.6 |
| Keene | 76 | 29 | 61.2 | 16.2 | 24.9 | 47.6 | 46.3 | 48.4 | 40.6 |
| Steele-ND | 77 | 29 | 62.4 | 16.2 | 23.1 | 48.1 | 49.8 | 49.0 | 40.3 |
| Mercury | 73 | 23 | 61.3 | 15.6 | 22.1 | 52.5 | 46.4 | 49.4 | 40.3 |
| Outlook | 78 | 25 | 60.0 | 16.0 | 23.4 | 48.4 | 49.0 | 48.7 | 40.3 |
| Oxen | 74 | 27 | 60.0 | 16.5 | 24.3 | 54.7 | 40.4 | 47.6 | 39.8 |
| Briggs | 72 | 25 | 60.2 | 15.9 | 23.3 | 45.7 | 49.4 | 47.6 | 39.5 |
| AC Superb | 77 | 27 | 61.2 | 16.6 | 23.3 | 48.0 | 46.8 | 47.4 | 39.4 |
| Norpro | 78 | 23 | 61.2 | 15.6 | 23.1 | 46.0 | 49.0 | 47.5 | 39.4 |
| Ingot | 71 | 27 | 61.5 | 16.6 | 21.6 | 51.9 | 44.0 | 48.0 | 39.2 |
| Parshall | 76 | 30 | 60.9 | 16.1 | 23.3 | 46.2 | 47.9 | 47.0 | 39.1 |
| Knudson | 76 | 25 | 60.7 | 15.6 | 20.9 | 49.0 | 44.9 | 47.0 | 38.3 |
| Granite | 79 | 25 | 59.2 | 16.3 | 22.0 | 45.1 | 46.2 | 45.6 | 37.8 |
| Hanna | 76 | 30 | 61.3 | 16.0 | 23.8 | 41.7 | 47.8 | 44.8 | 37.8 |
| Alsen | 74 | 25 | 60.9 | 16.4 | 23.9 | 46.9 | 41.7 | 44.3 | 37.5 |
| AC Amizon | 80 | 30 | 61.2 | 15.6 | 19.3 | 46.7 | 46.0 | 46.4 | 37.3 |
| Gunner | 80 | 28 | 61.6 | 16.4 | 21.0 | 43.6 | 46.1 | 44.8 | 36.9 |
| Russ | 76 | 27 | 60.2 | 15.8 | 21.2 | 44.9 | 44.2 | 44.6 | 36.8 |
| Dapps | 77 | 29 | 60.3 | 18.0 | 18.2 | 42.9 | 46.5 | 44.7 | 35.9 |
| Trooper | 72 | 22 | 61.3 | 15.2 | | | 48.1 | | |
| Freyr | 76 | 28 | 60.8 | 15.7 | | | 46.6 | | |
| Laser | 72 | 26 | 59.1 | 16.5 | | | 41.7 | | |
| Banton | 70 | 23 | 61.9 | 16.4 | | | 39.7 | | |
| ES54 | 79 | 27 | 58.5 | 16.7 | | | 39.5 | | |
| Trial Mean | 76 | 27 | 60.9 | 16.1 | 21.8 | 47.8 | 46.5 | -- | -- |
| C.V. % | 1.5 | 7.0 | 1.4 | 2.7 | 13.7 | 9.8 | 8.5 | -- | -- |
| LSD .05 | 2 | 3 | 1.2 | 0.6 | NS | 6.6 | 5.5 | -- | -- |
| LSD .01 | 2 | 4 | 1.5 | 0.8 | NS | 8.7 | 7.3 | -- | -- |

Planting Date: April 5, 2004 Harvest Date: August 6, 2004

Seeding Rate: 1.1 million live seeds / acre (approx. 1.6 bu/A).

Previous Crop: 2001 = barley, 2002 & 2003 = soybean.

Notes: The 2002 trial sustained severe heat and moisture stress. The 2003 trial sustained late season heat and moisture stress. The 2004 trial sustained hard frosts on May 13 (18° F), May 14 (16° F) and on June 18 (25° F).

NS = no statistical difference between varieties.

2004 Hard Red Spring Wheat - Alfalfa burn down

Dickinson, ND

| Variety | Days to Head | Seeds per Pound | Plant Height in | Test Weight lbs/bu | Protein % | ----- Grain Yield----- | | | Avg. Yield | | |
|-------------|--------------|-----------------|-----------------|--------------------|-----------|------------------------|------|------|---------------|--------|--------|
| | | | | | | 2002 | 2003 | 2004 | Returns \$/ac | Year 2 | Year 3 |
| AC Glenavon | 77 | 11,874 | 22 | 61.0 | 17.2 | 38.6 | 63.7 | 15.2 | 72.09 | 39.5 | 39.2 |
| AC Superb | 78 | 14,680 | 19 | 62.0 | 16.8 | 47.7 | 60.8 | 26.5 | 123.54 | 43.6 | 45.0 |
| Alsen | 77 | 15,273 | 21 | 61.5 | 17.4 | 45.7 | 61.4 | 27.5 | 130.01 | 44.4 | 44.9 |
| Amazon | 81 | 12,923 | 23 | 59.5 | 17.9 | 40.9 | 54.5 | 14.1 | 66.91 | 34.3 | 36.5 |
| Banton | 76 | 14,446 | 18 | 63.0 | 17.6 | -- | -- | 14.9 | 70.41 | -- | -- |
| Briggs | 76 | 14,824 | 22 | 61.0 | 17.5 | 44.9 | 57.3 | 24.1 | 113.92 | 40.7 | 42.1 |
| Choteau | 76 | 14,921 | 15 | 61.0 | 18.1 | -- | -- | 18.3 | 86.70 | -- | -- |
| Dapps | 76 | 14,446 | 18 | 60.0 | 18.4 | 42.7 | 60.6 | 11.5 | 54.32 | 36.0 | 38.3 |
| ES 54 | 81 | 13,581 | 18 | 61.0 | 18.6 | -- | 55.6 | 7.6 | 35.91 | 31.6 | -- |
| Freyr | 76 | 13,829 | 20 | 61.0 | 17.3 | -- | -- | 29.7 | 140.34 | -- | -- |
| Granger | 75 | 13,829 | 20 | 63.0 | 17.5 | -- | 68.9 | 26.7 | 126.41 | 47.8 | -- |
| Granite | 79 | 18,144 | 18 | 63.0 | 18.0 | 41.5 | 56.4 | 29.7 | 140.55 | 43.1 | 42.5 |
| Gunner | 78 | 15,120 | 20 | 61.0 | 18.1 | 43.8 | 58.8 | 27.5 | 130.27 | 43.2 | 43.4 |
| Hanna | 77 | 16,200 | 22 | 62.0 | 16.7 | 45.4 | 60.9 | 31.9 | 148.89 | 46.4 | 46.1 |
| Ingot | 74 | 15,750 | 22 | 63.0 | 17.7 | 45.9 | 64.1 | 25.8 | 122.02 | 44.9 | 45.3 |
| Keene | 78 | 17,053 | 18 | 61.0 | 17.5 | 47.2 | 61.3 | 30.2 | 142.61 | 45.7 | 46.2 |
| Keystone | 76 | 15,972 | 21 | 61.5 | 17.2 | 43.9 | 55.0 | 23.7 | 111.90 | 39.3 | 40.9 |
| Knudson | 77 | 14,775 | 18 | 62.5 | 17.2 | 44.6 | 62.8 | 23.6 | 111.48 | 43.2 | 43.7 |
| McKenzie | 76 | 14,632 | 18 | 59.0 | 18.4 | 43.4 | 63.6 | 14.2 | 67.28 | 38.9 | 40.4 |
| Mercury | 76 | 18,072 | 19 | 59.0 | 17.7 | 44.2 | 61.6 | 30.2 | 142.96 | 45.9 | 45.3 |
| Norpro | 78 | 14,000 | 19 | 62.0 | 17.4 | 45.9 | 63.0 | 27.6 | 130.38 | 45.3 | 45.5 |
| Oklee | 75 | 15,376 | 18 | 61.5 | 18.5 | -- | 57.7 | 24.7 | 116.97 | 41.2 | -- |
| Outlook | 77 | 15,221 | 18 | 60.5 | 17.1 | 45.0 | 62.1 | 30.3 | 143.12 | 46.2 | 45.8 |
| Oxen | 75 | 14,585 | 19 | 62.0 | 17.2 | 45.2 | 66.1 | 28.3 | 133.65 | 47.2 | 46.5 |
| Parshall | 75 | 15,481 | 18 | 62.0 | 17.6 | 44.9 | 62.5 | 21.2 | 100.25 | 41.8 | 42.9 |
| Polaris | 80 | 17,117 | 17 | 62.0 | 17.3 | -- | -- | 20.1 | 94.96 | -- | -- |
| Reeder | 78 | 19,220 | 19 | 59.0 | 18.5 | 47.1 | 65.4 | 28.4 | 134.21 | 46.9 | 47.0 |
| Russ | 76 | 14,872 | 20 | 62.5 | 17.3 | 40.0 | 64.4 | 25.7 | 121.77 | 45.1 | 43.4 |
| Saturn | 79 | 14,872 | 18 | 59.0 | 18.1 | -- | -- | 30.5 | 144.23 | -- | -- |
| Steele-ND | 76 | 14,354 | 21 | 62.0 | 17.5 | 46.1 | 63.9 | 26.5 | 125.30 | 45.2 | 45.5 |
| Trooper | 75 | 13,072 | 17 | 63.0 | 16.8 | -- | -- | 22.6 | 105.54 | -- | -- |
| Trial Mean | 76 | 14,969 | 20 | 61.6 | 17.5 | 44.1 | 60.8 | 24.0 | 113.25 | -- | -- |
| CV % | 1.2 | -- | 10.3 | -- | -- | 7.1 | 6.0 | 17.8 | -- | -- | -- |
| LSD 0.05 | 1 | -- | 3 | -- | -- | 4.4 | 5.1 | NS | -- | -- | -- |

Planting Date: April 12, 2004

Harvest Date: August 16, 2004

Seeding Rate: 1.2 million live seeds/ac

Previous Crop: Alfalfa burn down

Returns were calculated by multiplying the 2004 yield by protein premium or discount paid at the Southwest Grain Terminal located at Gladstone on October 18. The price paid on this date was \$3.53/bu, assuming that grain protein concentration was 14%. An additional \$.09/bu was paid for each additional 0.2% increase in grain protein up to 15%, 15% protein received an additional \$.45/bu. \$.03/bu was paid for each additional 0.2% increase in grain protein from 15% to 17% protein, above which an additional premium was not paid. Grain was discounted \$0.11/bu for each 0.2% reduction in grain protein from 14% to 13%, an additional discount of \$.07/bu for each 0.2% reduction in grain protein from 13% to 11%, below which no additional discount was not assigned. Returns factored in discounts for grain with a test weight <58 lb/bu [-\$.01/bu for 0.5 lb/bu between 58 and 57 lb/bu; -\$.02/bu for 0.5 lb/bu between 57 and 55 lb/bu; -\$.03/bu for 0.5 lb/bu between 55 and 50 lb/bu; and -\$.04/bu for 0.5 lb/bu between 50 and 46 lb/bu].

2004 HRSW - Continuously Cropped - No-till

Scranton

| Variety | Plant Height | Test Weight | Grain Protein | Grain Yield | | | Average Yield | |
|------------|--------------|-------------|---------------|------------------------------|------|------|---------------|------|
| | | | | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| | inches | Lbs/bu | % | ----- Bushels per acre ----- | | | | |
| Mercury | 29 | 60.4 | 14.2 | 40.6 | 43.2 | 72.3 | 57.8 | 52.0 |
| Oxen | 32 | 59.5 | 14.8 | 41.0 | 42.9 | 70.2 | 56.6 | 51.4 |
| Reeder | 34 | 59.1 | 15.3 | 44.2 | 40.8 | 67.7 | 54.2 | 50.9 |
| Alsen | 34 | 59.9 | 15.4 | 39.3 | 43.7 | 66.4 | 55.0 | 49.8 |
| Briggs | 35 | 60.0 | 15.3 | 39.3 | 36.3 | 62.8 | 49.6 | 46.1 |
| Keene | 41 | 59.9 | 15.0 | 41.1 | 35.9 | 60.6 | 48.2 | 45.9 |
| Parshall | 37 | 59.5 | 15.6 | 38.6 | 34.3 | 62.8 | 48.6 | 45.2 |
| Dapps | 39 | 58.5 | 15.9 | 39.6 | 32.8 | 57.7 | 45.2 | 43.4 |
| Steele ND | 34 | 59.0 | 15.0 | | 41.6 | 63.1 | 52.4 | |
| Butte 86 | 38 | 59.6 | 14.9 | | | 60.3 | | |
| Granite | 32 | 60.6 | 16.3 | | | 57.9 | | |
| Trial Mean | 35 | 59.7 | 15.2 | 40.0 | 39.1 | 63.5 | -- | -- |
| C.V. % | 3.8 | 1.2 | 2.5 | 5.3 | 11.3 | 5.2 | -- | -- |
| LSD .05 | 2 | 1.0 | 0.5 | 3.1 | 6.4 | 4.7 | -- | -- |
| LSD .01 | 3 | 1.4 | 0.7 | 4.1 | 8.7 | 6.3 | -- | -- |

Planting Date: April 14, 2004 Harvest Date: August 16, 2004
 Seeding Rate: 1.1 million live seeds / acre (approx. 1.6 bu/A).
 Previous Crop: 2001 – 2003 = Lentil.

2004 HRSW - Continuously Cropped - No-till

New Leipzig

| Variety | Plant Height | Test Weight | Grain Protein | Grain Yield | | | Average Yield | |
|------------|--------------|-------------|---------------|------------------------------|------|------|---------------|------|
| | | | | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| | inches | Lbs/bu | % | ----- Bushels per acre ----- | | | | |
| Keene | 26 | 58.8 | 16.8 | 13.6 | 35.3 | 32.6 | 34.0 | 27.2 |
| Parshall | 24 | 59.1 | 17.3 | 12.0 | 37.3 | 26.6 | 32.0 | 25.3 |
| Briggs | 24 | 59.2 | 17.0 | 13.0 | 31.8 | 31.0 | 31.4 | 25.3 |
| Oxen | 21 | 58.5 | 16.7 | 12.7 | 36.1 | 26.6 | 31.4 | 25.1 |
| Reeder | 22 | 58.0 | 16.7 | 16.7 | 35.2 | 22.7 | 29.0 | 24.9 |
| Alsen | 23 | 59.6 | 17.2 | 11.1 | 30.0 | 26.1 | 28.0 | 22.4 |
| Dapps | 26 | 57.2 | 17.9 | 13.2 | 29.3 | 22.3 | 25.8 | 21.6 |
| Mercury | 20 | 58.5 | 16.8 | 11.0 | 30.1 | 23.0 | 26.6 | 21.4 |
| Steele ND | 24 | 59.4 | 17.0 | | 30.9 | 29.7 | 30.3 | |
| Granite | 21 | 55.5 | 17.3 | | | 24.4 | | |
| Trial Mean | 24 | 58.5 | 17.1 | 12.9 | 32.9 | 26.8 | -- | -- |
| C.V. % | 4.6 | 2.7 | 1.2 | 16.2 | 10.8 | 14.0 | -- | -- |
| LSD .05 | 2 | 2.3 | 0.3 | NS | 5.2 | 5.4 | -- | -- |
| LSD .01 | 2 | NS | 0.4 | NS | 7.0 | 7.2 | -- | -- |

Planting Date: April 14, 2004 Harvest Date: August 11, 2004
 Seeding Rate: 1.1 million live seeds / acre (approx. 1.6 bu/A).
 Previous Crop: 2001 – 2003 = Lentil.
 NS = no-statistical difference between varieties.
 Notes: The 2002 trial sustained severe heat and moisture stress. The 2003 and 2004 trials sustained moderate moisture stress.

2004 HRSW - Continuously Cropped - No-till

Selfridge

| Variety | Plant Height | Test Weight | Grain Protein | ---- Grain Yield ---- | | | Average Yield | | |
|------------|--------------|-------------|---------------|------------------------------|------|------|---------------|------|--|
| | inches | Lbs/bu | % | 2002 | 2003 | 2004 | 2 yr | 3 yr | |
| | | | | ----- Bushels per acre ----- | | | | | |
| Oxen | 33 | 57.2 | 14.8 | 29.3 | 30.8 | 60.1 | 45.4 | 40.1 | |
| Mercury | 31 | 57.6 | 14.7 | 23.8 | 32.0 | 61.2 | 46.6 | 39.0 | |
| Briggs | 37 | 59.8 | 15.6 | 24.4 | 30.8 | 61.3 | 46.0 | 38.8 | |
| Alsen | 38 | 58.4 | 15.8 | 22.9 | 28.9 | 54.0 | 41.4 | 35.3 | |
| Reeder | 36 | 56.9 | 15.7 | 25.4 | 26.8 | 53.1 | 40.0 | 35.1 | |
| Keene | 42 | 58.3 | 16.0 | 22.8 | 30.4 | 52.0 | 41.2 | 35.1 | |
| Dapps | 42 | 58.0 | 17.0 | 16.8 | 28.1 | 52.9 | 40.5 | 32.6 | |
| Parshall | 40 | 58.1 | 16.5 | 18.6 | 28.1 | 50.9 | 39.5 | 32.5 | |
| Steele-ND | 40 | 58.6 | 15.3 | | 25.5 | 58.9 | 42.2 | | |
| Granite | 33 | 59.3 | 16.8 | | | 50.4 | | | |
| Trial Mean | 38 | 58.4 | 15.9 | 23.3 | 29.0 | 55.0 | -- | -- | |
| C.V. % | 5.2 | 2.0 | 1.6 | 16.9 | 10.4 | 8.2 | -- | -- | |
| LSD .05 | 3 | 1.7 | 0.4 | 5.7 | 4.4 | 6.6 | -- | -- | |
| LSD .01 | 4 | NS | 0.5 | 7.7 | 6.0 | 8.8 | -- | -- | |

Planting Date: April 13, 2004 Harvest Date: August 11, 2004
 Seeding Rate: 1.1 million live seeds / acre (approx. 1.6 bu/A).
 Previous Crop: 2001 – 2003 = Lentil.
 NS = no statistical difference between varieties.

2004 HRSW - Continuously Cropped - No-till

Mandan

| Variety | Plant Height | Test Weight | Grain Protein | ---- Grain Yield ---- | | | Average Yield | | |
|------------|--------------|-------------|---------------|------------------------------|------|------|---------------|------|--|
| | inches | Lbs/bu | % | 2001 | 2003 | 2004 | 2 yr | 3 yr | |
| | | | | ----- Bushels per acre ----- | | | | | |
| Mercury | 25 | 56.0 | 16.0 | 52.3 | 42.3 | 43.5 | 42.9 | 46.0 | |
| Reeder | 29 | 57.3 | 16.2 | 48.6 | 40.7 | 45.0 | 42.8 | 44.8 | |
| Oxen | 29 | 55.9 | 15.9 | 45.0 | 45.8 | 41.7 | 43.8 | 44.2 | |
| Parshall | 34 | 57.6 | 16.3 | 45.6 | 40.5 | 42.0 | 41.2 | 42.7 | |
| Alsen | 28 | 57.2 | 16.1 | 42.9 | 38.0 | 41.5 | 39.8 | 40.8 | |
| Keene | 35 | 57.7 | 16.2 | 40.6 | 39.2 | 39.8 | 39.5 | 39.9 | |
| Briggs | 31 | 55.6 | 16.3 | | 40.8 | 45.7 | 43.2 | | |
| Dapps | 35 | 56.6 | 17.2 | | 37.5 | 33.3 | 35.4 | | |
| Butte 86 | 34 | 56.5 | 16.2 | | | 38.7 | | | |
| Granite | 27 | 56.9 | 18.0 | | | 32.2 | | | |
| Trial Mean | 30 | 56.9 | 16.4 | 45.9 | 40.5 | 40.1 | -- | -- | |
| C.V. % | 8.7 | 1.5 | 2.6 | 8.3 | 7.3 | 9.4 | -- | -- | |
| LSD .05 | 5 | 1.4 | 0.7 | 6.4 | 4.3 | 6.4 | -- | -- | |
| LSD .01 | 6 | NS | 1.0 | 8.7 | NS | 8.6 | -- | -- | |

Planting Date: April 13, 2004 Harvest Date: August 13, 2004
 Seeding Rate: 1.1 million live seeds / acre (approx. 1.6 bu/A).
 Previous Crop: 2000 – 2003 = Barley.
 NS = no statistical difference between varieties.
 Notes: The 2004 trial sustained moderate moisture stress.

| Variety | Seeds per Pound | Plant Height in | Test Weight lbs/bu | Protein % | Returns \$/ac | Grain Yield bu/ac |
|------------|-----------------------|-----------------------|--------------------------|--------------|------------------|-------------------------|
| Alsen | 19,011 | 27 | 56.3 | 18.2 | 115.37 | 24.6 |
| Amazon | 13,510 | 35 | 57.8 | 16.7 | 139.17 | 29.8 |
| Briggs | 17,319 | 33 | 58.3 | 16.9 | 144.29 | 30.7 |
| Dapps | 17,406 | 28 | 57.1 | 17.6 | 114.22 | 24.2 |
| Freyr | 18,656 | 30 | 58.0 | 16.8 | 135.36 | 28.8 |
| Granite | 19,771 | 26 | 59.6 | 19.1 | 147.58 | 31.2 |
| Gunner | 22,428 | 28 | 57.4 | 18.0 | 139.71 | 29.6 |
| Hanna | 17,881 | 30 | 58.8 | 15.4 | 126.17 | 28.1 |
| Knudson | 18,361 | 27 | 57.8 | 17.4 | 126.29 | 26.7 |
| Mercury | 17,862 | 25 | 57.5 | 15.3 | 70.76 | 15.9 |
| Parshall | 18,143 | 29 | 57.9 | 17.1 | 135.75 | 28.7 |
| Reeder | 22,202 | 27 | 57.8 | 18.6 | 140.48 | 29.7 |
| Russ | 18,557 | 30 | 56.6 | 17.3 | 150.25 | 31.9 |
| Steele-ND | 19,615 | 31 | 56.9 | 16.0 | 140.90 | 30.9 |
| Trial Mean | 18,645 | 29 | 57.7 | 17.5 | 129.84 | 27.8 |
| CV % | 9.0 | 8.9 | 2.0 | 4.2 | -- | 12.5 |
| LSD 0.05 | 2,400 | 4 | 1.6 | 1.6 | -- | 5.0 |

Planting Date: April 28, 2004

Harvest Date: August 26, 2004

Seeding Rate: 1.2 million live seeds/ac

Returns were calculated by multiplying the 2004 yield by protein premium or discount paid at the Southwest Grain Terminal located at Gladstone on October 18. The price paid on this date was \$3.53/bu, assuming that grain protein concentration was 14%. An additional \$.09/bu was paid for each additional 0.2% increase in grain protein up to 15%, 15% protein received an additional \$.45/bu. \$.03/bu was paid for each additional 0.2% increase in grain protein from 15% to 17% protein, above which an additional premium was not paid. Grain was discounted \$.11/bu for each 0.2% reduction in grain protein from 14% to 13%, an additional discount of \$.07/bu for each 0.2% reduction in grain protein from 13% to 11%, below which no additional discount was not assigned. Returns factored in discounts for grain with a test weight <58 lb/bu [-\$.01/bu for 0.5 lb/bu between 58 and 57 lb/bu; -\$.02/bu for 0.5 lb/bu between 57 and 55 lb/bu; -\$.03/bu for 0.5 lb/bu between 55 and 50 lb/bu; and -\$.04/bu for 0.5 lb/bu between 50 and 46 lb/bu].

2004 Hannover Hard Red Spring Wheat

Dickinson, ND

| Variety | Seeds per Pound | Plant Height in | Test Weight lbs/bu | Protein % | Returns \$/ac | Grain Yield bu/ac |
|------------|-----------------------|-----------------------|--------------------------|--------------|------------------|-------------------------|
| Alsen | 15,722 | 31.7 | 58.0 | 17.1 | 188.25 | 39.8 |
| Amazon | 13,747 | 38.4 | 58.5 | 17.0 | 163.19 | 34.5 |
| Briggs | 15,758 | 36.2 | 58.3 | 17.4 | 162.71 | 34.4 |
| Dapps | 16,352 | 38.8 | 58.3 | 17.6 | 171.23 | 36.2 |
| Freyr | 17,096 | 35.7 | 58.3 | 17.3 | 195.35 | 41.3 |
| Granite | 17,239 | 32.3 | 60.7 | 17.2 | 224.20 | 47.4 |
| Gunner | 18,232 | 37.8 | 59.5 | 17.8 | 196.30 | 41.5 |
| Hanna | 15,416 | 39.6 | 59.2 | 15.3 | 171.71 | 38.5 |
| Knudson | 14,223 | 32.3 | 59.7 | 15.1 | 202.01 | 45.6 |
| Mercury | 15,246 | 29.8 | 57.2 | 15.5 | 205.18 | 45.8 |
| Parshall | 15,594 | 40.9 | 59.8 | 15.8 | 238.42 | 52.4 |
| Reeder | 18,661 | 35.2 | 59.0 | 17.3 | 213.80 | 45.2 |
| Russ | 16,455 | 38.4 | 58.3 | 16.3 | 165.96 | 36.0 |
| Steele-ND | 17,179 | 33.2 | 56.8 | 15.4 | 190.87 | 42.7 |
| Trial Mean | 16,224 | 36 | 58.7 | 16.6 | 192.25 | 41.6 |
| CV % | 6.8 | 6.9 | 2.2 | 6.2 | -- | 15.6 |
| LSD 0.05 | 1,832 | 4 | 2.1 | NS | -- | NS |

Planting Date: April 28, 2004

Harvest Date: August 26, 2004

Seeding Rate: 1.2 million live seeds/ac

Returns were calculated by multiplying the 2004 yield by protein premium or discount paid at the Southwest Grain Terminal located at Gladstone on October 18. The price paid on this date was \$3.53/bu, assuming that grain protein concentration was 14%. An additional \$.09/bu was paid for each additional 0.2% increase in grain protein up to 15%, 15% protein received an additional \$.45/bu. \$.03/bu was paid for each additional 0.2% increase in grain protein from 15% to 17% protein, above which an additional premium was not paid. Grain was discounted \$.11/bu for each 0.2% reduction in grain protein from 14% to 13%, an additional discount of \$.07/bu for each 0.2% reduction in grain protein from 13% to 11%, below which no additional discount was not assigned. Returns factored in discounts for grain with a test weight <58 lb/bu [-\$.01/bu for 0.5 lb/bu between 58 and 57 lb/bu; -\$.02/bu for 0.5 lb/bu between 57 and 55 lb/bu; -\$.03/bu for 0.5 lb/bu between 55 and 50 lb/bu; and -\$.04/bu for 0.5 lb/bu between 50 and 46 lb/bu].

SDSU Hard Red Spring Wheat Variety Trial – Perkins County (Bison), 2004.

| Variety | Height Inches | Lodging 0-9* | Test Wt. Lb/Bu | Protein Percent | Yield Bu/A 2004 |
|-------------|------------------|-----------------|-------------------|--------------------|--------------------|
| ALSEN | 27 | 0 | 61.2 | 17.5 | 26.9 |
| BRIGGS | 27 | 0 | 58.0 | 17.3 | 28.0 |
| CHRIS | 33 | 0 | 57.4 | 17.5 | 25.8 |
| DANDY | 27 | 0 | 58.3 | 16.0 | 26.7 |
| DAPPS | 29 | 0 | 56.7 | 18.5 | 22.5 |
| FORGE | 26 | 0 | 58.6 | 15.7 | 30.5 |
| FREYR | 29 | 0 | 59.2 | 17.8 | 26.7 |
| GRANGER | 27 | 0 | 59.8 | 17.0 | 29.8 |
| GRANITE | 24 | 0 | 59.6 | 17.2 | 27.3 |
| INGOT | 28 | 0 | 60.0 | 17.5 | 25.0 |
| KNUDSON | 25 | 0 | 58.7 | 17.4 | 23.5 |
| MERCURY | 23 | 0 | 59.0 | 16.9 | 25.7 |
| NORPRO | 27 | 0 | 59.9 | 18.0 | 31.4 |
| OKLEE | 24 | 0 | 58.6 | 18.4 | 27.6 |
| OXEN | 25 | 0 | 56.8 | 17.8 | 26.7 |
| POLARIS | 25 | 0 | 58.9 | 14.8 | 33.5 |
| REEDER | 26 | 0 | 58.0 | 17.0 | 29.8 |
| RUSS | 28 | 0 | 56.4 | 16.5 | 29.2 |
| STEELE | 29 | 0 | 58.3 | 18.4 | 26.9 |
| TROOPER | 23 | 0 | 59.0 | 16.3 | 25.7 |
| WALWORTH | 28 | 0 | 58.0 | 17.4 | 28.5 |
| Average | 26.8 | 0.0 | 58.4 | 16.9 | 28.8 |
| LSD (P=.05) | 2.5 | 0.0 | 2.2 | -- | 4.08 |
| CV | 6.8 | 0.0 | 2.7 | -- | 10.0 |

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

Planted: April 12, 2004 Herbicide: Bronate (1 pint/A)
 Harvested: August 10, 2004 Additional Nitrogen: 30 lb/A
 Previous crop: Durum Wheat, No-Till planted

SDSU Hard Red Spring Wheat Variety Trial - Harding County (Ralph), 2004.

| Variety | Height Inches | Lodging 0-9* | Test Wt. Lb/Bu | Protein Percent | Yield Bu/A 2004 |
|-------------|------------------|-----------------|-------------------|--------------------|--------------------|
| ALSEN | 31 | 0 | 59.2 | 14.2 | 54.0 |
| BRIGGS | 31 | 0 | 59.4 | 14.2 | 51.8 |
| CHRIS | 36 | 0 | 58.0 | 16.9 | 42.3 |
| DANDY | 31 | 0 | 61.5 | 15.3 | 53.7 |
| DAPPS | 35 | 0 | 59.0 | 16.7 | 45.9 |
| FORGE | 31 | 0 | 62.0 | 12.0 | 56.8 |
| FREYR | 30 | 0 | 60.7 | 14.4 | 52.4 |
| GRANGER | 35 | 0 | 60.9 | 13.5 | 55.0 |
| GRANITE | 29 | 0 | 60.3 | 14.3 | 54.0 |
| INGOT | 35 | 0 | 61.5 | 14.7 | 50.2 |
| KNUDSON | 29 | 0 | 60.0 | 16.5 | 55.4 |
| MERCURY | 26 | 0 | 60.7 | 11.9 | 56.6 |
| NORPRO | 28 | 0 | 59.0 | 14.6 | 60.6 |
| OKLEE | 28 | 0 | 59.3 | 13.9 | 45.0 |
| OXEN | 29 | 0 | 59.5 | 13.3 | 57.2 |
| POLARIS | 31 | 0 | 58.3 | 12.0 | 60.2 |
| REEDER | 31 | 0 | 59.0 | 13.8 | 56.6 |
| RUSS | 32 | 0 | 59.2 | 15.7 | 56.8 |
| STEELE | 33 | 0 | 59.6 | 15.5 | 56.4 |
| TROOPER | 26 | 0 | 59.5 | 13.4 | 51.6 |
| WALWORTH | 29 | 0 | 59.4 | 12.2 | 56.9 |
| Average | 31.4 | 0.0 | 59.9 | 13.7 | 54.6 |
| LSD (P=.05) | 2.6 | 0.0 | 0.3 | -- | 4.0 |
| CV | 4.0 | 0.0 | 0.6 | -- | 5.4 |

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

Planted: April 12, 2004 Herbicide: Ally (¹/₁₀ oz/A) +2,4-D LV6 (6 oz/A)
 Harvested: August 9, 2004 Additional Nitrogen: 50 lb/A
 Previous crop: Conventional fallow

Table 1. Plant stand, seedling vigor, height, and canopy of eighteen hard red spring wheat cultivars during 2004 in a certified organic field near Richardton, ND.

| Variety | Plant Stand | | Seedling vigor ¹ | | Plant height | | | Plant canopy | |
|--------------------------------|---------------------|--------|-----------------------------|--------|--------------|--------|------------------|---------------------|--|
| | 10-May | 18-May | 10-May | 18-May | 18-May | 12-Jul | PAR ² | Ground ² | |
| | no./ft ² | | | | inches | | | % | |
| AC Cadillac | 24 | 26 | 7.3 | | 5 | 24 | 86 | 14 | |
| Acadia | 25 | 23 | 6.9 | | 4 | 25 | 85 | 15 | |
| Alsen | 25 | 25 | 7.1 | | 4 | 21 | 85 | 15 | |
| Backup | 25 | 23 | 7.1 | | 5 | 22 | 88 | 12 | |
| Chris | 27 | 26 | 7.3 | | 4 | 23 | 85 | 15 | |
| Coteau | 28 | 28 | 7.1 | | 4 | 22 | 83 | 17 | |
| Dapps | 27 | 26 | 7.1 | | 4 | 22 | 83 | 18 | |
| Glupro | 24 | 25 | 7.3 | | 4 | 24 | 82 | 18 | |
| Gunner | 26 | 26 | 7.3 | | 4 | 21 | 84 | 16 | |
| Ingot | 22 | 26 | 7.5 | | 4 | 21 | 86 | 14 | |
| Marquis | 28 | 29 | 7.6 | | 4 | 27 | 84 | 16 | |
| Oklee | 27 | 26 | 7.8 | | 4 | 19 | 88 | 12 | |
| Parshall (CON) ³ | 29 | 27 | 7.3 | | 4 | 22 | 84 | 16 | |
| Parshall (2003DS) ³ | 27 | 28 | 7.1 | | 5 | 22 | 84 | 16 | |
| Parshall | 27 | 27 | 7.3 | | 4 | 21 | 84 | 16 | |
| Red Fife | 26 | 24 | 7.5 | | 4 | 27 | 86 | 14 | |
| Reeder | 25 | 27 | 7.4 | | 5 | 21 | 86 | 14 | |
| Stoa (CON) ³ | 23 | 23 | 6.9 | | 4 | 24 | 86 | 14 | |
| Stoa (2003DS) ³ | 29 | 27 | 7.0 | | 4 | 22 | 84 | 16 | |
| Stoa | 24 | 27 | 7.0 | | 4 | 21 | 87 | 13 | |
| Waldron | 23 | 25 | 7.4 | | 4 | 23 | 85 | 15 | |
| Walworth | 24 | 27 | 7.1 | | 4 | 22 | 87 | 13 | |
| Mean | 26 | 26 | 7.2 | | 4 | 23 | 85 | 15 | |
| CV % | 11.7 | 10.0 | 4.3 | | 8.8 | 6.6 | 3.3 | 19.1 | |
| LSD | NS | NS | 0.4 | | 0.5 | 2 | NS | NS | |

¹ 9 = good vigor; 1 = poor vigor

² PAR = light interception by the plant canopy; Ground = percentage ground coverage

³ (CON) & (2003DS) = individual seed lots produced under conventional management; seed lots of other variety treatments generally were produced under organic management.

Planting Date: April 14, 2004

Harvest Date: August 13, 2004

Table 2. Days to heading, spike density, competitiveness, grain yield and quality of eighteen hard red spring wheat cultivars during 2004 in a certified organic field near Richardton, ND.

| Variety | Grain | | | | | | |
|--------------------------------|----------------------------------|---|---------------------------------------|----------------------|------------------|---------------------------|---------------------------------|
| | Days to heading -----no.----- | Spike density ----no./ft ² ---- | Competition ¹ ----%---- | Yield - bu/acre - | Protein - % - | Test Weight - lbs/bu - | Kernel weight - kernels/lb - |
| AC Cadillac | 74 | 18 | 51 | 21.8 | 14.2 | 58.8 | 14,034 |
| Acadia | 75 | 20 | 54 | 22.1 | 13.0 | 59.4 | 13,493 |
| Alsen | 71 | 18 | 53 | 21.7 | 15.4 | 59.4 | 13,357 |
| Backup | 70 | 18 | 55 | 15.0 | 16.9 | 57.8 | 14,055 |
| Chris | 73 | 22 | 46 | 18.7 | 14.2 | 55.6 | 16,886 |
| Coteau | 75 | 19 | 57 | 19.3 | 14.6 | 58.4 | 14,150 |
| Dapps | 72 | 20 | 48 | 17.5 | 15.6 | 57.4 | 12,970 |
| Glupro | 73 | 18 | 49 | 17.0 | 17.4 | 56.1 | 14,459 |
| Gunner | 74 | 24 | 53 | 22.6 | 14.9 | 58.6 | 16,180 |
| Ingot | 70 | 18 | 50 | 20.5 | 15.3 | 59.0 | 13,899 |
| Marquis | 76 | 21 | 55 | 21.6 | 13.5 | 58.6 | 14,753 |
| Oklee | 69 | 24 | 59 | 22.8 | 14.7 | 60.0 | 14,203 |
| Parshall (CON) ² | 71 | 21 | 48 | 21.2 | 14.6 | 59.5 | 14,696 |
| Parshall (2003DS) ² | 71 | 23 | 49 | 22.0 | 13.5 | 58.9 | 14,146 |
| Parshall | 72 | 20 | 46 | 22.4 | 14.3 | 58.3 | 14,745 |
| Red Fife | 79 | 21 | 48 | 20.8 | 13.4 | 56.9 | 13,786 |
| Reeder | 72 | 19 | 53 | 23.3 | 13.8 | 60.8 | 12,368 |
| Stoa (CON) ² | 74 | 18 | 48 | 22.8 | 13.2 | 58.8 | 14,327 |
| Stoa (2003DS) ² | 73 | 18 | 51 | 21.5 | 13.0 | 58.9 | 14,629 |
| Stoa | 75 | 19 | 51 | 21.7 | 13.4 | 58.0 | 14,562 |
| Waldron | 71 | 19 | 49 | 18.1 | 15.1 | 57.0 | 14,065 |
| Walworth | 70 | 21 | 53 | 21.0 | 14.4 | 57.0 | 14,078 |
| Mean | 73 | 20 | 51 | 20.7 | 14.5 | 58.3 | 14,265 |
| CV % | 1.1 | 14.2 | 13.4 | 9.8 | 4.3 | 2.5 | 3.5 |
| LSD | 1 | 4 | NS | 2.9 | 0.9 | 2.0 | 703 |

¹Visual estimate of the weed density in plots compared with a prostrate winter wheat check plot expressed as a percentage.

²(CON) & (2003DS)= individual seed lots produced under conventional management; seed lots of other variety treatments generally were produced under organic management.

Planting Date: April 14, 2004

Harvest Date: August 13, 2004

2004 North Dakota durum wheat variety descriptions, agronomic traits

| Variety | Agent or Origin ¹ | Year Released | Chaff Color | Height | Straw Strength | Maturity | Reaction to Disease ² | | | |
|---------------|------------------------------|---------------|-------------|--------|----------------|----------|----------------------------------|-----------|----------------|------|
| | | | | | | | Stem Rust | Leaf Rust | Foliar Disease | Scab |
| AC Avonlea | Can. | 1997 | white | med | med. | med. | R | R | M | S |
| AC Melita | Can. | 1995 | white | tall | med. | med. | R | NA | NA | S |
| AC Morse | Can. | 1996 | white | s.dwf. | strong | med. | R | R | M | NA |
| AC Navigator | Can. | 1999 | white | s.dwf. | weak | med. | R | R | M | S |
| AC Pathfinder | Can. | 1999 | white | med. | weak | med. | R | R | M | S |
| Alzada | WestBred | 2004 | white | s.dwf | strong | early | R | NA | NA | NA |
| Belzer | ND | 1997 | white | tall | med. | late | R | R | M | MR |
| Ben | ND | 1996 | white | med. | strong | med. | R | R | MR | S* |
| Cando | ND | 1975 | tan | s.dwf. | v.strong. | med. | R | R | M | VS |
| Dilse | ND | 2002 | white | med. | strong | late | R | R | M | MS |
| Dressler | AgriPro | 1996 | white | tall | med. | med. | R | MR | NA | VS |
| Fjord | AgriPro | 1986 | white | tall | strong. | m.early | R | R | M | S |
| Kari | Agripro | 1998 | white | med | strong | med | R | R | M | S |
| Kyle | Can. | 1984 | white | tall | weak | med. | R | MR | M | NA |
| Laker | WestBred | 1985 | white | s.dwf. | strong. | med. | R | MR | S | S |
| Lebsock | ND | 1999 | white | med | strong | med | R | R | M | MS |
| Lloyd | ND | 1983 | white | s.dwf. | v.strong. | med. | R | MR | S | VS |
| Maier | ND | 1998 | white | med | strong | m-late | R | R | M | S* |
| Medora | Can. | 1983 | white | tall | strg. | m.early | R | R | MS | VS |
| Monroe | ND | 1985 | white | tall | med. | early | R | R | M | VS |
| Mountrail | ND | 1998 | white | med | strong | late | R | R | M | S* |
| Munich | ND | 1995 | white | med. | v.strg. | med. | R | R | MR | S* |
| Pierce | ND | 2001 | white | med. | m.strong | med. | R | R | MS | S |
| Plaza | ND | 1999 | white | s.dwf. | strong | late | R | R | M | MS |
| Plenty | Can. | 1990 | white | tall | weak | late | R | R | MR | MS |
| Primo D'Oro | WB/DGP | 2004 | white | tall | med. | m.early | NA | NA | NA | NA |
| Renville | ND | 1988 | white | tall | med. | med. | R | R | M | S* |
| Rugby | ND | 1973 | tan | tall | v.strong. | m.early | R | R | MR | S* |
| Vic | ND | 1979 | white | tall | med. | m.early | R | R | MR | S* |
| Voss | AgriPro | 1994 | white | s.dwf. | v.strong. | med. | R | MR | MS | S |

1 Refers to agent or developer: WB = WestBred..

2 R = resistant; MR = moderately resistant (slow rusters); M = intermediate; MS = moderately susceptible; S = susceptible; VS = very susceptible; Foliar Disease = reaction to tan spot and septoria leaf spot complex. Letter ratings for head blight (scab) based on visual head symptoms. * Indicates yields and/or quality have often been higher than would be expected based on visual symptoms.

2004 Durum Wheat in the West River Region

Combined Means

| Variety | Days to Head | Plant Height | Seeds / Pound | Test Weight | Protein | Grain Yield | | | Avg. Yield | |
|----------------|--------------|--------------|---------------|-------------|---------|-------------------|------|------|------------|--------|
| | | | | | | 2002 | 2003 | 2004 | 2 year | 3 year |
| | | inches | | lbs/bu | % | ----- bu/ac ----- | | | | |
| Ben | 76 | 30 | 10,730 | 59.3 | 16.5 | 36.3 | 39.2 | 37.2 | 38.2 | 37.6 |
| Mountrail | 76 | 28 | 12,341 | 58.2 | 15.6 | 28.1 | 39.8 | 40.2 | 40.0 | 36.0 |
| Lebsock | 76 | 28 | 11,210 | 59.2 | 16.2 | 27.7 | 38.8 | 36.1 | 37.4 | 42.2 |
| Maier | 77 | 28 | 11,381 | 58.6 | 16.6 | 26.4 | 38.2 | 36.9 | 37.6 | 33.8 |
| Pierce | 76 | 29 | 12,071 | 59.3 | 15.8 | 26.6 | 38.4 | 36.5 | 37.4 | 33.8 |
| Dilse | 78 | 28 | 11,906 | 58.2 | 16.8 | 25.6 | 37.2 | 37.3 | 37.2 | 33.4 |
| # of locations | 2 | 8 | 1 | 8 | 8 | 7 | 12 | 8 | 20 | 27 |

Locations: 2004 = Hettinger, Dickinson, Scranton, Selfridge, New Leipzig, Mandan, Ralph SD & Bison SD.
 2003 = Hettinger, Dickinson, Scranton, Regent, Selfridge, New Leipzig, Mandan, Beulah, Hannover, Glen Ullin, Ralph SD and Bison SD.
 2002 = Hettinger, Dickinson, Scranton, Regent, Selfridge, New Leipzig and Wibaux MT.



2004 Durum Variety Trial - Continuously Cropped - No-till

Hettinger

| Variety | Days to Head | Plant Height | Test Weight | Grain Protein | ---- Grain Yield ---- | | | Average Yield | |
|-------------|--------------|--------------|-------------|---------------|------------------------------|------|------|---------------|------|
| | | | | | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| | | inches | Lbs/bu | % | ----- Bushels per acre ----- | | | | |
| Mountrail | 78 | 23 | 60.8 | 16.1 | 22.6 | 44.3 | 36.1 | 40.2 | 34.3 |
| Lebsock | 78 | 25 | 60.4 | 16.3 | 26.0 | 44.2 | 32.2 | 38.2 | 34.1 |
| Ben | 77 | 26 | 60.5 | 16.6 | 22.8 | 43.8 | 33.4 | 38.6 | 33.3 |
| Renville | 80 | 25 | 60.2 | 16.1 | 26.2 | 40.4 | 32.5 | 36.4 | 33.0 |
| Munich | 76 | 23 | 60.4 | 15.9 | 22.0 | 43.8 | 32.7 | 38.2 | 32.8 |
| Belzer | 79 | 24 | 59.2 | 15.6 | 21.7 | 39.5 | 33.5 | 36.5 | 31.6 |
| Monroe | 73 | 25 | 60.3 | 16.4 | 24.2 | 36.6 | 30.5 | 33.6 | 30.4 |
| Dilse | 81 | 24 | 60.1 | 17.0 | 22.0 | 36.6 | 32.5 | 34.6 | 30.4 |
| Pierce | 78 | 22 | 61.0 | 15.8 | 22.1 | 38.0 | 29.9 | 34.0 | 30.0 |
| Rugby | 79 | 27 | 59.8 | 17.0 | 21.6 | 38.9 | 29.2 | 34.0 | 29.9 |
| Plaza | 79 | 22 | 61.0 | 16.3 | 22.3 | 36.5 | 29.8 | 33.2 | 29.5 |
| Maier | 79 | 25 | 59.4 | 17.2 | 17.3 | 38.2 | 32.1 | 35.2 | 29.2 |
| AC Avonlea | 76 | 25 | 61.4 | 16.5 | | 39.9 | 38.7 | 39.3 | |
| Alzada | 73 | 24 | 60.8 | 15.9 | | | 33.1 | | |
| Primo D'Oro | 75 | 25 | 60.6 | 16.2 | | | 32.4 | | |
| Trial Mean | 78 | 24 | 60.5 | 16.1 | 23.4 | 39.8 | 32.9 | -- | -- |
| C.V. % | 1.9 | 6.4 | 1.0 | 2.1 | 15.3 | 10.4 | 9.6 | -- | -- |
| LSD .05 | 2 | 2 | 0.8 | 0.5 | NS | 5.8 | 4.4 | -- | -- |
| LSD .01 | 3 | 3 | 1.1 | 0.6 | NS | 7.7 | 5.8 | -- | -- |

Planting Date: April 5, 2004 Harvest Date: August 9, 2004

Seeding Rate: 1.25 million live seeds / acre (approx. 2.2 bu/A).

Previous Crop: 2001 = barley, 2002 & 2003 = soybean.

Notes: The 2002 trial sustained severe heat and moisture stress. The 2003 trial sustained late season heat and moisture stress. The 2004 trial sustained hard frosts on May 13 (18° F), May 14 (16° F) and on June 18 (25° F).

NS = no statistical difference between varieties.

2004 Durum - Recrop

Dickinson, ND

| Variety | Days to Head | Seeds per Pound | Plant Height in | Test Weight lbs/bu | Protein % | ----- Grain Yield----- | | | Returns \$/ac | Avg. Yield | |
|---------------|--------------------|-----------------------|-----------------------|--------------------------|--------------|------------------------|------|------|------------------|------------|-----------|
| | | | | | | 2002 | 2003 | 2004 | | Year 2 | Year 3 |
| AC Avonlea | 74 | 11,131 | 22 | 61.6 | 16.0 | 34.1 | 61.4 | 30.0 | 111.02 | 45.7 | 41.8 |
| AC Navigator | 74 | 10,430 | 20 | 62.4 | 15.3 | -- | -- | 27.1 | 100.17 | -- | -- |
| AC Pathfinder | 75 | 11,540 | 24 | 62.1 | 14.6 | -- | -- | 30.9 | 114.15 | -- | -- |
| Alzada | 72 | 10,431 | 21 | 62.5 | 14.8 | -- | -- | 23.2 | 85.84 | -- | -- |
| Belzer | 75 | 11,330 | 22 | 59.9 | 15.7 | 34.3 | 55.9 | 26.9 | 99.38 | 41.4 | 39.0 |
| Ben | 74 | 10,730 | 22 | 62.5 | 15.7 | 31.3 | 55.6 | 28.6 | 105.73 | 42.1 | 38.5 |
| Dilse | 76 | 11,906 | 23 | 62.1 | 15.7 | 36.5 | 55.5 | 35.4 | 131.14 | 45.5 | 42.5 |
| Lebsock | 74 | 11,210 | 21 | 62.0 | 15.8 | 36.4 | 56.0 | 28.7 | 106.29 | 42.4 | 40.4 |
| Maier | 75 | 11,381 | 20 | 61.9 | 16.3 | 35.5 | 60.6 | 28.1 | 103.81 | 44.3 | 41.4 |
| Monroe | 74 | 12,780 | 23 | 61.6 | 15.4 | 34.7 | 54.2 | 29.8 | 110.36 | 42.0 | 39.6 |
| Mountrail | 75 | 12,341 | 23 | 61.0 | 14.6 | 35.1 | 56.2 | 32.1 | 118.90 | 44.2 | 41.1 |
| Munich | 74 | 12,277 | 21 | 61.5 | 15.8 | 31.1 | 56.6 | 30.5 | 112.89 | 43.6 | 39.4 |
| Pierce | 75 | 12,071 | 20 | 62.1 | 15.3 | 34.5 | 58.0 | 31.0 | 114.56 | 44.5 | 41.2 |
| Plaza | 74 | 11,796 | 19 | 62.1 | 16.0 | 33.4 | 56.4 | 28.0 | 103.74 | 42.2 | 39.3 |
| Primo D'Oro | 73 | 11,308 | 24 | 61.8 | 15.8 | -- | -- | 30.1 | 111.38 | -- | -- |
| Renville | 72 | 9,829 | 23 | 61.4 | 15.9 | 31.0 | 48.9 | 28.1 | 103.79 | 38.5 | 36.0 |
| Rugby | 74 | 11,661 | 22 | 62.1 | 15.8 | 32.8 | 53.3 | 29.9 | 110.48 | 41.6 | 38.7 |
| Trial Mean | 74 | 11,423 | 22 | 61.6 | 15.5 | 34.2 | 56.7 | 28.8 | 106.44 | -- | -- |
| CV % | 1.0 | 5.6 | 11.1 | 1.0 | 1.7 | 10.0 | 8.0 | 14.3 | 14.4 | -- | -- |
| LSD 0.05 | 1 | 888 | NS | 0.8 | 0.5 | 4.8 | 6.4 | 5.8 | 21.35 | -- | -- |

Planting Date: April 12, 2004

Harvest Date: August 16, 2004

Previous Crop: Field Pea

Seeding Rate: 1.2 million live seeds/ac

Returns were calculated by multiplying the 2004 yield by the test weight discount paid at the Southwest Grain Terminal located at Gladstone on October 18. The price paid on this date was \$3.70/bu, assuming a minimum test weight of 60 lb/bu. Grain was discounted \$.01/bu for each 0.5 lb reduction in test weight between 60 and 59 lb/bu, \$.03/bu per 0.5 lb reduction between 59 and 58 lb/bu, \$.04/bu between 58 and 55 lb/bu, and \$.05/bu per 0.5 lb/bu reduction between 55 and 50 lb/bu.

2004 Durum Variety Trial - Continuously Cropped - No-till Scranton

| Variety | Plant Height | Test Weight | Grain Protein | ---- Grain Yield ---- | | | Average Yield | | |
|------------|--------------|-------------|---------------|------------------------------|------|------|---------------|------|--|
| | inches | Lbs/bu | % | 2002 | 2003 | 2004 | 2 yr | 3 yr | |
| | | | | ----- Bushels per acre ----- | | | | | |
| Mountrail | 36 | 58.8 | 15.5 | 39.1 | 38.2 | 65.1 | 51.6 | 47.5 | |
| Lebsock | 35 | 60.6 | 15.2 | 41.1 | 36.1 | 64.8 | 50.4 | 47.3 | |
| Ben | 37 | 61.3 | 15.2 | 38.1 | 35.8 | 65.1 | 50.4 | 46.3 | |
| Dilse | 34 | 60.0 | 16.4 | 40.3 | 35.3 | 59.7 | 47.5 | 45.1 | |
| Maier | 33 | 59.2 | 16.0 | 41.9 | 34.7 | 58.1 | 46.4 | 44.9 | |
| Pierce | 37 | 60.3 | 15.4 | 39.2 | 33.8 | 60.4 | 47.1 | 44.5 | |
| Trial Mean | 35 | 60.1 | 15.5 | 40.0 | 35.7 | 63.1 | -- | -- | |
| C.V. % | 3.4 | 1.0 | 3.2 | 4.9 | 3.3 | 5.7 | -- | -- | |
| LSD .05 | 2 | 0.9 | 0.7 | NS | 1.8 | 5.3 | -- | -- | |
| LSD .01 | 2 | 1.3 | 1.0 | NS | 2.5 | 7.3 | -- | -- | |

Planting Date: April 14, 2004
 Harvest Date: August 16, 2004
 Seeding Rate: 1.25 million live seeds / acre (approx. 2.2 bu/A).
 Previous Crop: 2001 – 2003 = Lentil.
 NS = no statistical difference between varieties.

2004 Durum Variety Trial - Continuously Cropped - No-till New Leipzig

| Variety | Plant Height | Test Weight | Grain Protein | ---- Grain Yield ---- | | | Average Yield | | |
|------------|--------------|-------------|---------------|------------------------------|------|------|---------------|------|--|
| | inches | Lbs/bu | % | 2002 | 2003 | 2004 | 2 yr | 3 yr | |
| | | | | ----- Bushels per acre ----- | | | | | |
| Mountrail | 24 | 57.7 | 17.5 | 14.0 | 23.7 | 25.0 | 24.4 | 20.9 | |
| Ben | 25 | 58.7 | 17.8 | 15.4 | 23.1 | 23.4 | 23.2 | 20.6 | |
| Maier | 25 | 55.9 | 18.4 | 14.2 | 21.8 | 23.2 | 22.5 | 19.7 | |
| Pierce | 25 | 58.6 | 17.1 | 12.5 | 21.0 | 24.3 | 22.6 | 19.3 | |
| Lebsock | 24 | 58.1 | 17.9 | 11.1 | 22.6 | 22.2 | 22.4 | 18.6 | |
| Dilse | 22 | 56.0 | 18.5 | 11.3 | 20.0 | 23.6 | 21.8 | 18.3 | |
| Trial Mean | 24 | 57.7 | 17.8 | 13.1 | 22.0 | 24.0 | -- | -- | |
| C.V. % | 4.3 | 1.7 | 1.1 | 11.3 | 14.3 | 10.6 | -- | -- | |
| LSD .05 | 2 | 1.4 | 0.3 | 2.2 | NS | NS | -- | -- | |
| LSD .01 | 2 | 2.0 | 0.4 | 3.1 | NS | NS | -- | -- | |

Planting Date: April 14, 2004
 Harvest Date: August 11, 2004
 Seeding Rate: 1.25 million live seeds / acre (approx. 1.9 bu/A).
 Previous Crop: 2001 – 2003 = Lentil.
 NS = no statistical difference between varieties.
 Notes: The 2002, 2003 and 2004 trials sustained severe moisture stress.

2004 Durum Variety Trial - Continuously Cropped - No-till Selfridge

| Variety | Plant Height | Test Weight | Grain Protein | ---- Grain Yield ---- | | | Average Yield | | |
|------------|--------------|-------------|---------------|------------------------------|------|------|---------------|------|--|
| | inches | Lbs/bu | % | 2002 | 2003 | 2004 | 2 yr | 3 yr | |
| | | | | ----- Bushels per acre ----- | | | | | |
| Mountrail | 40 | 60.2 | 15.3 | 22.1 | 26.8 | 54.3 | 40.6 | 34.4 | |
| Lebsock | 38 | 60.6 | 16.4 | 20.4 | 30.3 | 49.9 | 40.1 | 33.5 | |
| Pierce | 41 | 61.2 | 15.5 | 18.7 | 29.0 | 52.3 | 40.6 | 33.3 | |
| Dilse | 38 | 58.6 | 16.9 | 19.4 | 29.2 | 49.9 | 39.6 | 32.8 | |
| Ben | 40 | 60.6 | 16.4 | 18.5 | 28.0 | 50.3 | 39.2 | 32.3 | |
| Maier | 39 | 59.8 | 16.5 | 19.9 | 26.8 | 49.0 | 37.9 | 31.9 | |
| Trial Mean | 39 | 60.2 | 16.0 | 19.8 | 28.4 | 52.3 | -- | -- | |
| C.V. % | 4.0 | 1.4 | 2.5 | 8.6 | 8.4 | 14.2 | -- | -- | |
| LSD .05 | 2 | 1.3 | 0.6 | NS | NS | NS | -- | -- | |
| LSD .01 | NS | 1.8 | 0.8 | NS | NS | NS | -- | -- | |

Planting Date: April 13, 2004 Harvest Date: August 11, 2004
 Seeding Rate: 1.25 million live seeds / acre (approx. 1.9 bu/A).
 Previous Crop: 2001 – 2003 = Lentil.
 NS = no statistical difference between varieties.
 Notes: The 2002 and 2003 trials sustained severe moisture stress.

2004 Durum Variety Trial - Continuously Cropped - No-till Mandan

| Variety | Plant Height | Test Weight | Grain Protein | ---- Grain Yield ---- | | | Average Yield | | |
|------------|--------------|-------------|---------------|------------------------------|------|------|---------------|------|--|
| | inches | Lbs/bu | % | 2001 | 2003 | 2004 | 2 yr | 3 yr | |
| | | | | ----- Bushels per acre ----- | | | | | |
| Mountrail | 27 | 55.2 | 17.9 | 50.3 | 42.4 | 37.6 | 40.0 | 43.4 | |
| Ben | 32 | 56.3 | 17.7 | 42.8 | 44.9 | 34.4 | 39.6 | 40.7 | |
| Pierce | 31 | 56.6 | 17.8 | 43.4 | 42.2 | 31.9 | 37.0 | 39.2 | |
| Lebsock | 27 | 57.0 | 17.4 | 43.1 | 40.4 | 32.6 | 36.5 | 38.7 | |
| Maier | 30 | 56.2 | 18.4 | 37.3 | 39.4 | 35.9 | 37.6 | 37.5 | |
| Dilse | 30 | 56.4 | 18.4 | | 40.4 | 32.8 | 36.6 | | |
| Renville | 30 | 55.7 | 18.0 | | | 34.4 | | | |
| Trial Mean | 29 | 56.2 | 17.8 | 43.4 | 41.7 | 34.8 | -- | -- | |
| C.V. % | 6.4 | 0.9 | 2.1 | 6.9 | 2.8 | 13.5 | -- | -- | |
| LSD .05 | NS | 0.9 | 0.7 | 5.4 | 1.7 | NS | -- | -- | |
| LSD .01 | NS | NS | 0.9 | 7.7 | 2.4 | NS | -- | -- | |

Planting Date: April 13, 2004 Harvest Date: August 13, 2004
 Seeding Rate: 1.25 million live seeds / acre (approx. 2.2 bu/A).
 Previous Crop: 2000 – 2003 = Barley.
 NS = no statistical difference between varieties.
 Notes: The 2004 trial sustained moderate moisture stress.

SDSU Durum Wheat Variety Trial - Perkins County (Bison), 2004.

| Variety | Height | Lodging | Test Wt | Protein | Yield | Bu/A |
|-------------|--------|---------|---------|---------|-------------|------|
| | Inches | 0-9* | Lb/Bu | Percent | 2004 | |
| AC Avonlea | 27 | 0 | 52.1 | 16.7 | 21.6 | |
| Ben | 27 | 0 | 55.8 | 17.6 | 22.5 | |
| Dilse | 26 | 0 | 54.4 | 17.7 | 22.4 | |
| Lebsock | 25 | 0 | 56.7 | 17.0 | 20.5 | |
| Maier | 27 | 0 | 56.3 | 16.7 | 22.1 | |
| Mountrail | 27 | 0 | 54.4 | 16.3 | 27.0 | |
| Pierce | 29 | 0 | 56.2 | 16.4 | 24.4 | |
| Plaza | 26 | 0 | 55.8 | 17.0 | 26.6 | |
| Renville | 27 | 0 | 51.8 | 15.4 | 20.6 | |
| Vic | 28 | 0 | 55.5 | 16.7 | 22.8 | |
| Average | 26.8 | 0.0 | 54.9 | 16.8 | 23.0 | |
| LSD (P=.05) | 2.4 | 0.0 | 3.8 | -- | NS | |
| CV | 6.2 | 0.0 | 4.5 | -- | 21.4 | |

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

Planted: April 12, 2004 Herbicide: Bronate (1 pint/A)
 Harvested: August 10, 2004 Additional Nitrogen: 30 lb/A
 Previous crop: Durum Wheat, No-Till planted

SDSU Durum Wheat Variety Trial – Harding County (Ralph), 2004.

| Variety | Height | Lodging | Test Wt | Protein | Yield | Bu/A |
|-------------|--------|---------|---------|---------|-------------|-----------|
| | Inches | 0-9* | Lb/Bu | Percent | 2004 | 3 Year |
| AC Avonlea | 28 | 0 | 57.4 | 14.6 | 46.6 | -- |
| Ben | 31 | 0 | 58.8 | 14.7 | 39.9 | 29.9 |
| Dilse | 30 | 0 | 57.7 | 14.0 | 42.0 | 31.3 |
| Lebsock | 30 | 0 | 58.1 | 13.6 | 37.8 | 29.6 |
| Maier | 29 | 0 | 59.8 | 13.3 | 46.6 | 33.3 |
| Mountrail | 25 | 0 | 57.3 | 12.0 | 44.3 | 32.2 |
| Pierce | 25 | 0 | 58.7 | 12.8 | 37.6 | 30.8 |
| Plaza | 24 | 0 | 57.1 | 12.3 | 38.3 | -- |
| Renville | 28 | 0 | 56.7 | 12.4 | 42.3 | 29.4 |
| Vic | 29 | 0 | 58.4 | 14.2 | 37.5 | 29.1 |
| Average | 27.9 | 0.0 | 58.0 | 13.4 | 41.3 | 30.7 |
| LSD (P=.05) | -- | -- | 2.8 | -- | NS | NS |
| CV | -- | -- | 3.3 | -- | 17.9 | 16.9 |

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

Planted: April 12, 2004 Herbicide: Ally (¹/₁₀ oz/A) +2,4-D LV6 (6 oz/A)
 Harvested: August 9, 2004 Additional Nitrogen: 50 lb/A
 Previous crop: Conventional fallow

2004 North Dakota barley variety descriptions

| Variety | Use ¹ | Origin | Year Released | Awn Type ² | Rachilla hair length ⁶ | Aleurone Color | Height | Straw Strength | Relative Maturity | Reaction to Disease ³ | | | |
|-------------------------|------------------|--------|---------------|-----------------------|-----------------------------------|----------------|---------|----------------|-------------------|----------------------------------|------------|-------------|------------|
| | | | | | | | | | | Stem Rust | Loose Smut | Spot Blotch | Net Blotch |
| Six-rowed | | | | | | | | | | | | | |
| Azure | M/F | ND | 1982 | S | L | blue | med. | m.strg. | m.early | S | S | MR-R | MS-S |
| Excel | M/F | MN | 1990 | S | L | white | m.short | strg. | med. | S | S | MR-R | MS-S |
| Foster | M/F | ND | 1995 | S | L | white | m.short | strg. | med. | S | S | MR-R | MS-S |
| Hazen | F | ND | 1984 | S | L | white | med. | m.strg. | med. | S | S | MR-R | MS-S |
| Morex | M/F | MN | 1978 | S | S | white | tall | med. | early | S | S | MR | S |
| Robust | M/F | MN | 1983 | S | S | white | med. | m.strg. | med. | S | S | MR-R | MS-S |
| Stander | F | MN | 1993 | S | S | white | m.short | v.strg. | m.late | S | S | MR-R | MS-S |
| MNBrite* | F | MN | 1997 | S | S | white | tall | med. | early | S | S | MR-R | MS-S |
| Lacey | M/F† | MN | 1999 | S | S | white | m.short | strg. | med. | S | S | MR-R | MS-S |
| Drummond | M/F | ND | 2000 | S | L | white | m.short | v.strg. | med. | S | S | MR-R | MS-S |
| Legacy | M/F† | BARI | 2000 | S | L | white | med. | strg. | m.late | S | S | MR-R | MS-S |
| Tradition | M/F† | BARI | 2003 | S | L | white | m.short | v.strg. | med. | S | S | MR-R | MS-S |
| Two-rowed | | | | | | | | | | | | | |
| AC Metcalfe† | M | Can | 1197 | R | L | white | med. | med. | late | S | NA | NA | NA |
| Bowman | F | ND | 1984 | S | L | white | m.short | med. | early | S | S | MS-S | S-MS |
| Conlon ⁴ | M/F† | ND | 1996 | S | L | white | m.short | med. | early | S | S | MS | MR-R |
| Eslick | F | MT | 2003 | R | L | white | med | med | m.late | S | NA | NA | NA |
| Gallatin | F | MT | 1986 | R | L | white | med. | med. | late | S | S | MS-S | MS |
| Harrington ⁵ | F | Can | 1981 | R | L | white | med. | m.weak | v.late | S | S | S | MR-MS |
| Haxby | F | MT | 2003 | R | L | white | med. | med. | med. | S | NA | NA | NA |
| Logan | F | ND | 1995 | S | L | white | med. | strg. | med. | S | S | MS-MR | MR |
| Stark | F | ND | 1991 | S | L | white | m.tall | med. | late | S | S | S-MS | MS-S |
| Valier | F | Can | 1999 | R | L | white | med. | med. | m.late | S | NA | NA | NA |
| Specialty | | | | | | | | | | | | | |
| Wanubet | SP | MT | 1990 | R | L | white | med. | weak | late | S | S | S | S |

†Not being used by all major U.S. brewers.

*Moderately resistant to Fusarium head blight

1 M = malting; F = feed; SP = special uses (hullless).

2 Rough or smooth awned.

3 R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; N/A = not available.

4 Lower DON accumulation than other varieties tested.

5 Recommended as a malting barley in western U.S.

6 S = short, L = long

2004 Barley Variety Trial - Continuously Cropped - No-till

Hettinger

| Variety | Days to Head | Plant Height | Test Weight | % Plump | Grain Protein | ---- Grain Yield ---- | | | Average Yield | |
|----------------------|--------------|--------------|-------------|---------|---------------|------------------------------|------|------|---------------|------|
| | | | | | | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| | | inches | Lbs/bu | >6/64 | % | ----- Bushels per acre ----- | | | | |
| Two Row Types | | | | | | | | | | |
| Logan | 73 | 22 | 50.7 | 96 | 12.2 | 33.3 | 90.8 | 68.1 | 79.4 | 64.1 |
| Stark | 74 | 27 | 52.0 | 97 | 12.5 | 30.6 | 84.9 | 70.2 | 77.6 | 61.9 |
| Bowman | 72 | 25 | 51.3 | 97 | 12.6 | 30.0 | 84.3 | 63.5 | 73.9 | 59.3 |
| Valier | 82 | 23 | 52.4 | 95 | 12.6 | 25.1 | 77.8 | 73.9 | 75.8 | 58.9 |
| Conlon | 70 | 24 | 50.5 | 97 | 11.8 | 23.9 | 96.4 | 44.5 | 70.4 | 54.9 |
| Harrington | 83 | 24 | 51.8 | 92 | 12.9 | 16.5 | 63.4 | 69.4 | 66.4 | 49.8 |
| Eslick | 82 | 22 | 52.8 | 97 | 11.6 | | | 78.3 | | |
| Haxby | 79 | 23 | 53.4 | 97 | 12.0 | | | 76.9 | | |
| AC Metcalfe | 82 | 22 | 51.5 | 96 | 12.2 | | | 68.3 | | |
| Six Row Types | | | | | | | | | | |
| Lacey | 76 | 25 | 51.0 | 96 | 12.3 | 24.3 | 82.6 | 67.2 | 74.9 | 58.0 |
| Morex | 78 | 28 | 49.7 | 92 | 11.9 | 23.1 | 83.3 | 66.0 | 74.6 | 57.5 |
| Drummond | 75 | 27 | 49.8 | 95 | 12.3 | 21.4 | 79.4 | 62.4 | 70.9 | 54.4 |
| Robust | 78 | 28 | 51.7 | 96 | 12.8 | 24.4 | 74.7 | 62.6 | 68.6 | 53.9 |
| Foster | 77 | 27 | 50.2 | 97 | 11.6 | 21.0 | 73.9 | 66.2 | 70.0 | 53.7 |
| Stander | 80 | 27 | 48.6 | 96 | 12.0 | 22.8 | 77.5 | 60.1 | 68.8 | 53.5 |
| Tradition | 79 | 25 | 50.7 | 95 | 12.6 | 19.3 | 77.3 | 62.0 | 69.6 | 52.9 |
| Excel | 78 | 26 | 49.4 | 96 | 11.8 | 20.0 | 71.1 | 66.7 | 68.9 | 52.6 |
| Legacy | 79 | 26 | 49.9 | 95 | 12.2 | 18.5 | 68.7 | 67.6 | 68.2 | 51.6 |
| Trial Mean | 77 | 25 | 50.9 | 96 | 11.9 | 22.9 | 77.2 | 66.7 | -- | -- |
| C.V. % | 1.3 | 7.0 | 1.2 | 1.2 | 1.9 | 18.0 | 7.1 | 5.8 | -- | -- |
| LSD .05 | 1 | 2 | 0.9 | 2 | 0.3 | 5.8 | 7.8 | 5.4 | -- | -- |
| LSD .01 | 2 | 3 | 1.1 | 2 | 0.4 | 7.8 | 10.4 | 7.1 | -- | -- |

Planting Date: April 5, 2004

Harvest Date: August 2, 2004

Seeding Rate: 750,000 live seeds / acre (approx. 1.4 bu/A).

Previous Crop: 2001 = barley, 2002 & 2003 = soybean.

Notes: The 2002 trial sustained severe heat and moisture stress. The 2004 trial sustained hard frosts on May 13 (18° F), May 14 (16° F) and on June 18 (25° F).

2004 Barley - Alfalfa burn down

Dickinson, ND

| Variety | Days to Head | Seeds per Pound | Plant Height in | Test Weight lbs/bu | Protein % | Plump % >6/64 | ----- Grain Yield----- | | | Avg. Yield | | |
|----------------|--------------------|-----------------------|-----------------------|--------------------------|--------------|---------------------|------------------------|-------|------|------------------|-----------|-----------|
| | | | | | | | 2002 | 2003 | 2004 | Returns \$/ac | Year 2 | Year 3 |
| Six Row | | | | | | | | | | | | |
| Drummond | 82 | 12,909 | 18 | 44.6 | 17.4 | 84 | 74.4 | 110.4 | 47.8 | 59.70 | 79.1 | 77.5 |
| Excel | 87 | 12,529 | 20 | 47.5 | 17.0 | 85 | 74.1 | 110.6 | 57.5 | 74.81 | 84.1 | 80.7 |
| Foster | 87 | 12,981 | 20 | 43.9 | 17.1 | 87 | 80.8 | 116.3 | 45.2 | 56.26 | 80.8 | 80.8 |
| Lacey | 83 | 11,981 | 21 | 45.9 | 16.7 | 88 | 76.5 | 111.3 | 46.2 | 58.80 | 78.8 | 78.0 |
| Legacy | 86 | 12,584 | 22 | 45.0 | 16.6 | 90 | 72.9 | 107.8 | 57.2 | 72.67 | 82.5 | 79.3 |
| Morex | 88 | 13,220 | 20 | 42.8 | 18.8 | 71 | 72.7 | 104.1 | 35.7 | 41.63 | 69.9 | 70.8 |
| Robust | 88 | 12,224 | 20 | 45.5 | 17.7 | 80 | 75.0 | 106.2 | 40.4 | 50.91 | 73.3 | 73.9 |
| Stander | 82 | 12,458 | 18 | 46.4 | 16.9 | 76 | 72.8 | 113.0 | 49.7 | 64.41 | 81.4 | 78.5 |
| Tradition | 79 | 12,779 | 20 | 45.8 | 16.9 | 87 | -- | 116.4 | 52.1 | 67.28 | 84.2 | -- |
| Two Row | | | | | | | | | | | | |
| AC Metcalfe | 84 | 11,438 | 21 | 49.5 | 18.2 | 93 | -- | -- | 57.6 | 74.86 | -- | -- |
| Barke | 89 | 11,154 | 21 | 50.2 | 18.5 | 93 | -- | -- | 44.0 | 57.21 | -- | -- |
| Bowman | 78 | 9,804 | 24 | 51.6 | 17.0 | 97 | 83.6 | 98.0 | 62.9 | 81.75 | 80.4 | 81.5 |
| Conlon | 75 | 9,615 | 20 | 50.8 | 16.4 | 97 | 78.1 | 93.6 | 34.4 | 44.76 | 64.0 | 68.7 |
| Eslick | 86 | 11,398 | 20 | 50.7 | 16.5 | 88 | -- | -- | 63.1 | 82.04 | -- | -- |
| Harrington | 86 | 11,404 | 20 | 48.7 | 18.3 | 87 | 77.8 | 95.0 | 45.0 | 58.45 | 70.0 | 72.6 |
| Haxby | 81 | 10,848 | 23 | 51.6 | 16.8 | 91 | -- | -- | 72.5 | 94.22 | -- | -- |
| Logan | 80 | 10,223 | 22 | 49.0 | 16.9 | 93 | 86.9 | 112.6 | 60.3 | 78.40 | 86.5 | 86.6 |
| Prestige | 86 | 11,988 | 18 | 49.0 | 17.8 | 93 | -- | -- | 40.5 | 52.60 | -- | -- |
| Scarlett | 89 | 12,817 | 17 | 49.7 | 17.1 | 83 | -- | -- | 56.8 | 73.90 | -- | -- |
| Stark | 80 | 9,692 | 24 | 51.8 | 17.2 | 96 | 82.3 | 116.3 | 60.5 | 78.65 | 88.4 | 86.4 |
| Valier | 89 | 12,383 | 18 | 49.7 | 18.2 | 76 | 80.4 | 100.9 | 44.9 | 58.41 | 72.9 | 75.4 |
| Trial Mean | 84 | 11,821 | 20 | 47.7 | 16.9 | 88 | 77.4 | 106.9 | 50.6 | 65.10 | -- | -- |
| CV % | 3.4 | 4.5 | 11.4 | 3.7 | 3.0 | 6.5 | 5.0 | 9.5 | 18.6 | 19.7 | -- | -- |
| LSD 0.05 | 4 | 741 | 3 | 2.5 | 1.0 | 8 | 5.4 | 14.3 | NS | NS | -- | -- |

Planting Date April 13, 2004

Harvest Date August 10, 2004

Previous Crop: Alfalfa burn down

Seeding Rate: 1.2 million live seeds/ac

Returns were calculated by multiplying the 2004 yields by the price paid for feed barley minus the test weight discount paid at the Southwest Grain Terminal located at Gladstone on October 18. The price paid on this date was \$1.30/bu, assuming that the test weight was heavier than 45 lb/bu. Grain with a test weight of 45 lb/bu was discounted \$.03/bu, with an additional discount of \$.04/bu per pound down to 42 lb/bu. Below 42 lb/bu, an additional discount of \$.05/bu occurred per pound.

2004 Barley Variety Trial - Continuously Cropped - No-till

Scranton

| Variety | Plant Height | Lodging | Test Weight | % Plump | Grain Protein | ---- Grain Yield ---- | | | Average Yield | |
|--------------------------------|--------------|---------|-------------|---------|---------------|------------------------------|------|------|---------------|------|
| | | | | | | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| | inches | 0 – 9* | Lbs/bu | >6/64 | % | ----- Bushels per acre ----- | | | | |
| Robust | 35 | 3.0 | 48.4 | 86.0 | 13.7 | 42.4 | 58.5 | 75.4 | 67.0 | 58.8 |
| Drummond | 35 | 2.8 | 47.0 | 81.8 | 12.6 | | | 89.9 | | |
| Tradition | 33 | 2.0 | 47.2 | 86.0 | 13.0 | | | 81.1 | | |
| Conlon – destroyed by wildlife | | | | | | | | | | |
| Trial Mean | 34 | 2.1 | 47.2 | 87.6 | 12.6 | 42.1 | 64.3 | 82.1 | -- | -- |
| C.V. % | 2.6 | 20.2 | 2.5 | 3.8 | 2.7 | 14.4 | 11.5 | 6.5 | -- | -- |
| LSD .05 | 1 | 0.7 | NS | NS | 0.6 | -- | -- | 8.5 | -- | -- |
| LSD .01 | NS | NS | NS | NS | 0.8 | -- | -- | 12.2 | -- | -- |

Planting Date: April 14, 2004
 Harvest Date: August 16, 2004
 Seeding Rate: 750,000 live seeds / acre (approx. 1.4 bu/A).
 Previous Crop: 2001 – 2003 = Lentil.
 *Lodging: 0 = none, 9 = lying flat on ground.
 NS = no statistical difference between varieties.

2004 Barley Variety Trial - Continuously Cropped - No-till

New Leipzig

| Variety | Plant Height | Test Weight | % Plump | Grain Protein | ---- Grain Yield ---- | | | Average Yield | |
|------------|--------------|-------------|---------|---------------|------------------------------|------|------|---------------|------|
| | | | | | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| | inches | Lbs/bu | >6/64 | % | ----- Bushels per acre ----- | | | | |
| Robust | 22 | 47.8 | 87 | 14.2 | 12.0 | 43.1 | 32.6 | 37.8 | 29.2 |
| Conlon | 19 | 47.5 | 93 | 13.2 | | 44.2 | 27.4 | 35.8 | |
| Drummond | 20 | 46.2 | 88 | 12.9 | | | 38.9 | | |
| Tradition | 20 | 46.5 | 86 | 13.0 | | | 34.7 | | |
| Trial Mean | 20 | 46.7 | 89 | 13.1 | 11.9 | 46.0 | 34.2 | -- | -- |
| C.V. % | 7.4 | 1.4 | 2.6 | 2.7 | 17.8 | 5.7 | 11.1 | -- | -- |
| LSD .05 | NS | 1.0 | 4 | 0.5 | -- | NS | 5.9 | -- | -- |
| LSD .01 | NS | 1.4 | 5 | 0.8 | -- | NS | 8.3 | -- | -- |

Planting Date: April 14, 2004
 Harvest Date: August 11, 2004
 Seeding Rate: 750,000 live seeds / acre (approx. 1.4 bu/A).
 Previous Crop: 2001 – 2003 = Lentil.
 NS = no statistical difference between varieties.

2004 Barley Variety Trial - Continuously Cropped - No-till

Selfridge

| Variety | Plant Height | Lodging | Test Weight | % Plump | Grain Protein | ---- Grain Yield ---- | | | Average Yield | |
|------------|--------------|---------|-------------|---------|---------------|------------------------------|------|------|---------------|------|
| | inches | | | | | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| | | 0 – 9* | Lbs/bu | >6/64 | % | ----- Bushels per acre ----- | | | | |
| Conlon | 36 | 1.8 | 51.4 | 98.0 | 12.2 | 21.7 | 58.6 | 81.7 | 70.2 | 54.0 |
| Robust | 44 | 5.0 | 50.5 | 91.6 | 12.3 | 17.5 | 50.6 | 66.3 | 58.4 | 44.8 |
| Tradition | 40 | 3.8 | 49.8 | 92.8 | 11.5 | | | 87.9 | | |
| Drummond | 40 | 4.0 | 49.1 | 92.2 | 11.9 | | | 87.4 | | |
| Trial Mean | 40 | 3.0 | 49.8 | 94.4 | 11.8 | 19.9 | 57.3 | 82.0 | -- | -- |
| C.V. % | 4.2 | 26.4 | 0.9 | 1.1 | 2.2 | 10.7 | 7.0 | 7.5 | -- | -- |
| LSD .05 | 3 | 1.2 | 0.7 | 1.7 | 0.4 | 3.2 | 6.1 | 9.5 | -- | -- |
| LSD .01 | 4 | 1.7 | 1.0 | 2.3 | 0.6 | NS | NS | 13.3 | -- | -- |

Planting Date: April 13, 2004
 Harvest Date: August 11, 2004
 Seeding Rate: 750,000 live seeds / acre (approx. 1.4 bu/A).
 Previous Crop: 2001 – 2003 = Lentil.
 *Lodging: 0 = none, 9 = lying flat on ground.
 NS = no statistical difference between varieties.

2004 Barley Variety Trial - Continuously Cropped - No-till

Mandan

| Variety | Plant Height | Test Weight | % Plump | Grain Protein | ---- Grain Yield ---- | | | Average Yield | |
|------------|--------------|-------------|---------|---------------|------------------------------|------|------|---------------|------|
| | inches | | | | 2001 | 2003 | 2004 | 2 yr | 3 yr |
| | | Lbs/bu | >6/64 | % | ----- Bushels per acre ----- | | | | |
| Conlon | 24 | 47.5 | 92 | 12.8 | 104.9 | 42.9 | 24.7 | 33.8 | 57.5 |
| Robust | 26 | 48.2 | 85 | 12.6 | 85.8 | 43.5 | 43.2 | 43.4 | 57.5 |
| Haxby | 23 | 49.8 | 84 | 12.6 | | | 56.1 | | |
| Drummond | 27 | 47.0 | 91 | 11.9 | | | 48.1 | | |
| Tradition | 23 | 47.1 | 89 | 12.6 | | | 41.3 | | |
| Trial Mean | 24 | 47.7 | 89 | 12.4 | 87.6 | 45.2 | 43.6 | -- | -- |
| C.V. % | 10.3 | 1.1 | 3.1 | 2.5 | 5.9 | 11.7 | 16.3 | -- | -- |
| LSD .05 | NS | 1.0 | 5 | 0.6 | 11.8 | NS | 12.9 | -- | -- |
| LSD .01 | NS | 1.4 | 7 | 0.8 | NS | NS | 18.4 | -- | -- |

Planting Date: April 13, 2004
 Harvest Date: August 13, 2004
 Seeding Rate: 750,000 live seeds / acre (approx. 1.4 bu/A).
 Previous Crop: 2000 – 2003 = Barley.
 NS = no statistical difference between varieties.
 Notes: The 2004 trial sustained moderate moisture stress.

SDSU Spring Barley Variety Trial - Perkins County (Bison), 2004.

| Variety | Height Inches | Lodging 0-9* | Test Wt Lb/Bu | Protein Percent | Yield Bu/A | |
|----------------|------------------|-----------------|------------------|--------------------|-------------|--|
| | | | | | 2004 | |
| TWO ROW | | | | | | |
| CONLON | 22 | 0 | 41.0 | 13.3 | 41.6 | |
| ESLICK | 22 | 0 | 42.8 | 12.8 | 49.4 | |
| HAXBY | 23 | 0 | 38.3 | 14.7 | 29.2 | |
| VALIER | 22 | 0 | 39.6 | 13.4 | 41.3 | |
| SIX ROW | | | | | | |
| DRUMMOND | 26 | 0 | 41.9 | 13.0 | 37.0 | |
| EXCEL | 23 | 0 | 39.9 | 12.8 | 32.9 | |
| LACEY | 25 | 0 | 39.9 | -- | 39.7 | |
| LEGACY | 27 | 0 | 41.9 | 13.2 | 40.3 | |
| ROBUST | 26 | 0 | 41.8 | 13.9 | 24.7 | |
| TRADITION | 24 | 0 | 40.0 | 13.3 | 35.8 | |
| Average | 23.8 | 0.0 | 40.7 | 13.3 | 36.5 | |
| LSD (P=.05) | 3.2 | 0.0 | 3.0 | -- | 9.7 | |
| CV | 9.2 | 0.0 | 5.0 | -- | 18.5 | |

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

Planted: April 12, 2004 Herbicide: Bronate (1 pint/A)
 Harvested: August 10, 2004 Additional Nitrogen: 30 lb/A
 Previous crop: Durum Wheat, No-Till planted

SDSU Spring Barley Variety Trial - Harding County (Ralph), 2002-2004.

| Variety | Height Inches | Lodging 0-9* | Test Wt Lb/Bu | Protein Percent | Yield Bu/A | |
|----------------|------------------|-----------------|------------------|--------------------|-------------|-----------|
| | | | | | 2004 | 3 Year |
| TWO ROW | | | | | | |
| CONLON | 25 | 0 | 43.7 | 12.2 | 59.2 | 38 |
| ESLICK | 23 | 0 | 45.7 | 12.2 | 65.3 | -- |
| HAXBY | 22 | 0 | 47.0 | 11.7 | 58.3 | -- |
| VALIER | 19 | 0 | 45.7 | 12.2 | 65.7 | -- |
| SIX ROW | | | | | | |
| DRUMMOND | 30 | 0 | 41.0 | 12.0 | 60.0 | 38 |
| EXCEL | 23 | 0 | 42.7 | 11.4 | 61.0 | 44 |
| LACEY | 25 | 0 | 44.2 | 11.8 | 61.9 | 41 |
| LEGACY | 27 | 0 | 42.2 | 11.9 | 64.6 | 45 |
| ROBUST | 23 | 0 | 43.7 | 12.2 | 46.5 | 32 |
| TRADITION | 26 | 0 | 41.9 | 11.9 | 57.9 | -- |
| Average | 23.9 | 0.0 | 43.8 | 11.9 | 59.4 | 39 |
| LSD (P=.05) | 4.2 | 0.0 | 0.8 | -- | 9.9 | 7 |
| CV | 7.9 | 0.0 | 2.9 | -- | 11.5 | 15 |

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

Planted: April 12, 2004 Herbicide: Ally (¹/₁₀ oz/A) +2,4-D LV6 (6 oz/A)
 Harvested: August 9, 2004 Additional Nitrogen: 50 lb/A
 Previous crop: Conventional fallow

2004 Barley in the West River Region

Combined Means

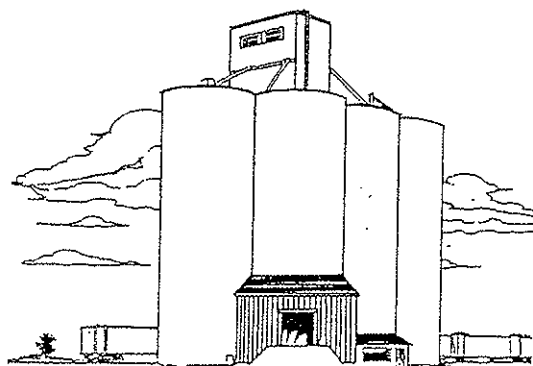
| Variety | Days to Head | Plant Height inches | Lodg. 0-9* | Seeds/ Pound | Test Weight lbs/bu | Protein % | Plump Seed % | Grain Yield | | | Avg. Yield | |
|-------------|--------------|------------------------|---------------|-----------------|--------------------------|--------------|--------------------|-------------|------|------|------------|--------|
| | | | | | | | | 2002 | 2003 | 2004 | 2 year | 3 year |
| Robust | 83 | 28 | 4.0 | 12,224 | 47.2 | 13.7 | 88 | 33.9 | 58.3 | 49.0 | 53.6 | 47.1 |
| Conlon | 72 | 24 | 1.8 | 9,615 | 47.5 | 13.1 | 95 | 33.0 | 59.5 | 44.8 | 52.2 | 45.8 |
| Tradition | 79 | 26 | 2.9 | 12,779 | 46.1 | 13.1 | 90 | | 72.1 | 56.6 | 64.4 | |
| Drummond | 78 | 28 | 3.4 | 12,909 | 45.8 | 13.0 | 89 | | 61.0 | 58.9 | 60.0 | |
| # locations | 2 | 8 | 2 | 1 | 8 | 8 | 6 | 8 | 12 | 8 | 20 | 28 |

* Lodging: 0 = none, 9 = lying flat on ground.

Locations: 2004 = Hettinger, Dickinson, Scranton, Selfridge, New Leipzig, Mandan, Ralph SD and Bison SD.

2003 = Hettinger, Dickinson, Scranton, Regent, Selfridge, New Leipzig, Mandan, Beulah, Hannover, Glen Ulin, Ralph SD and Bison SD.

2002 = Hettinger, Dickinson, Scranton, Regent, Selfridge, New Leipzig, Beulah & Glen Ulin.



2004 North Dakota oat variety descriptions

| Variety | Origin ¹ | Year Released | Grain Color | Height | Straw Strength | Maturity ² | Reaction to Diseases | | | | |
|---------------|---------------------|---------------|-------------|---------|----------------|-----------------------|------------------------|------------|---------------------------|--------|----------------------|
| | | | | | | | Stem rust ¹ | Crown rust | Barley Y.Dwf ⁴ | bu/Wt | Protein ³ |
| AC Assiniboia | Can. Proven Seed | 1997 | red | med. | strong | L | S | R | T | good | ML |
| AC Gwen | SeCan | 2000 | hulless | tall | strong | L | S | R | R | good | L |
| AC Kaufman | Can. | 2000 | yellow | tall | strong | L | S | R | MT | v.good | ML |
| AC Medallion | Can. Cargill | 1997 | white | tall | med. | L | S | R | MT | good | ML |
| AC Morgan | Can. SeCan | 1999 | white | med. | strong | L | S | S | S | v.good | ML |
| AC Pinnacle | Can. QAS | 1999 | white | tall | med. | L | S | R | S | v.good | L |
| AC Ronald | Can. SeCan | 2001 | white | m.short | v.strong | L | S | R | T | v.good | M |
| Beach | ND | 2004 | white | tall | m.strg. | ML | S | MR/MS | MS | v.good | M |
| Buff | SD | 2002 | hulless | med. | m.strg. | E | S | MR/MS | MT | good | H |
| CDC Boyer | Sask. Value Added | 1994 | white | tall | m.strg. | L | S | MS | S | v.good | ML |
| CDC Dancer | Can. Cargill | 2000 | white | tall | strong | L | S | S | S | v.good | M |
| CDC Orrin | Can. QAS Cargill | 2001 | white | tall | strong | L | S | S | S | good | ML |
| CDC Pacer | Sask. Value Added | 1996 | white | tall | m.strg. | L | S | S | S | good | L |
| Ebeltoft | ND | 1999 | white | tall | strong | VL | S | MR/MS | S | v.good | M |
| Gem | WI | 1996 | yellow | tall | strong | L | S | R | MT | good | MH |
| HiFi | ND | 2001 | white | tall | strong | L | MR/MS | R | T | good | M |
| Hyttest | SD | 1986 | white | tall | m.strg. | E | S | MS | S | v.good | H |
| Jerry | ND | 1994 | white | tall | strg. | M | S | MS | MT | v.good | M |
| Jud | ND | 1997 | ivory | tall | med. | L | R | MR | T | good | MH |
| Killdeer | ND | 2000 | white | med | strong | M | S | MS | MT | good | M |
| Leonard | MN | 2001 | yellow | tall | m.strong | L | S | R | T | fair | ML |
| Loyal | SD | 2000 | ivory | tall | m.strong | L | S | MR | T | good | MH |
| Monida | MT/ID | 1985 | white | m.tail | strong | L | S | S | NA | good | ML |
| Morton | ND | 2001 | white | tall | v.strong | L | S | R | MT | v.good | M |
| Otana | MT | 1977 | white | m.tail | m.weak | L | S | S | S | v.good | ML |
| Paul | ND | 1994 | naked | v.tail | strg. | L | R | R/MR | T | good | H |
| Reeves | SD | 2002 | white | m.tail | med. | E | S | MR | MT | good | H |
| Richard | MN | 2000 | yellow | tall | strong | M | S | MS | T | good | M |
| Sesqui | MN | 2001 | yellow | m.tail | strong | L | S | R | T | good | M |
| Stark | ND | 2004 | naked | tall | m.strg. | L | R | MR/MS | T | v.good | M |
| Triple Crown | Canterra | 1998 | white | tall | strong | L | S | S | S | good | L |
| Vista | WI | 2000 | yellow | tall | strong | L | S | R | MT | good | M |
| Wabasha | MN | 2001 | white | tall | v.strong | M | S | R | T | good | M |
| Whitestone | ND | 1994 | white | short | strg. | L | S | MS | MT | good | L |
| Youngs | ND | 1999 | white | med. | strong | L | S | MS/S | MT | good | M |

¹Reaction to NA-67 currently the most prevalent race of stem rust.

² E = early; M = medium; L = late.

³ H = high; M = medium; L = low; V = very; VL = very low.

⁴ S = susceptible; MS = moderately susceptible; MT = moderately tolerant; T = tolerant. Varieties rated MT or T have a relatively good degree of protection against barley yellow dwarf virus.

† Resistant to the new race of stem rust that is gaining in importance in the state.

2004 Oat Variety Trial – Continuously Cropped - No-till **Hettinger**

| Variety | Days to Head | Plant Height | Test Weight | ---- Grain Yield ---- | | | Average Yield | |
|---------------|--------------|--------------|-------------|------------------------------|------|------|---------------|------|
| | | | | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| | | inches | Lbs/bu | ----- Bushels per acre ----- | | | | |
| Sesqui | 79 | 26 | 39.4 | 39.4 | 78.1 | 83.9 | 81.0 | 67.1 |
| Monida | 82 | 31 | 37.8 | 42.5 | 73.4 | 82.2 | 77.8 | 66.0 |
| Killdeer | 76 | 28 | 38.0 | 38.8 | 72.4 | 84.4 | 78.4 | 65.2 |
| Beach | 78 | 31 | 41.0 | 39.0 | 72.3 | 74.2 | 73.8 | 62.2 |
| Otana | 80 | 34 | 38.6 | 39.2 | 68.7 | 78.6 | 73.6 | 62.2 |
| Jerry | 71 | 28 | 38.2 | 41.0 | 76.2 | 67.7 | 72.0 | 61.6 |
| Youngs | 79 | 29 | 38.5 | 34.4 | 66.1 | 82.6 | 74.4 | 61.0 |
| AC Assiniboia | 78 | 29 | 36.4 | 34.2 | 67.4 | 75.4 | 71.4 | 59.0 |
| Morton | 78 | 33 | 38.6 | 30.4 | 69.0 | 75.2 | 72.1 | 58.2 |
| AC Medallion | 80 | 30 | 38.6 | 30.4 | 68.9 | 73.9 | 71.9 | 58.1 |
| Ebeltoft | 82 | 26 | 38.1 | 34.2 | 63.5 | 74.7 | 69.1 | 57.5 |
| HiFi | 78 | 28 | 38.3 | 31.3 | 65.1 | 74.9 | 70.0 | 57.1 |
| Hyttest | 76 | 33 | 39.8 | 33.3 | 71.1 | 63.0 | 67.0 | 55.8 |
| Reeves | 70 | 31 | 38.1 | 20.6 | 65.3 | 70.2 | 67.8 | 55.0 |
| Buff* | 69 | 27 | 46.9 | 24.8 | 44.9 | 61.1 | 53.0 | 43.6 |
| Stark* | 82 | 34 | 42.6 | 20.4 | 36.9 | 61.7 | 49.3 | 39.7 |
| Paul* | 80 | 35 | 45.0 | 16.7 | 33.7 | 56.6 | 45.2 | 35.7 |
| CDC Pacer | 78 | 30 | 39.1 | | 66.8 | 88.0 | 77.4 | |
| AC Pinnacle | 80 | 27 | 38.8 | | 69.2 | 83.5 | 76.4 | |
| AC Kaufman | 77 | 30 | 38.0 | | 66.9 | 77.8 | 72.4 | |
| AC Ronald | 81 | 28 | 38.4 | | 68.7 | 63.4 | 66.0 | |
| CDC Dancer | 78 | 30 | 38.6 | | | 68.2 | | |
| AC Gwen | 79 | 33 | 40.0 | | | 60.1 | | |
| Trial Mean | 78 | 30 | 39.1 | 35.6 | 67.2 | 74.6 | -- | -- |
| C.V. % | 1.5 | 8.4 | 1.9 | 17.4 | 8.3 | 10.4 | -- | -- |
| LSD .05 | 2 | 3 | 1.1 | 8.7 | 7.8 | 10.9 | -- | -- |
| LSD .01 | 2 | 5 | 1.4 | 11.6 | 10.3 | 14.4 | -- | -- |

*Naked (hulless) type.

Planting Date: April 6, 2004 Harvest Date: August 2, 2004

Seeding Rate: 750,000 live seeds / acre (approx. 1.7 bu/A).

Previous Crop: 2001 = barley, 2002 & 2003 = soybean.

Notes: The 2002 trial sustained severe heat and moisture stress. The 2003 trial sustained late season heat and moisture stress. The 2004 trial sustained hard frosts on May 13 (18° F), May 14 (16° F) and on June 18 (25° F).

2004 Oat - Alfalfa burn down

Dickinson, ND

| Variety | Days to Head | Seeds per Pound | Plant Height in | Test Weight lbs/bu | Protein % | ----- Grain Yield----- | | | Returns \$/ac | Avg. Yield | |
|---------------|--------------------|-----------------------|-----------------------|--------------------------|--------------|------------------------|-------|------|------------------|---------------|------|
| | | | | | | 2002 | 2003 | 2004 | | 2 | 3 |
| | | | | | | -----bu/ac----- | | | | ----bu/ac---- | |
| AC Assiniboia | 80 | 12,609 | 24 | 35.9 | 14.8 | 68.6 | 103.8 | 55.9 | 63.12 | 79.9 | 76.1 |
| AC Gwen | 82 | 14,580 | 27 | 39.9 | 14.2 | -- | -- | 44.3 | 53.20 | -- | -- |
| AC Kaufman | 81 | 12,307 | 23 | 33.5 | 12.9 | -- | 112.3 | 41.5 | 42.41 | 76.9 | -- |
| AC Medallion | 82 | 13,186 | 23 | 31.9 | 14.5 | 68.1 | 107.1 | 40.7 | 39.56 | 73.9 | 72.0 |
| AC Pinnacle | 82 | 13,327 | 24 | 36.2 | 13.4 | -- | 124.8 | 60.1 | 69.04 | 92.4 | 92.4 |
| AC Ronald | 82 | 14,433 | 24 | 35.0 | 14.5 | 76.2 | 120.1 | 48.3 | 52.71 | 84.2 | 81.5 |
| Beach | 79 | 14,371 | 26 | 37.6 | 15.5 | 73.6 | 120.1 | 46.2 | 54.40 | 83.2 | 80.0 |
| Buff* | 76 | 17,223 | 23 | 42.4 | 18.4 | -- | 103.5 | 37.3 | 44.72 | 70.4 | -- |
| CDC Dancer | 79 | 14,056 | 25 | 36.4 | 14.7 | -- | -- | 52.1 | 59.77 | -- | -- |
| CDC Pacer | 82 | 12,175 | 25 | 34.7 | 14.6 | 84.4 | 125.2 | 54.4 | 58.42 | 89.8 | 88.0 |
| Ebeltoft | 82 | 12,442 | 24 | 31.6 | 15.7 | 78.8 | 109.1 | 53.5 | 52.78 | 81.3 | 80.5 |
| HiFi | 79 | 15,690 | 24 | 35.2 | 15.8 | 63.4 | 121.6 | 49.4 | 54.71 | 85.5 | 78.1 |
| Hyttest | 76 | 13,568 | 26 | 39.4 | 18.3 | 69.1 | 122.9 | 51.6 | 61.38 | 87.2 | 81.2 |
| Jerry | 73 | 13,908 | 25 | 36.9 | 15.7 | 68.8 | 124.2 | 46.1 | 52.97 | 85.1 | 79.7 |
| Killdeer | 78 | 14,803 | 22 | 35.9 | 14.5 | 78.4 | 127.7 | 56.8 | 63.90 | 92.2 | 87.6 |
| Leonard | 81 | 15,876 | 23 | 35.2 | 17.7 | -- | -- | 58.0 | 61.51 | -- | -- |
| Monida | 82 | 16,065 | 24 | 34.7 | 14.3 | 75.7 | 127.5 | 56.0 | 60.50 | 91.7 | 86.4 |
| Morton | 79 | 15,473 | 25 | 36.5 | 17.2 | 67.8 | 114.7 | 49.8 | 56.97 | 82.2 | 77.4 |
| Otana | 79 | 15,606 | 26 | 37.7 | 16.0 | 78.5 | 130.3 | 62.9 | 73.13 | 96.6 | 90.6 |
| Paul* | 80 | 16,678 | 27 | 45.0 | 21.0 | 39.9 | 73.5 | 42.0 | 50.44 | 57.8 | 51.8 |
| Reeves | 75 | 15,466 | 27 | 36.9 | 16.9 | -- | 109.8 | 47.7 | 55.13 | 78.7 | -- |
| Sesqui | 81 | 15,663 | 22 | 37.0 | 18.7 | 77.3 | 131.6 | 57.7 | 66.92 | 94.6 | 88.9 |
| Stark* | 81 | 16,892 | 27 | 43.2 | 18.3 | 66.1 | 106.9 | 43.8 | 52.72 | 75.4 | 72.3 |
| Youngs | 80 | 11,755 | 27 | 33.8 | 15.6 | 75.8 | 119.3 | 52.8 | 55.44 | 86.1 | 82.6 |
| Trial Mean | 79 | 14,226 | 25 | 36.7 | 15.8 | 70.5 | 118.0 | 51.1 | 57.77 | -- | -- |
| CV % | 1.4 | 5.8 | 9.3 | 4.0 | -- | 10.4 | 4.4 | 17.9 | 19.8 | -- | -- |
| LSD 0.05 | 2 | 1,159 | 3 | 2.0 | -- | 10.3 | 7.4 | NS | NS | -- | -- |

Planting Date: April 13, 2004

Harvest Date: August 19, 2004

* Hulless

Previous Crop: Alfalfa burn down

Seeding Rate: 1 million live seeds/ac

Returns were calculated by multiplying the 2004 yield by the test weight discount paid at the Southwest Grain Terminal located in Gladstone on October 18. The price paid was \$1.20/bu, assuming that the test weight was heavier than 37 lb/bu. Grain with a test weight of 37 lb/bu was discounted \$.04/bu, with an additional discount of \$.04/bu per pound down to 30 lb/bu.

Below 30 lb/bu, an additional discount of \$.07/bu occurred per pound.

2004 Oat Variety Trial - Continuously Cropped - No-till **Scranton**

| Variety | Plant Height | Test Weight | --- Grain Yield --- | | | Average Yield | |
|------------------------------|--------------|-------------|---------------------|------|-------|---------------|------|
| | inches | Lbs/bu | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| ----- Bushels per acre ----- | | | | | | | |
| Killdeer | 33 | 35.4 | 80.3 | 94.7 | 113.1 | 103.9 | 96.0 |
| HiFi | 38 | 36.0 | 77.1 | 83.8 | 107.9 | 95.8 | 89.6 |
| Morton | 39 | 36.9 | 73.9 | 76.6 | 105.6 | 91.1 | 85.4 |
| Beach | 37 | 38.1 | | 92.6 | 112.3 | 102.4 | |
| Stark* | 39 | 39.2 | | | 80.2 | | |
| Trial Mean | 37 | 37.2 | 75.3 | 86.9 | 103.8 | -- | -- |
| C.V. % | 3.0 | 1.2 | 9.9 | 9.9 | 4.6 | -- | -- |
| LSD .05 | 2 | 0.7 | 11.2 | NS | 7.3 | -- | -- |
| LSD .01 | 2 | 0.9 | NS | NS | 10.2 | -- | -- |

Planting Date: April 14, 2004
 Harvest Date: August 16, 2004
 Seeding Rate: 750,000 live seeds / acre (approx. 1.7 bu/A).
 Previous Crop: 2001 – 2003 = Lentil.
 *Naked (hulless) type.
 NS = no statistical difference between varieties.

2004 Oat Variety Trial - Continuously Cropped - No-till **Selfridge**

| Variety | Plant Height | Lodging | Test Weight | --- Grain Yield --- | | | Average Yield | |
|------------------------------|--------------|---------|-------------|---------------------|-------|-------|---------------|-------|
| | inches | 0 – 9** | Lbs/bu | 2000 | 2001 | 2004 | 2 yr | 3 yr |
| ----- Bushels per acre ----- | | | | | | | | |
| Killdeer | 41 | 1.0 | 35.8 | 109.0 | 104.4 | 104.0 | 104.2 | 105.8 |
| HiFi | 45 | 1.8 | 37.3 | | 128.5 | 106.7 | 117.6 | |
| Morton | 49 | 1.2 | 38.6 | | 111.7 | 105.4 | 108.6 | |
| Beach | 50 | 1.5 | 38.0 | | | 110.4 | | |
| Stark* | 50 | 1.2 | 38.8 | | | 73.5 | | |
| Trial Mean | 47 | 1.4 | 37.7 | 99.5 | 119.4 | 100.0 | -- | -- |
| C.V. % | 3.5 | 67.3 | 1.6 | 7.8 | 17.0 | 8.2 | -- | -- |
| LSD .05 | 3 | NS | 0.9 | -- | NS | 12.6 | -- | -- |
| LSD .01 | 4 | NS | 1.3 | -- | NS | 17.7 | -- | -- |

Planting Date: April 13, 2004
 Harvest Date: August 11, 2004
 Seeding Rate: 750,000 live seeds / acre (approx. 1.7 bu/A).
 Previous Crop: 1999 & 2000 = HRWW, 2003 = Lentil.
 *Naked (hulless) type.
 **Lodging: 0 = none, 9 = lying flat on ground.
 NS = no statistical difference between varieties.

2004 Oat Variety Trial - Continuously Cropped - No-till Mandan

| Variety | Plant Height | Test Weight | ---- Grain Yield ---- | | | Average Yield | |
|------------------------------|--------------|-------------|-----------------------|------|------|---------------|------|
| | inches | Lbs/bu | 2001 | 2003 | 2004 | 2 yr | 3 yr |
| ----- Bushels per acre ----- | | | | | | | |
| Killdeer | 31 | 34.6 | 89.2 | 92.5 | 86.1 | 89.3 | 89.3 |
| HIFi | 34 | 35.5 | 98.9 | 81.0 | 68.8 | 74.9 | 82.9 |
| Morton | 36 | 37.2 | 82.2 | 77.5 | 60.8 | 69.2 | 73.5 |
| Beach | 36 | 37.9 | | 85.4 | 64.2 | 74.8 | |
| Otana | 34 | 36.9 | | | 71.5 | | |
| Stark* | 38 | 38.3 | | | 50.4 | | |
| Trial Mean | 35 | 36.7 | 89.2 | 80.8 | 67.0 | -- | -- |
| C.V. % | 7.1 | 1.5 | 20.8 | 6.3 | 9.5 | -- | -- |
| LSD .05 | NS | 1.0 | NS | 7.9 | 11.6 | -- | -- |
| LSD .01 | NS | 1.4 | NS | 11.0 | 16.5 | -- | -- |

*Naked (hulless) type.

Planting Date: April 13, 2004 Harvest Date: August 13, 2004

Seeding Rate: 750,000 live seeds / acre (approx. 1.7 bu/A).

Previous Crop: 2000 – 2003 = Barley.

NS = no statistical difference between varieties.

Notes: The 2004 trial sustained moderate moisture stress.

SDSU Oat Variety Trial - Perkins County (Bison), 2004.

| Variety | Height | Lodging | Test Wt | Protein | Yield |
|---------------|--------|---------|---------|---------|-------------|
| | Inches | 0-9* | Lb/Bu | Percent | Bu/A 2004 |
| BUFF HULLESS | 25 | 0 | 39.8 | 18.4 | 49.2 |
| PAUL HULLESS | 31 | 0 | 39.6 | 20.5 | 44.7 |
| STARK HULLESS | 32 | 0 | 36.7 | 19.2 | 55.0 |
| DON | 26 | 0 | 34.8 | 15.7 | 55.8 |
| HIFI | 30 | 0 | 34.3 | 16.3 | 61.0 |
| HYTEST | 32 | 0 | 38.3 | 17.5 | 56.8 |
| JERRY | 29 | 0 | 36.4 | 17.0 | 63.3 |
| LOYAL | 29 | 0 | 36.6 | 15.7 | 68.0 |
| MORTON | 30 | 0 | 35.0 | 17.4 | 61.3 |
| REEVES | 31 | 0 | 34.6 | 14.7 | 51.3 |
| Average | 30.2 | 0.0 | 36.8 | 16.8 | 58.7 |
| LSD (P=.05) | 3.0 | 0.0 | 0.3 | -- | 10.8 |
| CV | 7.0 | 0.0 | 2.6 | -- | 12.9 |

* 0 = No Lodging, 9 = 100% lodged.

Planted: April 12, 2004

Herbicide: Bronate (1 pint/A)

Harvested: August 10, 2004 Additional Nitrogen: 30 lb/A

Previous crop: Durum Wheat, No-Till planted

Table 1. Plant stand, seedling vigor, days to heading, canopy cover, height, grain yield and quality of fourteen oat cultivars during 2004 in a certified organic field near Richardton, ND.

| variety | Plant Stand | | Seedling Vigor ¹ | | Days to heading | | Plant Canopy ² | | Plant height | | Grain | |
|--------------------------------|-------------------------------|--------|-----------------------------|--------|-----------------|---------|---------------------------|--------------|--------------|--------------|-------------|---------|
| | 10-May | 18-May | 10-May | 18-May | 10-May | 18-May | Plant Canopy ² | Plant height | 12-Jul | Yield | Test weight | Kernels |
| | -----no/ft ² ----- | | | | - d - | -- % -- | -----inches----- | -bu/acre- | -lb/bu- | -kernels/lb- | | |
| AC Assiniboia | 25 | 23 | 7.3 | 7.3 | 77 | 25 | 4 | 23 | 55.8 | 32.6 | 12,173 | |
| Buff | 18 | 20 | 7.1 | 7.1 | 70 | 14 | 4 | 23 | 47.9 | 40.4 | 16,698 | |
| Ebeltoft | 29 | 25 | 7.5 | 7.5 | 78 | 17 | 4 | 21 | 57.6 | 34.4 | 12,345 | |
| Gopher | 31 | 26 | 8.4 | 8.4 | 71 | 18 | 4 | 28 | 58.9 | 34.5 | 15,317 | |
| Hifi | 24 | 24 | 7.4 | 7.4 | 78 | 14 | 4 | 25 | 62.9 | 34.6 | 13,817 | |
| Hyttest | 26 | 24 | 7.6 | 7.6 | 71 | 24 | 4 | 28 | 61.0 | 37.1 | 12,685 | |
| Hyttest (organic) ³ | 22 | 22 | 7.5 | 7.5 | 71 | 15 | 5 | 27 | 52.4 | 37.7 | 12,873 | |
| Leonard | 24 | 22 | 6.9 | 6.9 | 77 | 16 | 4 | 24 | 72.8 | 35.6 | 13,702 | |
| Morton | 23 | 18 | 7.3 | 7.3 | 77 | 14 | 4 | 26 | 59.8 | 32.9 | 12,552 | |
| Otana | 29 | 24 | 7.4 | 7.4 | 77 | 14 | 4 | 27 | 64.1 | 37.5 | 14,948 | |
| Otana (organic) ³ | 28 | 25 | 7.5 | 7.5 | 71 | 15 | 4 | 28 | 65.9 | 36.9 | 14,603 | |
| Richard | 25 | 22 | 7.5 | 7.5 | 73 | 12 | 4 | 25 | 74.3 | 33.7 | 12,709 | |
| Sesqui | 22 | 22 | 7.5 | 7.5 | 77 | 15 | 4 | 25 | 75.3 | 36.3 | 14,635 | |
| Triple Crown | 23 | 22 | 7.4 | 7.4 | 80 | 14 | 4 | 24 | 36.8 | 27.4 | 14,994 | |
| Wabasha | 24 | 25 | 7.4 | 7.4 | 70 | 16 | 4 | 24 | 58.2 | 34.8 | 14,460 | |
| Youngs | 27 | 24 | 7.1 | 7.1 | 77 | 44 | 4 | 26 | 60.5 | 34.1 | 12,281 | |
| Mean | 25 | 23 | 7.4 | 7.4 | 75 | 18 | 4 | 25 | 60.3 | 35.0 | 13,800 | |
| CV % | 17.5 | 10.6 | 4.7 | 4.7 | 1.2 | 68.2 | 7.5 | 9.7 | 15.9 | 2.7 | 5.7 | |
| LSD | NS | 3 | 0.5 | 0.5 | 1 | NS | NS | 3 | NS | 1.4 | 1,116 | |

¹ 9=good vigor; 1=poor vigor

² Plant canopy is percentage ground cover.

³ (organic) = an organic seed lot; the remaining variety treatments were established using a seed lot produced under conventional management.

Planting Date: April 14, 2004

Harvest Date: August 9, 2004

2004 Oats in the West River Region

Combined Means

| Variety | Days to Head | Plant Height | Seeds / Pound | Test Weight | Grain Protein | Grain Yield | | | Avg. Yield | |
|----------------|--------------|--------------|---------------|-------------|---------------|-------------|------|------|------------|--------|
| | | | | | | 2002 | 2003 | 2004 | 2 year | 3 year |
| | | inches | | lbs/bu | % | bu/ac | | | | |
| Killdeer | 77 | 31 | 14,803 | 35.9 | 14.5 | 53.4 | 91.7 | 88.9 | 90.3 | 78.0 |
| HiFi | 78 | 33 | 15,690 | 36.1 | 16.0 | 55.8 | 77.4 | 78.1 | 77.8 | 70.4 |
| Morton | 78 | 35 | 15,473 | 37.1 | 17.3 | 50.7 | 78.7 | 76.4 | 77.6 | 68.6 |
| Beach | 78 | 36 | 14,371 | 38.5 | 15.5 | | | 81.5 | | |
| Stark* | 82 | 37 | 16,892 | 39.8 | 18.8 | | | 60.8 | | |
| # of locations | 2 | 6 | 1 | 6 | 2 | 6 | 11 | 6 | 17 | 23 |

*Naked (hulless) type.

Locations: 2004 = Hettinger, Dickinson, Scranton, Selfridge, Mandan, and Bison SD.

2003 = Hettinger, Dickinson, Scranton, Regent, New Leipzig, Mandan, Beulah, Glen Ullin, Hannover, Richardton (organic), and Bison SD.

2002 = Hettinger, Dickinson, Scranton, Regent, Beulah & Glen Ullin.

2004 Triticale Variety Trial – Continuously Cropped No-till, Hettinger

| Variety | Days to Head | Plant Height | Test Weight | Grain Yield | | | Average Yield | |
|-------------|--------------|--------------|-------------|------------------|------|------|---------------|------|
| | | | | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| | | inches | Lbs/bu | Bushels per acre | | | | |
| Laser | 77 | 37 | 57.2 | 10.4 | 42.3 | 55.1 | 48.7 | 35.9 |
| RSI 310 | 72 | 31 | 56.8 | 6.2 | 43.4 | 51.9 | 47.6 | 33.8 |
| Companion | 73 | 37 | 57.2 | 9.1 | 37.9 | 53.4 | 45.6 | 33.5 |
| Trical 2700 | 79 | 35 | 51.8 | 8.2 | 30.2 | 55.2 | 42.7 | 31.2 |
| Wapiti | 73 | 37 | 57.1 | 3.3 | 27.9 | 57.4 | 42.6 | 29.5 |
| Marvel | 77 | 35 | 50.9 | 5.0 | 30.4 | 49.5 | 40.0 | 28.3 |
| Trial Mean | 75 | 35 | 55.2 | 7.1 | 35.4 | 53.8 | -- | -- |
| C.V. % | 0.4 | 3.1 | 0.7 | 36.5 | 9.6 | 5.4 | -- | -- |
| LSD .05 | 1 | 2 | 0.5 | 3.8 | 5.1 | 4.4 | -- | -- |
| LSD .01 | 1 | 2 | 0.7 | 5.3 | 7.1 | 6.1 | -- | -- |

Planting Date: April 5, 2004

Harvest Date: August 9, 2004

Seeding Rate: 1 million live seeds / acre.

Previous Crop: soybean.

Notes: The 2002 trial sustained severe heat and moisture stress. The 2003 trial sustained late season heat and moisture stress. The 2004 trial sustained hard frosts on May 13 (18° F), May 14 (16° F) and on June 18 (25° F).

2004 Origin, year of release and agronomic traits of Hard Red Winter Wheat varieties

| Variety | Agent or Origin | Year | Quality ¹ | Leaf Rust ² | Stem Rust ² | Maturity | Straw Strength | Height | Winter ³ Hardiness |
|-----------------------|-----------------|------|----------------------|------------------------|------------------------|----------|----------------|----------|-------------------------------|
| Agassiz | ND | 1983 | Average | S | R | med. | med. | med. | good |
| Alliance | NE | 1997 | Poor | S | NA | early | strong | short | good |
| Arapahoe | NE | 1989 | Poor | MS | MR | med. | med. | med. | fair |
| CDC Falcon | Can/WPB | 2000 | NA | MS | NA | med. | m. strong | short | good |
| CDC Kestrel | Can. | 1994 | Poor | S | S | med. | m. strong | med. | good |
| CDC Raptor | Can. | 2002 | NA | MS | NA | med. | m. strong | m. short | good |
| Crimson | SD | 1997 | Good | S | MS | med. | m. strong | med. | fair-good |
| Culver | NE | 1998 | Poor | MS | MR | m. early | m. strong | med. | good |
| Elkhorn | ND | 1995 | Average | MR | R ⁵ | med. | med. | med. | good |
| Erhardt | MT | 1996 | NA | S | R | med. | strong | med. | good |
| Expedition | SD | 2002 | Average | MS | R | med. | strong | med. | good |
| Goodstreak | NE | 2002 | Average | S | MR | M. early | med. | Tall | fair |
| Harding | SD | 1999 | Average | MS | NA | med. | m. strong | med. | good |
| Harry | NE | 2002 | Poor | MR | MR | med. | strong | med. | poor |
| Jagalene | Agripro | 2002 | NA | S | MR | early | strong | short | fair |
| Jerry | ND | 2001 | Good | MR | R | med. | strong | med. | good |
| McClintock | Can | 2003 | Average | S | NA | med. | strong | med. | fair |
| Millennium | NE/SD | 1999 | Average | MS | MR | med. | strong | m. short | fair |
| Morgan | WPB | 1996 | NA | S | NA | med. | m. strong | med. | good |
| Nekota | SD/NE | 1997 | Good | MS | MR | early | v. strong | v. short | good |
| Norstar | Can. | 1977 | Average | S | S | late | med. | tall | good |
| Nuplains ⁴ | NE | 2000 | Average | S | MS | med. | m. strong | short | fair-poor |
| NuSky ⁴ | MT | 2001 | Avg-Good | S | NA | med. | m. strong | med. | fair |
| Paul | MT | 2003 | Average | S | NA | med. | med. | med. | fair |
| Rampart ⁵ | MT | 1996 | NA | S | R | med. | strong | med. | poor |
| Ransom | ND | 1998 | Good | MR | NA | m. early | med. | med. | good |
| Rose | SD | 1981 | Poor | S | MS | early | v. strong | short | fair |
| Roughrider | ND | 1975 | Good | S | R | med. | m. strong | med. | good |
| Seward | ND | 1987 | Poor | S | R | med. | m. strong | med. | good |
| Tandem | SD | 1997 | Good | S | NA | early | med. | med. | fair |
| Wahoo | NE/WY | 2001 | Poor | S | R | med. | m. strong | med. | fair |
| Wendy ⁴ | SD | 2004 | NA | NA | NA | m. early | m. strong | short | fair-good |
| Wesley | NE/SD/WY | 2000 | Average | MS | R | m. early | m. strong | short | fair |
| Windstar | NE | 1997 | Average | MS | NA | early | med. | med. | fair-good |

¹NA = data not available, or data insufficient to give rating.

²R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible.

³Varieties with less than good winterhardness should be seeded only in tall stubble.

⁴White wheat

⁵Saw fly resistant.

| Variety | Winter Kill | Days to Head | Plant Height | Test Weight | Protein | Grain Yield | |
|------------|-------------|--------------|--------------|-------------|---------|-------------|----------|
| | | | | | | 2004 | 3 yr ave |
| | % | From 1/1 | in | lbs/bu | % | bu/ac | |
| Arapahoe | 1 | 162 | 22 | 60.4 | 14 | 42.6 | 40.6 |
| CDC Raptor | 1 | 163 | 23 | 59 | 12.7 | 49.8 | 42 |
| CDC Falcon | 1 | 160 | 19 | 58.3 | 12.9 | 41.5 | 44.8 |
| Elkhorn | 1 | 164 | 25 | 59.8 | 14.1 | 50.4 | 40.8 |
| Expedition | 1 | 160 | 20 | 61.3 | 13.8 | 43.2 | 45.7 |
| Goodstreak | 1 | 163 | 25 | 61.1 | 13.4 | 51.3 | |
| Harding | 1 | 163 | 25 | 60.5 | 13.7 | 60.6 | 49.8 |
| Harry | 3 | 163 | 22 | 60.4 | 11.9 | 52.8 | |
| Jagalene | 1 | 160 | 19 | 61.8 | 13.2 | 42.4 | |
| Jerry | 1 | 163 | 27 | 59.3 | 13.2 | 64.6 | 50.7 |
| McClintock | 2 | 162 | 26 | 62.3 | 12.5 | 53.7 | |
| Millennium | 2 | 161 | 25 | 60.7 | 13.9 | 55.4 | 47 |
| Morgan | 1 | 165 | 23 | 59.7 | 14.2 | 48.5 | 40.4 |
| MT00159 | 1 | 163 | 24 | 60.8 | 14 | 57 | |
| MT01148 | 1 | 162 | 24 | 60.1 | 13.5 | 51.7 | |
| MTW01133* | 1 | 160 | 21 | 58.8 | 13.7 | 53.2 | |
| Nekota | 1 | 161 | 18 | 60.7 | 13.5 | 35.6 | 38.3 |
| NuSky* | 1 | 163 | 23 | 60.3 | 14.3 | 55.4 | |
| Norstar | 1 | 167 | 24 | 60.8 | 13.6 | 51.5 | 42.9 |
| NuPlains* | 1 | 163 | 19 | 61.7 | 14 | 42.4 | |
| Paul | 2 | 163 | 19 | 58.3 | 13.7 | 45.4 | |
| Ransom | 1 | 162 | 21 | 59 | 14 | 46.7 | 40.9 |
| Roughrider | 1 | 164 | 26 | 60.6 | 14.7 | 50.2 | 39.3 |
| S96-35 | 1 | 163 | 22 | 61.8 | 12.7 | 55.6 | |
| SD92107-5 | 1 | 162 | 26 | 60.2 | 13.6 | 61.1 | |
| SD97W604* | 1 | 159 | 19 | 60.8 | 14.3 | 46.3 | |
| SD97W609* | 1 | 162 | 19 | 60.8 | 13.5 | 45.7 | |
| Seward | 1 | 166 | 30 | 61.1 | 13.5 | 61.1 | 44 |
| Wahoo | 2 | 160 | 21 | 57.6 | 12.5 | 49.1 | 46 |
| Wesley | 2 | 162 | 20 | 60.6 | 14.3 | 44.3 | 40.7 |
| Mean | 1 | 162 | 23 | 60.3 | 13.6 | 44.8 | |
| LSD 0.05 | NS | 2 | 5 | 1.1 | 0.5 | NS | |
| CV % | 68.8 | 0.8 | 14.3 | 1.1 | 2.5 | 19.5 | |

Planting Date: Sept. 19, 2003

Harvest Date: Aug. 2, 2004

* Hard White Winter Wheat

Notes: Wahoo was severely infected with common bunt. Hard frost (25 F) on June 18 caused some spikelette sterility.

**2004 Hard Red Winter Wheat Variety Trial at Mandan
Continuously Cropped – No-till**

| Variety | Winter Kill | Plant Height | Test Weight | Grain Protein | Grain Yield |
|------------|-------------|--------------|-------------|---------------|-------------|
| | % | inches | lbs/bu | % | bu/A |
| S96-35 | 4 | 31 | 57.4 | 12.6 | 55.3 |
| Millenium | 2 | 25 | 56.3 | 13.2 | 55.0 |
| Jerry | 4 | 28 | 56.0 | 13.6 | 54.3 |
| CDC Raptor | 10 | 29 | 56.9 | 12.8 | 53.3 |
| SD97W604 | 3 | 22 | 55.6 | 12.9 | 53.3 |
| Harding | 7 | 26 | 56.3 | 13.7 | 52.6 |
| Jagalene | 3 | 27 | 57.0 | 12.9 | 52.2 |
| Elkhorn | 5 | 30 | 56.8 | 14.4 | 52.0 |
| Arapahoe | 1 | 27 | 57.2 | 13.9 | 51.9 |
| Nekota | 2 | 25 | 55.5 | 13.0 | 51.7 |
| Nuplains | 2 | 25 | 57.1 | 13.3 | 51.1 |
| Ransom | 3 | 29 | 54.7 | 12.9 | 51.1 |
| Expedition | 4 | 22 | 55.2 | 13.6 | 50.0 |
| Wahoo | 6 | 27 | 54.8 | 13.2 | 50.0 |
| Wesley | 2 | 22 | 54.0 | 14.0 | 49.5 |
| CDC Falcon | 3 | 23 | 55.0 | 13.2 | 48.0 |
| SD97W609 | 3 | 23 | 55.7 | 13.1 | 42.6 |
| Roughrider | 10 | 32 | 57.7 | 14.4 | 44.2 |
| Trial Mean | 4 | 26 | 56.1 | 13.4 | 51.0 |
| C.V. % | 121 | 9.3 | 1.3 | 5.0 | 6.7 |
| LSD .05 | NS | 4 | 1.2 | 1.1 | 5.7 |
| LSD .01 | NS | 6 | 1.6 | NS | 7.6 |

Planting Date: September 25, 2003

Harvest Date: August 13, 2004

Seeding rate: 1 million live seeds/A (approx. 1.2 bu/A).

Previous Crop: Barley

NS = no statistical difference between varieties.

2004 North Dakota flax variety descriptions

| Variety ¹ | Origin | Year Released | Relative Maturity ² | Seed Color | Plant Height | Wilt | Relative Yield |
|----------------------|--------|---------------|--------------------------------|------------|--------------|------|----------------|
| NorLin | Can. | 1982 | early | brown | med. | MS | good |
| AC-Watson | Can. | 1996 | early | brown | short | MR | v.good |
| CDC-Valour | Can. | 1996 | early | brown | short | MR | v.good |
| Linton | ND | 1985 | early | brown | med. | R | v.good |
| Prompt | SD | 1988 | early | brown | med. | MR | good |
| Hanley | Can. | 2002 | mid/early | brown | med. | R | v.good |
| AC-Emerson | Can. | 1994 | mid. | brown | med. | VR | v.good |
| CDC-Normandy | Can. | 1995 | mid. | brown | short | MR | v.good |
| Cathay | ND | 1998 | mid. | brown | med. | MR | v.good |
| Pembina | ND | 1998 | mid. | brown | med. | MR | v.good |
| Carter | ND | 2004 | mid. | yellow | med. | R | v.good |
| Neche | ND | 1988 | mid. | brown | med. | R | good |
| Omega | ND | 1989 | mid. | yellow | med. | MS | v.good |
| Rahab 94 | SD | 1994 | mid. | brown | med. | MR | good |
| CDC Arras | Can. | 1999 | mid. | brown | med. | MR | v.good |
| CDC Bethume | Can. | 1999 | mid/late | brown | med.tail | MR | v.good |
| AC Carnduff | Can. | 1998 | mid/late | brown | med.tail | MR | v.good |
| CDC Mons | Can. | 2003 | mid/late | brown | med. | MR | v.good |
| Taurus | Can. | 2003 | mid/late | brown | med. | MR | v.good |
| Flanders | Can. | 1989 | late | brown | med. | MS | good |
| Webster | SD | 1998 | late | brown | tall | MR | v.good |
| McDuff | Can. | 1993 | late | brown | med.tail | MR | v.good |
| AC Linora | Can. | 1993 | late | brown | tall | R | v.good |
| Selby | SD | 2000 | late | brown | tall | MR | good |
| York | ND | 2002 | late | brown | med. | R | v.good |
| Nekoma | ND | 2002 | late | brown | med. | MR | v.good |
| Lightning | Can. | 2002 | late | brown | med.tail | R | v.good |

1 All varieties have resistance to prevalent races of rust; all have good oil yield and oil quality.

2 Varieties listed order of maturity.

2004 Flax Variety Trial - Continuously Cropped - No-till

Hettinger

| Variety | Plant Stand* | Plant Height | Test Weight | ---- Grain Yield ---- | | | Average Yield | |
|------------------------------|--------------|--------------|-------------|-----------------------|------|------|---------------|------|
| | % | inches | Lbs/bu | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| ----- Bushels per acre ----- | | | | | | | | |
| CDC Arras | 60 | 18 | 52.8 | 6.6 | 21.6 | 19.9 | 20.8 | 16.0 |
| York | 38 | 19 | 49.7 | 5.2 | 24.8 | 17.5 | 21.2 | 15.8 |
| Selby | 46 | 19 | 51.2 | 5.7 | 24.0 | 16.2 | 20.1 | 15.3 |
| AC Watson | 38 | 19 | 50.0 | 4.8 | 25.7 | 15.2 | 20.4 | 15.2 |
| CDC Bethume | 55 | 19 | 50.0 | 5.6 | 20.5 | 18.6 | 19.6 | 14.9 |
| Cathay | 55 | 19 | 49.5 | 5.3 | 19.5 | 19.5 | 19.5 | 14.8 |
| AC Carnduff | 62 | 18 | 51.2 | 6.6 | 19.0 | 18.9 | 19.0 | 14.8 |
| Webster | 58 | 20 | 51.6 | 5.8 | 17.9 | 19.9 | 18.9 | 14.5 |
| Nekoma | 51 | 18 | 51.1 | 4.6 | 19.7 | 16.6 | 18.2 | 13.6 |
| Pembina | 39 | 19 | 51.2 | 5.8 | 19.2 | 14.9 | 17.0 | 13.3 |
| Neché | 22 | 19 | 50.3 | 4.5 | 17.6 | 13.7 | 15.6 | 11.9 |
| Rahab 94 | 18 | 18 | -- | 5.0 | 17.1 | 9.6 | 13.4 | 10.6 |
| Omega** | 7 | 19 | -- | 2.9 | 20.2 | 5.4 | 12.8 | 9.5 |
| Prairie Blue | 44 | 19 | 51.1 | | 26.8 | 16.9 | 21.8 | |
| CDC Mons | 45 | 18 | 50.7 | | 20.0 | 18.8 | 19.4 | |
| Hanley | 42 | 18 | 52.3 | | 19.5 | 17.0 | 18.2 | |
| Carter** | 45 | 18 | 52.4 | | 19.8 | 16.1 | 18.0 | |
| Trial Mean | 43 | 19 | 51.0 | 5.2 | 20.6 | 16.2 | -- | -- |
| C.V. % | 41.5 | 8.2 | 2.0 | 15.2 | 11.8 | 27.8 | -- | -- |
| LSD .05 | 25 | NS | 1.5 | 1.1 | 4.0 | 6.4 | -- | -- |
| LSD .01 | 34 | NS | NS | 1.5 | 5.4 | 8.5 | -- | -- |

Planting Date: April 8, 2004

Harvest Date: August 23, 2004

Seeding Rate: 32 lbs / acre.

Previous Crop: 2001& 2002 = barley, 2003 = hrsw.

*Visual estimation of plant stand on June 1.

**Yellow seed type.

NS = no statistical difference between varieties.

Notes: The 2002 trial sustained severe heat and moisture stress. The 2003 trial sustained moderate heat and moisture stress. The 2004 trial sustained hard frosts on May 13 (18° F) and on May 14 (16° F) causing stand loss.

2004 Oil Type Sunflower Variety Trial - Continuously Cropped - No-till

Hettinger

| Brand | Hybrid | Type | Days to Mature | Lodg | Plant Height | Test Weight | Oil Content | Seed Yield | | Avg. Yield |
|------------|--------------|-------|-------------------|------|-----------------|----------------|----------------|---------------------|------|---------------|
| | | | | | | | | 2003 | 2004 | |
| | | * | | % | inches | Lbs/bu | % | - Pounds per Acre - | | |
| Croplan | 345 | N | 132 | 5 | 30 | 30.4 | 46.0 | | 1161 | |
| Genetics | 3080DMR | N | 132 | 12 | 29 | 30.2 | 47.8 | | 1494 | |
| | 340 | H | 135 | 10 | 33 | 30.3 | 44.2 | | 1178 | |
| Dekalb | DKF 33-33NS | N | 127 | 8 | 36 | 31.6 | 36.6 | 1995 | 1575 | 1785 |
| | EXP35-10NS | N | 134 | 4 | 38 | 31.1 | 39.8 | | 1377 | |
| | MH4433 | N | 134 | 29 | 38 | 32.6 | 48.5 | | 1254 | |
| | MH4231 | N | 134 | 2 | 36 | 29.2 | 46.1 | | 1884 | |
| | DKF 30-33NS | N | 132 | 5 | 31 | 30.8 | 38.1 | 2492 | 1470 | 1981 |
| | DKF 38-80CL | C, CL | 130 | 1 | 31 | 28.0 | 35.7 | 2418 | 1394 | 1906 |
| | DKF 38-30NS | N | 137 | 7 | 38 | 30.8 | 46.7 | 2707 | 2217 | 2462 |
| | MH4233 | N | 136 | 0 | 33 | 29.4 | 48.5 | | 1639 | |
| | MH4431 | N | 135 | 5 | 36 | 30.6 | 45.4 | | 1762 | |
| Dyna-Gro | DG94T90 | C | 132 | 14 | 35 | 31.3 | 47.6 | | 1284 | |
| | EXP DG93N05 | N | 136 | 3 | 28 | 28.9 | 39.4 | | 1464 | |
| | EXP DG91N05 | N | 125 | 13 | 28 | 29.1 | 37.5 | | 758 | |
| | EXP DG93C05 | N, CL | 136 | 8 | 36 | 29.0 | 43.2 | | 1628 | |
| Interstate | F00125NS | N | 134 | 12 | 34 | 31.4 | 40.6 | | 1412 | |
| | IS 4540NS | N | 134 | 6 | 29 | 32.8 | 44.7 | | 1534 | |
| | F10003NS | N | 134 | 5 | 33 | 29.6 | 40.2 | | 1698 | |
| | Hysun 521 | N | 133 | 7 | 35 | 31.3 | 40.1 | | 1511 | |
| | IS 4704NS | N | 134 | 17 | 35 | 30.6 | 39.0 | | 1587 | |
| | Hysun 525 | N | 129 | 7 | 37 | 29.1 | 40.7 | 2347 | 1879 | 2113 |
| | Hysun 425 | N | 132 | 20 | 34 | 31.2 | 44.7 | | 1021 | |
| | F100016NS | N | 135 | 4 | 33 | 31.4 | 38.8 | | 1505 | |
| | IS 4575NS/CL | N, CL | 136 | 2 | 36 | 29.6 | 43.6 | | 1272 | |
| | IS 4880NS/CL | N, CL | 136 | 12 | 39 | 30.0 | 41.4 | | 1523 | |
| | IS 6039 | C | 130 | 15 | 38 | 31.4 | 43.7 | 1991 | 1400 | 1696 |
| | IS 4539 | C | 132 | 10 | 37 | 30.4 | 44.8 | | 1383 | |
| | IS 4049 | C | 132 | 6 | 35 | 30.6 | 47.1 | 2632 | 1634 | 2133 |
| | F10046HO | H | 135 | 6 | 29 | 32.8 | 48.0 | | 1155 | |
| | HyOleic 120 | H | 134 | 10 | 41 | 31.0 | 42.1 | 2664 | 1453 | 2058 |
| Kaystar | 8330NS | N | 134 | 2 | 32 | 28.3 | 39.3 | | 1330 | |
| | 8300 | C | 128 | 24 | 32 | 29.3 | 43.3 | 2168 | 939 | 1554 |
| Legend | LSF 117N | N | 134 | 4 | 33 | 30.7 | 40.8 | 2128 | 1272 | 1700 |
| | LSF 121N | N | 134 | 15 | 35 | 29.3 | 37.9 | | 1400 | |
| | LSF 126N | N | 130 | 14 | 32 | 30.1 | 43.1 | 2470 | 1313 | 1892 |

countinued

2004 Oil Type Sunflower Variety Trial – continued

Hettinger

| Brand | Hybrid | Type | Days to Mature | Lodg | Plant Height | Test Weight | Oil Content | Seed Yield | | Avg. Yield |
|---------------|-----------|-------|-------------------|------|-----------------|----------------|----------------|---------------------|------|---------------|
| | | | | | | | | 2003 | 2004 | |
| | | * | | % | inches | Lbs/bu | % | - Pounds per Acre - | | |
| Mycogen | 8D310 | N | 132 | 3 | 32 | 28.9 | 37.4 | | 1505 | |
| | 8N352 | N | 134 | 9 | 33 | 32.1 | 52.9 | | 1680 | |
| | 8N327 | N | 132 | 17 | 32 | 31.7 | 48.1 | 2357 | 974 | 1666 |
| | 8377NS | N | 132 | 6 | 34 | 31.1 | 47.2 | | 1307 | |
| Pioneer | 63M02 | N | 126 | 23 | 35 | 34.0 | 45.0 | | 1050 | |
| | 63M80 | N | 132 | 4 | 33 | 30.5 | 47.5 | | 1178 | |
| | 63M91 | N | 133 | 7 | 40 | 30.8 | 46.3 | | 1704 | |
| | EXP0401 | N | 130 | 22 | 31 | 29.8 | 45.2 | | 1237 | |
| Proseed | 9405 | N | 137 | 1 | 33 | 28.7 | 44.0 | 2546 | 1581 | 2064 |
| | 9444 | N | 129 | 11 | 39 | 29.4 | 45.5 | | 928 | |
| | T-1 | N | 138 | 3 | 34 | 26.0 | 45.2 | | 1622 | |
| | T-2 | N | 138 | 9 | 38 | 26.5 | 46.8 | | 1400 | |
| | T-3 | N | 128 | 1 | 41 | 28.4 | 44.9 | | 1400 | |
| REA | 2220SR | N | 130 | 5 | 38 | 29.1 | 45.3 | | 1593 | |
| Seeds 2000 | Colonel | N | 132 | 6 | 35 | 26.2 | 38.9 | 2439 | 1634 | 2036 |
| | Blazer | N | 132 | 10 | 32 | 30.0 | 45.6 | 2429 | 1237 | 1833 |
| | Charger | N, CL | 135 | 14 | 42 | 30.8 | 41.0 | 2256 | 1412 | 1834 |
| | Viper | N, CL | 135 | 9 | 38 | 30.6 | 43.7 | | 1441 | |
| | X978 | N, CL | 134 | 10 | 37 | 30.3 | 48.1 | | 1599 | |
| Triumph Seed | S675 | NS | 139 | 2 | 22 | 27.6 | 44.0 | | 1289 | |
| E. Mat. Check | Hysun 311 | | 125 | | | | | | | |
| M. Mat. Check | SF270 | | 128 | | | | | | | |
| L. Mat. Check | P6451 | | 136 | | | | | | | |
| Check | USDA 894 | C | 132 | 9 | 37 | 30.0 | 42.4 | 2471 | 1219 | 1845 |
| Trial Mean | | | 133 | 9 | 34 | 30.1 | 43.5 | 2274 | 1404 | -- |
| C.V. % | | | 1.4 | 122 | 13.6 | 4.6 | 5.9 | 10.7 | 20.3 | -- |
| LSD 5% | | | 3 | NS | 7 | 1.9 | 3.6 | 341 | 397 | -- |
| LSD 1% | | | 3 | NS | 9 | 2.6 | 4.7 | 450 | 525 | -- |

* Type: N = NuSun, C = conventional, H = high oleic, CL = Clearfield

Planting Date: May 18, 2004

Harvest Date: October 12, 2004

Seeding Rate: 21,000 seeds / acre, thinned to 18,650 plants / acre.

Row Spacing: 28"

Previous Crop: HRSW

Notes: The 2004 trial sustained cool and relatively dry growing conditions.

NS = no statistical difference between varieties.

Oil content is based on 10% moisture and is adjusted for NuSun types.

2004 Tame Mustard Variety Trial - Continuously Cropped - Minimum-till Hettinger

| Variety | Plant Stand* | Days to Bloom | Duration of Bloom | Days to Mature | Plant Height | 1000 Seed wt | Yield 2002 | Yield 2003 | Yield 2004 | Avg. Yield | |
|-----------------|--------------|---------------|-------------------|----------------|--------------|--------------|----------------------|------------|------------|------------|------|
| | % | | | | Inches | grams | ----- lbs / ac ----- | | | 2 yr | 3 yr |
| Yellow | | | | | | | | | | | |
| Ace | 90 | 56 | 26 | 99 | 22 | 7.8 | 504 | 868 | 1260 | 1064 | 877 |
| AC Pennant | 94 | 55 | 26 | 97 | 21 | 7.7 | 504 | 1036 | 1033 | 1034 | 858 |
| AC Base | 92 | 55 | 26 | 98 | 21 | 7.8 | 513 | 849 | 1207 | 1028 | 856 |
| Viscount | 92 | 56 | 26 | 99 | 25 | 7.4 | 448 | 840 | 1273 | 1056 | 854 |
| Tilney | 96 | 54 | 26 | 96 | 22 | 7.5 | 504 | 868 | 1180 | 1024 | 851 |
| Andante | 97 | 54 | 26 | 95 | 24 | 8.0 | | 971 | 1187 | 1079 | |
| Oriental | | | | | | | | | | | |
| Forge | 88 | 61 | 30 | 102 | 44 | 5.2 | 187 | 345 | 1160 | 752 | 564 |
| Trial Mean | 93 | 56 | 27 | 98 | 26 | 7.3 | 404 | 770 | 1186 | -- | -- |
| C.V. % | 4.2 | 2.4 | 3.2 | 1.8 | 11.1 | 5.8 | 15.8 | 8.6 | 16.6 | -- | -- |
| LSD .05 | 6 | 2 | 1 | 3 | 4 | 0.6 | 95 | 109 | NS | -- | -- |
| LSD .01 | NS | 3 | 2 | 4 | 6 | 0.9 | 130 | 148 | NS | -- | -- |

*Visual estimation of plant stand on June 1. NS = no statistical difference between varieties.

Planting Date: April 8, 2004

Harvest Date: August 9, 2004

Seeding rate: Yellow = 12 lbs/A, Oriental = 6 lbs/A

Previous Crop: 2001 = fallow, 2002 = barley, 2003 = HRSW

Notes: The 2002 trial sustained severe heat and moisture stress.

2004 Safflower Variety Trial – Continuously Cropped - No-till Hettinger

| Variety | Plant Stand* | Days to Bloom | Plant Height | Test Weight | Seed Yield | | | Average Yield | |
|--------------|--------------|---------------|--------------|-------------|-----------------------------|------|------|---------------|------|
| | % | | inches | lbs/bu | 2000 | 2003 | 2004 | 2 yr | 3 yr |
| | | | | | ----- Pounds per acre ----- | | | | |
| S-518 | 80 | 111 | 19 | 38.4 | 1127 | 1227 | 2355 | 1791 | 1570 |
| S-541 | 76 | 114 | 20 | 39.5 | 947 | 1207 | 2387 | 1797 | 1514 |
| Finch | 66 | 113 | 20 | 44.8 | 853 | 1280 | 2000 | 1640 | 1378 |
| Montola 2004 | 82 | 109 | 17 | 40.8 | 900 | 1267 | 1853 | 1560 | 1340 |
| Montola 2000 | 55 | 114 | 16 | 39.8 | 880 | 987 | 1880 | 1434 | 1249 |
| Montola 2003 | 81 | 112 | 17 | 42.0 | 720 | 1000 | 1900 | 1450 | 1207 |
| Nutrasaff | 69 | 115 | 20 | 37.4 | | | 1973 | | |
| Morlin | 72 | 114 | 19 | 38.4 | | | 1900 | | |
| Trial Mean | 73 | 113 | 18 | 41.1 | 908 | 1221 | 2100 | -- | -- |
| C.V. % | 8.8 | 1.9 | 10.4 | 1.6 | 9.4 | 14.2 | 13.5 | -- | -- |
| LSD .05 | 9 | 3 | 3 | 0.9 | 123 | 250 | 409 | -- | -- |
| LSD .01 | 12 | 4 | NS | 1.3 | 166 | 337 | NS | -- | -- |

* Visual estimation of plant stand on July 1, 2004. NS = no statistical difference between varieties.

Planting Date: April 8, 2004

Harvest Date: September 27, 2004

Seeding Rate: 400,000 live seeds / acre.

Previous Crop: 2001 = fallow, 2002 = barley, 2003 = HRSW.

Notes: The 2004 trial sustained hard frosts on May 13 (18° F), May 14 (16° F) and on June 18 (25° F).

2004 Roundup Ready Canola Variety Trial at Hettinger
Continuously Cropped – No-till

| Brand | Variety | Type* | Plant Stand ** | Days to Bloom | Duration of Flowering | Days to Mature | Plant Height | Oil Content | Yield | |
|------------|---------------|--------|-------------------|------------------|--------------------------|-------------------|--------------|-------------|-------|-----|
| | | | % | | days | | inches | % | lbs/A | |
| Croplan | Minot RR | OP | 69 | 71 | 34 | 118 | 27 | 41.2 | 381 | |
| | Crosby RR | OP | 61 | 72 | 33 | 117 | 26 | 43.9 | 465 | |
| | HyClass 767 | S | 68 | 70 | 35 | 114 | 29 | 41.2 | 867 | |
| | HyClass 2061 | H | 60 | 71 | 34 | 117 | 27 | 42.8 | 575 | |
| | HyClass 905 | H | 79 | 74 | 28 | 113 | 32 | 42.8 | 1078 | |
| | HyClass 910 | H | 68 | 72 | 30 | 111 | 29 | 42.8 | 996 | |
| Dekalb | DKL 223 | H | 45 | 68 | 35 | 115 | 24 | 41.1 | 692 | |
| | DKL 34-55 | OP | 68 | 70 | 33 | 115 | 27 | 43.7 | 643 | |
| Interstate | Hyola 505RR | H | 50 | 76 | 29 | 117 | 31 | 41.9 | 443 | |
| | SW Marksman | H | 76 | 69 | 33 | 113 | 28 | 42.4 | 944 | |
| | SW Patriot | S | 79 | 68 | 34 | 112 | 29 | 42.2 | 941 | |
| | SW G2535RR | H | 76 | 68 | 37 | 115 | 29 | 41.2 | 740 | |
| | Hyola 357 mag | H | 65 | 66 | 36 | 116 | 23 | 40.4 | 669 | |
| | SW PL-7835RR | S | 62 | 69 | 35 | 114 | 28 | 42.2 | 661 | |
| | Z2409RR | H | 66 | 78 | 27 | 114 | 30 | 42.0 | 785 | |
| | SW 5246RR | OP | 72 | 72 | 32 | 116 | 29 | 40.8 | 613 | |
| | HyLite 225RR | OP | 60 | 74 | 30 | 116 | 28 | 40.7 | 422 | |
| | Z2363 | H | 68 | 72 | 31 | 114 | 28 | 42.6 | 779 | |
| | Z2365 | H | 58 | 68 | 35 | 112 | 28 | 40.6 | 773 | |
| | Proseed | RR2013 | H | 58 | 78 | 27 | 115 | 28 | 43.5 | 678 |
| | | RR2066 | H | 58 | 68 | 35 | 113 | 26 | 42.6 | 766 |
| Razor | | S | 50 | 74 | 31 | 117 | 27 | 41.4 | 454 | |
| Roughrider | | OP | 62 | 70 | 36 | 118 | 28 | 44.8 | 395 | |
| Seeds 2000 | SW BadgeRR | S | 50 | 74 | 31 | 116 | 28 | 42.1 | 524 | |
| Trial Mean | | | 64 | 71 | 33 | 115 | 28 | 42.1 | 676 | |
| C.V. % | | | 18.0 | 5.8 | 11.9 | 1.5 | 8.0 | 2.8 | 24.7 | |
| LSD .05 | | | 16 | 6 | 5 | 2 | 3 | 1.7 | 235 | |
| LSD .01 | | | 21 | 8 | 7 | 3 | 4 | 2.2 | 312 | |

* Type: H = Hybrid, S = Synthetic, OP = Open Pollinated

** Visual estimation of plant stand on June 1.

Planting Date: April 8, 2004

Harvest Date: August 10, 2004

Previous Crop: HRSW

Notes: Hard frost on May 13 (16° F) reduced plant stands and delayed plant growth. Hard frost on June 18 (25° F), during mid-bloom, caused pod sterility and severe yield reductions.

2004 Conventional Canola Variety Trial at Hettinger
Continuously Cropped – Minimum till

| Brand | Variety | Type* | Plant Stand** | Days to Bloom | Duration of Flowering | Days to Mature | Plant Height | Oil Content | Yield |
|------------|---------------|--------|---------------|---------------|-----------------------|----------------|--------------|-------------|-------|
| | | | % | | days | | inches | % | lbs/A |
| Croplan | KAB 36 | OP, CL | 86 | 64 | 26 | 109 | 28 | 44.6 | 829 |
| Interstate | HyLite 618 CL | OP, CL | 80 | 64 | 28 | 109 | 27 | 43.4 | 906 |
| | Hyola 420 | H | 61 | 63 | 28 | 111 | 25 | 42.9 | 821 |
| | Hyola 440 | H | 81 | 64 | 26 | 109 | 32 | 46.0 | 1195 |
| Proseed | 99CH01 | H | 68 | 64 | 28 | 109 | 33 | 43.7 | 896 |
| RR Checks | Hyola 357 Mag | H | 84 | 61 | 28 | 110 | 24 | 43.2 | 1126 |
| | Minot RR | OP | 66 | 65 | 27 | 112 | 27 | 42.9 | 700 |
| Trial Mean | | | 76 | 64 | 27 | 110 | 27 | 43.8 | 930 |
| C.V. % | | | 18.1 | 1.5 | 4.0 | 1.3 | 7.8 | 4.1 | 28.2 |
| LSD .05 | | | NS | 1 | NS | NS | 3 | NS | NS |
| LSD .01 | | | NS | 2 | NS | NS | 4 | NS | NS |

* Type: H = Hybrid, S = Synthetic, OP = Open Pollinated, CL = Clearfield.

** Visual estimation of plant stand on June 1. NS = not statistical difference between varieties.

Planting Date: April 8, 2004 Harvest Date: August 9, 2004 Previous Crop: HRSW
Notes: Hard frost on May 13 (16° F) reduced plant stands and delayed plant growth. Hard frost on June 18 (25° F), during mid-bloom, caused pod sterility and yield reductions.

2004 Fertilizer Blends on Canola at Hettinger

| Fertilizer Blend* | Stand** | Days to 10% Bloom | Duration of Bloom | Days to Mature | Plant Height | Oil Content | Yield |
|-------------------|---------------------|-------------------|-------------------|----------------|--------------|-------------|--------|
| | # / ft ² | | days | | cm | % | lbs/ac |
| 0 - 0 - 0 | 6.6 | 70 | 22 | 116 | 22 | 45.1 | 405 |
| 102 - 0 - 0 | 5.9 | 64 | 28 | 117 | 23 | 43.2 | 522 |
| 0 - 21 - 0 | 5.7 | 69 | 24 | 117 | 23 | 44.0 | 564 |
| 0 - 0 - 34 | 5.7 | 70 | 22 | 117 | 24 | 45.0 | 390 |
| 102 - 21 - 0 | 4.2 | 72 | 20 | 117 | 22 | 45.2 | 422 |
| 102 - 0 - 34 | 3.4 | 70 | 22 | 118 | 22 | 44.3 | 348 |
| 0 - 21 - 34 | 4.8 | 72 | 21 | 117 | 22 | 45.3 | 421 |
| 102 - 21 - 34 | 5.9 | 68 | 24 | 117 | 23 | 45.2 | 399 |
| Trial Mean | | 5.3 | 69 | 23 | 117 | 44.7 | 434 |
| C.V. % | | 47.4 | 5.4 | 16.9 | 0.8 | 6.9 | 16.9 |
| LSD .05 | | NS | NS | NS | NS | NS | 129 |

*lbs / acre of actual nitrogen, phosphorus and sulfur applied pre-plant incorporated.

Residual soil fertility: N = 28 lbs/A, P = 14 lbs/A, S = 6 lbs/A

NS = no statistical difference between varieties.

**Number of plants / ft² on June 1. Variety = Hyola 357

Planting Date: April 12, 2004 Harvest Date: August 17, 2004 Previous Crop: HRSW
Notes: The trial sustained hard frosts on May 13 (18° F), May 14 (16° F) and June 18 (25° F).

2004 POST Applied Nitrogen Formulations on Canola at Hettinger, ND

| Trt No. | Treatment | Fertilizer Product | Rate | Plant Stand | Days to 10% Bloom | Duration of Bloom | Days to Mature | Plant Height | Yield |
|------------|-----------|--------------------|-------|---------------------|-------------------|-------------------|----------------|--------------|--------|
| | | | Lbs/A | # / ft ² | | days | | inches | lbs/ac |
| 1 | 67% PPI | Urea | 59 | | | | | | |
| 1 | 33% POST | Urea | 43 | 5.4 | 62 | 28 | 113 | 23 | 994 |
| 2 | 67% PPI | Urea | 59 | | | | | | |
| 2 | 33% POST | Am. Nitrate | 43 | 4.7 | 66 | 26 | 115 | 24 | 664 |
| 3 | 67% PPI | Urea | 59 | | | | | | |
| 3 | 33% POST | UAN – SB* | 43 | 5.0 | 66 | 26 | 116 | 24 | 709 |
| 4 | 67% PPI | Urea | 59 | | | | | | |
| 4 | 33% POST | UAN – FF* | 43 | 5.1 | 63 | 28 | 115 | 24 | 911 |
| 5 | 33% PPI | Urea | 15 | | | | | | |
| 5 | 67% POST | Urea | 87 | 6.0 | 61 | 28 | 113 | 24 | 902 |
| 6 | 33% PPI | Urea | 15 | | | | | | |
| 6 | 67% POST | Am. Nitrate | 87 | 6.3 | 63 | 28 | 114 | 22 | 883 |
| 7 | 33% PPI | Urea | 15 | | | | | | |
| 7 | 67% POST | UAN – SB | 87 | 8.0 | 62 | 29 | 115 | 23 | 782 |
| 8 | 33% PPI | Urea | 15 | | | | | | |
| 8 | 67% POST | UAN – FF | 87 | 3.6 | 62 | 29 | 115 | 22 | 927 |
| 9 | 100% PPI | Urea | 102 | 6.1 | 65 | 27 | 116 | 24 | 818 |
| Trial Mean | | | | 5.6 | 63 | 28 | 115 | 23 | 841 |
| C.V. % | | | | 32.8 | 4.8 | 8.7 | 1.7 | 7.3 | 26.4 |
| LSD .05 | | | | NS | NS | NS | NS | NS | NS |

*SB = stream bar, FF = flat fan nozzle.

NS = no statistical difference between treatments.

Planting Date: April 12, 2004

Harvest Date: August 17, 2004

Residual soil N (0 – 48"): 28 lbs/acre

Variety: Hyola 357

Date of Emergence: April 19, 2004

Date of POST application: May 21, 2004 (3 – 4 leaf)

Previous Crop: HRSW

Notes: The trial sustained hard frosts on May 13 (18° F), May 14 (16° F) and on June 18 (25° F).

Chlorosis and leaf cupping was noted following FF treatments. 0.30" of rainfall on 5/23/04.

2004 Yield Response of Canola to Nitrogen Fertilizer by Application Timing at Hettinger - No-fill Combined Means*

| Pounds / acre N** | Pre Plant | 4-5 leaf | Plant Stand #/sq ft | Biomass %*** | Plant Height cm | Days to 10% Bloom days | Duration of Bloom days | Days to Mature days | 1000 Seed Weight grams | Oil Content % | Seed Yield ----- lbs/acre ----- | | Avg. |
|-------------------|-----------|----------|---------------------|--------------|-----------------|------------------------|------------------------|---------------------|------------------------|---------------|---------------------------------|------|------|
| | | | | | | | | | | | 2004 | 2003 | |
| 28 | 0 | 0 | 7.9 | 100 | 57 | 72 | 24 | 122 | 5.0 | 44.2 | 212 | 900 | 556 |
| 45 | 0 | 0 | 9.9 | 106 | 58 | 66 | 28 | 117 | 5.2 | 46.3 | 372 | 993 | 682 |
| 60 | 0 | 0 | 8.8 | 119 | 61 | 65 | 29 | 117 | 4.8 | 46.4 | 594 | 1080 | 837 |
| 75 | 0 | 0 | 8.2 | 119 | 56 | 67 | 27 | 117 | 5.0 | 46.2 | 660 | 1163 | 912 |
| 90 | 0 | 0 | 9.4 | 114 | 65 | 65 | 29 | 117 | 4.9 | 46.1 | 601 | 1183 | 892 |
| 120 | 0 | 0 | 6.5 | 124 | 64 | 70 | 25 | 119 | 4.8 | 44.0 | 685 | 1123 | 904 |
| 150 | 0 | 0 | 6.5 | 121 | 62 | 68 | 26 | 118 | 5.0 | 43.7 | 633 | 1100 | 866 |
| 0 | 60 | 0 | 7.2 | 109 | 60 | 71 | 24 | 120 | 5.0 | 45.2 | 363 | 1027 | 695 |
| 0 | 90 | 0 | 7.3 | 119 | 59 | 70 | 26 | 119 | 5.1 | 44.8 | 448 | 980 | 714 |
| 0 | 120 | 0 | 7.3 | 124 | 60 | 72 | 24 | 119 | 5.0 | 43.9 | 539 | 840 | 690 |
| 0 | 150 | 0 | 6.9 | 115 | 64 | 71 | 25 | 119 | 5.1 | 43.6 | 473 | 1037 | 755 |
| Trial Mean | | | 7.8 | 115 | 61 | 69 | 26 | 119 | 5.0 | 44.9 | 507 | 1039 | -- |
| C.V. % | | | 39.9 | 6.8 | 11.1 | 7.2 | 15.9 | 1.9 | 6.4 | 2.5 | 31.7 | 15.6 | -- |
| LSD .05 | | | NS | 8 | NS | 5 | NS | 2 | NS | 1.1 | 160 | 161 | -- |
| LSD .01 | | | NS | 10 | NS | 7 | NS | 3 | NS | 1.5 | 213 | 213 | -- |

* Combined means of 2 varieties: Hyola 357 and Minot RR and 4 replications.

** Pounds per acre actual N (residual soil N 0-24" + fertilizer N). Pre-plant fert. = Urea. Post applied fert. = Amm. Nitrate applied on May 21, 2004. Rainfall after post applied N: 0.69" on May 21 - 24, 2004.

*** Biomass = Visual estimation of plant foliage compared to untreated at early bloom.

NS = no statistical difference between fertility treatments.

Planting Date: April 8, 2004

Harvest Date: August 17, 2004

Previous Crop: 2002 = sunflower, 2003 = HRSW

There was no lodging or plant diseases. The 2004 trial sustained hard frosts on May 13 (18 F), May 14 (16 F) and on June 18 (25 F), causing reduced plant stands and blossom abortion.

2004 SWP Juncea Variety Trial at Hettinger, ND

| Variety | Stand* | Days to 10% Bloom | Duration of Bloom | Days to Mature | Plant Height | Oil Content | Yield** |
|------------|--------|----------------------|----------------------|-------------------|-----------------|----------------|---------|
| | % | | days | | cm | % | lbs/ac |
| 3032 | 94 | 59 | 27 | 96 | 72 | 40.4 | 537 |
| 5171 | 92 | 60 | 28 | 101 | 79 | 42.0 | 840 |
| 7929 | 94 | 62 | 28 | 102 | 75 | 39.6 | 528 |
| 8061 | 94 | 60 | 28 | 96 | 73 | 40.0 | 712 |
| 9694 | 90 | 62 | 28 | 103 | 78 | 41.0 | 602 |
| Arid | 92 | 60 | 27 | 100 | 76 | 41.9 | 795 |
| Dahinda | 95 | 59 | 24 | 95 | 73 | 38.3 | 337 |
| Davin | 94 | 62 | 28 | 101 | 85 | 37.6 | 294 |
| Q2 | 79 | 65 | 26 | 108 | 70 | 40.7 | 732 |
| 46A65 | 49 | 64 | 27 | 108 | 64 | 42.3 | 739 |
| Trial Mean | 87 | 61 | 27 | 101 | 75 | 40.4 | 612 |
| C.V. % | 7.6 | 1.1 | 4.5 | 1.6 | 10.7 | 3.8 | 38.4 |
| LSD .05 | 10 | 1 | 2 | 2 | NS | 2.2 | 341 |
| LSD .01 | 13 | 1 | 2 | 3 | NS | 3.0 | NS |

*Stand = visual estimation of plant stand on June 1.

**Yield is not a true yield due to severe bird depredation.

NS = no statistical difference between varieties.

Planting Date: April 8, 2004

Date of Emergence: April 19, 2004

Harvest Date: August 9, 2004

Previous Crop: HRSW

Notes: The trial sustained hard frosts on May 13 (18° F), May 14 (16° F) and on June 18 (25° F). B. juncea had better frost tolerance than B. napus.

% oil content was calculated using NMR canola standards.



2004 Lentil Variety Trial – Continuously Cropped - No-till

Hettinger

| Variety | Days to Bloom | Plant Height inches | 1000 Seed wt. grams | Test Weight Lbs/bu | ---- Seed Yield ---- | | | Average Yield | |
|----------------|---------------|------------------------|------------------------|-----------------------|-----------------------------|------|------|---------------|------|
| | | | | | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| | | | | | ----- Pounds per acre ----- | | | | |
| Chilean | | | | | | | | | |
| Pennell | 70 | 10 | 68.6 | 59.4 | 347 | 905 | 2614 | 1760 | 1289 |
| CDC Richlea | 66 | 11 | 50.8 | 60.6 | 360 | 952 | 2436 | 1694 | 1249 |
| Mettitt | 63 | 10 | 66.6 | 59.6 | 258 | 1279 | 1951 | 1615 | 1163 |
| Laird | 69 | 14 | 73.4 | 59.9 | 53 | 719 | 2194 | 1456 | 989 |
| CDC Sedley | 68 | 12 | 75.2 | 60.3 | | | 2268 | | |
| Persian | | | | | | | | | |
| CDC Milestone | 66 | 10 | 36.2 | 62.3 | 293 | 1148 | 2203 | 1676 | 1215 |
| Crimson | 66 | 8 | 33.2 | -- | 231 | 775 | 1148 | 962 | 718 |
| Red Robin | 66 | 10 | 27.6 | 62.6 | | 1195 | 1382 | 1288 | |
| Pardina | 63 | 7 | 42.2 | 63.0 | | 859 | 1596 | 1228 | |
| CDC Blaze | 65 | 9 | 36.2 | 62.6 | | | 1587 | | |
| Trial Mean | 66 | 10 | 51.0 | 61.2 | 296 | 881 | 1938 | -- | -- |
| C.V. % | 1.1 | 7.8 | 2.6 | 0.5 | 33.1 | 14.4 | 10.6 | -- | -- |
| LSD .05 | 1 | 1 | 1.9 | 0.4 | 146 | 184 | 297 | -- | -- |
| LSD .01 | 1 | 2 | 2.6 | 0.6 | 199 | 248 | 402 | -- | -- |

Planting Date: April 15, 2004 Harvest Date: August 10, 2004

Seeding Rate: 550,000 live seeds / acre.

Previous Crop: 2001 = fallow, 2002 & 2003 = barley.

Notes: The 2002 trial sustained severe heat and moisture stress. The 2003 trial sustained late season heat and moisture stress. The 2004 trial sustained hard frosts on May 13 (18° F), May 14 (16° F) and on June 18 (25° F).

2004 Lentil Seeding Rate Trial – Continuously Cropped - No-till Hettinger

| Seeding Rate | Days to Bloom | Plant Height inches | 1000 Seed wt. grams | Test Weight lbs/bu | ---- Seed Yield ---- | | |
|---------------------|---------------|------------------------|------------------------|-----------------------|----------------------|------|------|
| | | | | | 2003 | 2004 | Avg. |
| # / ft ² | lbs/a | | | | - Pounds per Acre - | | |
| 12 | 66 | 72 | 49.0 | 59.4 | 1307 | 2233 | 1770 |
| 10 | 55 | 72 | 47.0 | 59.4 | 1232 | 2080 | 1656 |
| 8 | 44 | 72 | 48.5 | 59.2 | 999 | 1960 | 1480 |
| 6 | 33 | 72 | 50.0 | 59.4 | 1018 | 1747 | 1382 |
| 4 | 22 | 72 | 52.0 | 58.8 | 719 | 1591 | 1155 |
| Trial Mean | | 72 | 49.3 | 59.2 | 1055 | 1922 | -- |
| C.V. % | | 0 | 4.7 | 1.8 | 8.2 | 6.2 | -- |
| LSD .05 | | NS | NS | NS | 134 | 184 | -- |
| LSD .01 | | NS | NS | NS | 188 | 258 | -- |

Planting Date: April 8, 2004

Harvest Date: August 10, 2004

Variety = CDC Richlea

Previous Crop: barley

Notes: The 2003 trial sustained late season heat and moisture stress. The 2004 trial sustained hard frosts on May 13 (18° F), May 14 (16° F) and on June 18 (25° F).

2004 Field Pea Variety Trial - Continuously Cropped No-till

Hettinger

| Variety | Seed Type | Date of 10% Bloom | Plant Ht at Harvest | Lodg. | 1000 Seed wt | Yield | | | Avg. Yield | |
|------------|-----------|-------------------|---------------------|-------|--------------|-------------------|------|------|------------|------|
| | | | | | | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| | | June | Inches | 0-9* | grams | ----- Bu/ac ----- | | | | |
| Cruiser | G | 16 | 15 | 1.2 | 197 | 8.1 | 38.4 | 29.2 | 38.8 | 28.6 |
| Carneval | Y | 18 | 15 | 0.2 | 219 | 5.9 | 36.1 | 40.2 | 38.2 | 27.4 |
| CDC Mozart | Y | 17 | 12 | 2.2 | 226 | 6.5 | 41.2 | 29.2 | 35.2 | 25.6 |
| DS Admiral | Y | 17 | 15 | 0.0 | 236 | | 39.6 | 29.8 | 24.7 | |
| Majoret | G | 17 | 14 | 0.2 | 212 | | 35.4 | 33.7 | 34.6 | |
| Nitouche | G | 15 | 16 | 0.5 | 272 | | | 42.6 | | |
| Toledo | G | 14 | 15 | 1.8 | 256 | | | 34.4 | | |
| Eclipse | Y | 17 | 12 | 0.0 | 264 | | | 21.2 | | |
| Stirling | G | 13 | 12 | 0.5 | 216 | | | 20.0 | | |
| Trial Mean | | 16 | 14 | 0.8 | 233 | 6.5 | 38.8 | 32.3 | -- | -- |
| C.V. % | | 0.1 | 6.4 | 86.0 | 4.1 | 27.3 | 6.3 | 6.7 | -- | -- |
| LSD .05 | | 1 | 1 | 0.9 | 14 | NS | 3.7 | 3.1 | -- | -- |
| LSD .01 | | 1 | 2 | 1.3 | 19 | NS | 5.1 | 4.3 | -- | -- |

*Lodging: 0 = none, 9 = lying flat on ground.

Planting Date: April 8, 2004 Harvest Date: August 18, 2004

Seeding rate: 250,000 live seeds/A

Previous Crop: 2001 = fallow, 2002 & 2003 = barley

Notes: The 2002 trial sustained severe heat and moisture stress. The 2004 trial sustained a hard frost (25° F) on June 18 causing blossoms to abort.

2004 CDC Field Pea Variety Trial - Continuously Cropped No-till Hettinger

| Variety | Date of 10% Bloom | Plant Ht at Harvest | Lodg. | 1000 Seed wt | Yield |
|-------------|-------------------|---------------------|-------|--------------|-------|
| | June | Inches | 0-9* | grams | Bu/A |
| CDC Sonata | 22 | 17 | 7.2 | 253 | 55.9 |
| CDC Minuet | 26 | 15 | 1.2 | 188 | 48.2 |
| CDC Bronco | 27 | 13 | 2.0 | 192 | 42.1 |
| CDC Handel | 21 | 13 | 2.2 | 202 | 38.7 |
| CDC Cutlass | 22 | 15 | 2.5 | 218 | 36.5 |
| CDC Striker | 25 | 15 | 0.5 | 248 | 34.5 |
| CDC Montero | 22 | 15 | 2.2 | 216 | 33.8 |
| CDC Golden | 22 | 15 | 1.0 | 240 | 30.3 |
| Trial Mean | 23 | 15 | 2.4 | 220 | 40.0 |
| C.V. % | 4.7 | 8.4 | 35.0 | 3.4 | 6.9 |
| LSD .05 | 2 | 2 | 1.2 | 11 | 4.1 |
| LSD .01 | 2 | 3 | 1.7 | 15 | 5.5 |

*Lodging: 0 = none, 9 = lying flat on ground.

Planting Date: April 15, 2004 Harvest Date: August 18, 2004

Seeding rate: 250,000 live seeds/A

Previous Crop: barley

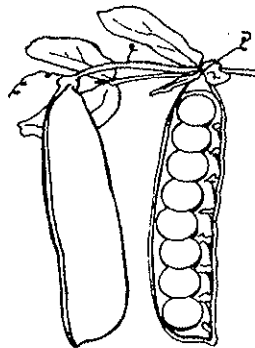
Notes: CDC Striker appeared to be less frost tolerant.

SDSU Field Pea Variety Trial -- Perkins County (Bison), 2004.

| Variety | Height Inches | Lodging 0-9* | Test Wt Lb/Bu | Yield Bu/A |
|-------------------------|------------------|-----------------|------------------|---------------|
| Forage | | | | |
| 40-10 Magda (long vine) | 24 | 8 | 62.8 | 25.3 |
| Arvika (long vine) | 25 | 8 | 60.4 | 27.9 |
| Forager (long vine) | 28 | 8 | 62.0 | 30.9 |
| Yellow Cotyledon | | | | |
| Lifter (long vine) | 19 | 8 | 61.6 | 20.5 |
| Victoria (long vine) | 33 | 8 | 62.7 | 29.9 |
| Grande (long vine) | 19 | 4 | 63.7 | 29.6 |
| Admiral | 14 | 0 | 61.8 | 24.4 |
| Carneval | 17 | 1 | 62.9 | 22.5 |
| Circus | 16 | 1 | 63.3 | 21.5 |
| Delta | 12 | 1 | 64.3 | 23.2 |
| Eclipse | 12 | 0 | 63.6 | 24.0 |
| CDC Mozart | 12 | 0 | 64.8 | 21.0 |
| Salute | 14 | 1 | 63.5 | 23.8 |
| Green Cotyledon | | | | |
| Crusier | 13 | 2 | 62.6 | 23.2 |
| Journey (long vine) | 21 | 8 | 62.8 | 22.2 |
| Majoret | 14 | 0 | 63 | 22.4 |
| Millennium | 11 | 0 | 62.8 | 17.0 |
| Stirling | 11 | 1 | 63.0 | 15.0 |
| Average | 17.5 | 3.3 | 62.9 | 23.6 |
| LSD (P=.05) | 4.0 | 0.9 | 0.9 | 4.4 |
| CV | 13.6 | 18.6 | 1.0 | 13.2 |

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

Planted: April 12, 2004 Herbicide: Pursuit (3 oz/A) + Poast Plus (0 pint/A)
 Harvested: August 10, 2004 Additional Nitrogen: Inoculated
 Previous crop: Durum Wheat, No-Till planted



2004 Field Pea Variety Trial – Continuously Cropped No-till Wilton

| Variety | Seed Type | Test Weight | 1000 Seed wt | Grain Yield |
|------------|-----------|-------------|--------------|-------------|
| | * | lbs/bu | grams | bu/A |
| SW Salute | Y | 64.5 | 240 | 82.0 |
| CDC Mozart | Y | 63.7 | 254 | 80.9 |
| SW Marquee | Y | 64.0 | 209 | 79.4 |
| Carneval | Y | 63.8 | 218 | 76.6 |
| SW Midas | Y | 64.0 | 224 | 75.9 |
| Majoret | G | 63.6 | 224 | 74.6 |
| Integra | Y | 63.6 | 265 | 72.7 |
| Nitouche | G | 63.5 | 266 | 72.4 |
| Stirling | G | 63.6 | 231 | 72.3 |
| SW Circus | Y | 64.5 | 214 | 72.0 |
| DS Admiral | Y | 64.5 | 246 | 69.2 |
| Cruiser | G | 63.7 | 210 | 64.9 |
| Journey | F | 62.2 | 201 | 61.0 |
| Trial Mean | | 63.6 | 247 | 73.6 |
| C.V. % | | 1.1 | 3.3 | 7.5 |
| LSD .05 | | 1.0 | 11 | 7.7 |
| LSD .01 | | 1.3 | 15 | 10.2 |

*Seed Type: G = Green, Y = Yellow, F = Forage
 Planting Date: May 5, 2004 Harvest Date: August 19, 2004
 Seeding rate: 250,000 live seeds/A Previous Crop: Spring Triticale

2004 Buckwheat Variety Trial – Continuously Cropped No-till, Hettinger

| Variety | Plant Stand* | Days to Bloom | Test Weight | ---- Grain Yield ---- | | | Average Yield | |
|----------------|--------------|---------------|-------------|-----------------------------|------|------|---------------|------|
| | | | | 2000 | 2003 | 2004 | 2 yr | 3 yr |
| | % | | Lbs/bu | ----- Pounds per acre ----- | | | | |
| AC Manisoba | 97 | 48 | 38.3 | 371 | 381 | 1007 | 694 | 586 |
| AC Springfield | 90 | 46 | 37.6 | 330 | 393 | 991 | 692 | 571 |
| Koto | 90 | 48 | 40.5 | 210 | 361 | 905 | 633 | 492 |
| Mancan | 89 | 48 | 39.1 | 262 | 373 | 745 | 559 | 460 |
| Koban | 79 | 48 | 37.8 | 348 | 306 | 608 | 457 | 421 |
| Manor | 72 | 48 | 39.5 | | | 732 | | |
| Trial Mean | 80 | 48 | 39.0 | 323 | 367 | 839 | -- | -- |
| C.V. % | 18.8 | 1.5 | 1.4 | 35.0 | 31.6 | 11.9 | -- | -- |
| LSD .05 | 22 | 1 | 0.8 | NS | NS | 146 | -- | -- |
| LSD .01 | 30 | 1 | 1.1 | NS | NS | 100 | -- | -- |

* Visual estimation of plant stand on July 1, 2004.
 Planting Date: May 25, 2004 Harvest Date: September 17, 2004
 Seeding Rate: 700,000 live seeds / acre.
 Previous Crop: 1999 = buckwheat, 2002 = soybean, 2003 = barley.
 Notes: The 2003 trial sustained late season heat and moisture stress. The 2004 trial sustained a hard frost on June 18 (25° F) causing plant die-back.
 NS = no statistical difference between varieties.

2004 Roundup Ready Corn - Continuously Cropped - No-till

Hettinger

| Brand | Hybrid | GDU's | | Trait | Days to Silk | Test Weight | Seed Yield | |
|------------------|--------------------|-------|----|-------|--------------|-------------|---------------|------|
| | | to BL | RM | | | | 2003 | 2004 |
| | | * | | | | Lbs/bu | - Bu / Acre - | |
| Dekalb | DKC 37-14 RR2 | 2270 | 87 | | 102 | 46.4 | 21.5 | |
| | DKC 39-47 RR2 | 2300 | 89 | | 107 | 32.1 | 7.9 | |
| | DKC 39-48 RR2/YGCB | 2300 | 89 | YG | 107 | 37.3 | 17.4 | 5.9 |
| | DKC 40-05 | 2310 | 90 | | 110 | 29.8 | 5.9 | |
| Interstate/Garst | 8905RR | 2110 | 87 | | 106 | 39.3 | 27.9 | 15.9 |
| | 8961RR | 2105 | 87 | | 106 | 42.1 | 25.8 | 6.6 |
| | 8986YG/RR | 2045 | 86 | YG | 106 | 41.2 | 17.6 | |
| | 8982RR | 2020 | 84 | | 104 | 42.8 | 12.8 | |
| | 8994RR | 1970 | 83 | | 98 | 46.0 | 23.4 | |
| | 8921YG1/RR | 2170 | 92 | YG | 109 | 38.0 | 6.0 | |
| Kaystar Seed | KX-3130RR | | 83 | | 107 | 41.5 | 13.8 | |
| | KX-4000RR/Bt | | 91 | Bt | 110 | 31.1 | 10.8 | |
| Proseed | 7902 | | 79 | Bt | 102 | 40.3 | 8.9 | |
| | M80 | | 80 | | 105 | 42.6 | 20.0 | |
| | T81 | 1950 | 81 | Bt | 105 | 42.7 | 17.2 | |
| | T82 | 1950 | 82 | | 104 | 43.8 | 32.0 | 22.1 |
| | XET83 | 2000 | 83 | Bt | 104 | 44.3 | 18.3 | |
| | S83 | 2000 | 84 | Bt | 106 | 41.4 | 21.2 | 17.9 |
| | XES86 | | 86 | Bt | 112 | 34.6 | 23.6 | 6.0 |
| REA Hybrids | 1823ARR.QR | 2103 | 82 | | 106 | 42.5 | 12.0 | |
| | 1772RR/Bt.QR | 1890 | 77 | Bt | 96 | 45.0 | 8.0 | |
| Seeds 2000 | 2842RR/Bt | 1960 | 84 | Bt | 105 | 41.6 | 18.8 | |
| | 2821RR | 1910 | 82 | | 107 | 40.6 | 11.5 | |
| Dyna-Gro | 51K95 | 2100 | 84 | | 105 | 46.8 | 21.2 | |
| | 51P88 | 2150 | 86 | | 102 | 43.4 | 15.2 | |
| Trial Mean | | | | | 105 | 41.2 | 25.2 | 13.8 |
| C.V. % | | | | | 2.2 | 7.8 | 14.9 | 29.1 |
| LSD 5% | | | | | 3 | 4.5 | 6.3 | 5.7 |
| LSD 1% | | | | | 4 | 6.1 | 8.5 | 7.5 |

*Growing Degree Units to Black Layer.

Planting Date: May 4, 2004

Harvest Date: November 6, 2004

Seeding Rate: 26,500 seeds / acre, thinned to 24,000 plants / acre.

Row Spacing: 28"

Previous Crop: 2002 = HRSW, 2003 = barley.

Notes: The 2004 trial sustained hard frosts on May 13 (18° F), May 14 (18° F) and on June 18 (25° F) and sustained relatively cool (1719 GDU's) and dry (10" precip.) growing conditions.

2004 Proso Millet Variety Trial – Continuously Cropped No-till, Hettinger

| Variety | Days to Head | Test Weight Lbs/bu | ---- Grain Yield ---- | | | Average Yield | |
|------------|--------------|-----------------------|-----------------------------|------|------|---------------|------|
| | | | 2002 | 2003 | 2004 | 2 yr | 3 yr |
| | | | ----- Pounds per acre ----- | | | | |
| Horizon | 82 | 50.2 | 1867 | 2900 | 1553 | 2226 | 2107 |
| Sunup | 80 | 45.1 | 1600 | 3067 | 1520 | 2294 | 2062 |
| Huntsman | 78 | 45.0 | 1960 | 2560 | 1427 | 1994 | 1982 |
| Minsum | 77 | 50.4 | 1289 | 2027 | 1933 | 1980 | 1750 |
| Earlybird | 81 | 43.5 | 1073 | 2620 | 1253 | 1936 | 1649 |
| Sunrise | 80 | 41.9 | 960 | 2787 | 1147 | 1967 | 1631 |
| Rise | 79 | 46.9 | 640 | 2353 | 1400 | 1876 | 1464 |
| Snowbird | 77 | 48.3 | 980 | 1780 | 1393 | 1586 | 1384 |
| Turghai | 76 | 52.9 | 693 | 1447 | 1653 | 1550 | 1264 |
| Cerise | 77 | 50.8 | 280 | 1289 | 1640 | 1464 | 1070 |
| Dawn | 78 | 48.6 | 507 | 1813 | 853 | 1333 | 1058 |
| Trial Mean | 79 | 47.6 | 1121 | 2262 | 1434 | -- | -- |
| C.V. % | 1.2 | 5.5 | 20.6 | 9.4 | 19.4 | -- | -- |
| LSD .05 | 1 | 3.8 | 335 | 308 | 402 | -- | -- |
| LSD .01 | 2 | 5.1 | 453 | 415 | 541 | -- | -- |

Planting Date: May 25, 2004 Harvest Date: September 27, 2004
 Seeding Rate: 25 lbs / acre.
 Previous Crop: 2001 = oat, 2002 & 2003 = barley.

2004 Hay Barley Variety Trial Hettinger

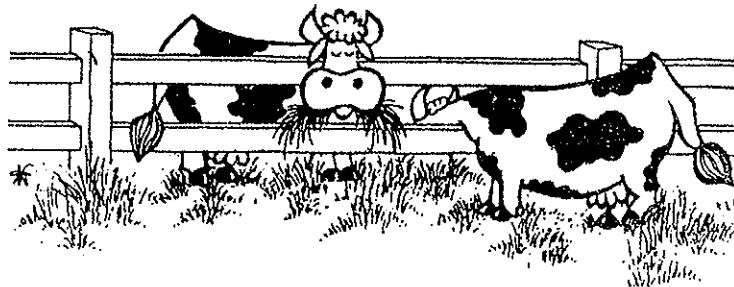
| Variety | Days to Head | Plant Height inches | Crude Protein % | ADF % | TDN % | Hay Yield | |
|------------|--------------|------------------------|--------------------|----------|----------|-----------|------|
| | | | | | | 2003 | 2004 |
| | | | | | | Tons/Ac* | |
| Westford | 87 | 24 | 21.8 | 28.1 | 70.5 | 3.41 | 2.15 |
| Bestford | 86 | 23 | 20.2 | 28.1 | 70.5 | 3.61 | 2.12 |
| Dillon | 86 | 23 | 19.2 | 26.8 | 72.0 | 4.32 | 1.96 |
| Trial Mean | 86 | 24 | -- | -- | -- | 3.86 | 2.17 |
| C.V. % | 0.9 | 4.1 | -- | -- | -- | 4.4 | 11.8 |
| LSD .05 | 1 | NS | -- | -- | -- | 0.26 | NS |

Planting Date: April 5, 2004 Harvest Date: July 14, 2004 (milk stage)
 Seeding Rate: 750,000 live seeds/acre.
 Previous Crop: soybean
 *Hay yields are adjusted to a 0% moisture basis.
 NS = no statistical difference between varieties.

2004 Oat/Barley Forage Trial -Chemical Fallow

Dickinson, ND

| Variety | Harvest | 12% | DM yield | | | |
|-------------------|----------|-----------|---------------------|------|------|----------|
| | Moisture | Moisture | 2002 | 2003 | 2004 | 2 yr avg |
| | -%- | -Tons/ac- | ----- Tons/ac ----- | | | |
| Haybet barley | 65 | 1.5 | 2.0 | 2.1 | 1.3 | 1.7 |
| Hays barley | 66 | 1.4 | -- | 2.2 | 1.2 | 1.7 |
| AC Assiniboia oat | 53 | 1.3 | -- | 1.7 | 1.1 | 1.4 |
| AC Ronald oat | 73 | 1.0 | -- | -- | 0.9 | -- |
| Ebeiftoft oat | 57 | 1.2 | -- | 1.7 | 1.1 | 1.4 |
| Ensiler oat | 68 | 1.4 | -- | 1.9 | 1.2 | 1.6 |
| Forage Plus oat | 56 | 1.5 | 1.8 | 2.2 | 1.3 | 1.8 |
| HiFi oat | 65 | 1.4 | -- | 1.5 | 1.2 | 1.4 |
| Jerry oat | 63 | 1.2 | -- | 2.0 | 1.1 | 1.6 |
| Killdeer oat | 54 | 1.5 | -- | 2.3 | 1.3 | 1.8 |
| Morton oat | 66 | 1.5 | -- | 1.9 | 1.3 | 1.6 |
| Paul oat | 50 | 1.4 | 2.0 | 1.8 | 1.2 | 1.5 |
| Stark oat | 52 | 1.4 | -- | -- | 1.3 | -- |
| Trial Mean | 58 | 1.4 | 2.0 | 1.9 | 1.2 | -- |
| C.V. % | 3.3 | 18.0 | 15.3 | 18.2 | 18.0 | -- |
| LSD .05 | 3 | 0.4 | NS | NS | 0.3 | -- |



2004 Oat/Barley Forage Trial - Chemical Fallow

Dickinson, ND

| Variety | Height --- inches --- | Harvest | DM | | | |
|----------------------------|--------------------------|-----------------------|-----------------|-----------------|----------------------|-----|
| | | Moisture ----%---- | Yield Ton/ac | CP ¹ | ADF ----- % ----- | TDN |
| Haybet barley | 20 | 65 | 1.3 | 17.6 | 31 | 65 |
| Hays barley | 17 | 66 | 1.2 | 18.5 | 31 | 65 |
| AC Assiniboia oat | 26 | 53 | 1.1 | 11.0 | 37 | 61 |
| AC Ronald oat ² | 25 | 73 | 0.9 | 17.1 | 34 | 63 |
| Ebeltoft oat | 25 | 57 | 1.1 | 12.6 | 38 | 59 |
| Ensiler oat | 29 | 68 | 1.2 | 14.2 | 40 | 58 |
| Forage Plus oat | 28 | 56 | 1.3 | 12.5 | 38 | 60 |
| HiFi oat | 26 | 65 | 1.2 | 14.1 | 38 | 59 |
| Jerry oat | 26 | 63 | 1.1 | 11.3 | 44 | 55 |
| Killdeer oat | 22 | 54 | 1.3 | 10.0 | 42 | 56 |
| Morton oat | 29 | 66 | 1.3 | 13.5 | 39 | 59 |
| Paul oat | 28 | 50 | 1.2 | 10.0 | 40 | 58 |
| Stark oat | 29 | 52 | 1.3 | 9.7 | 39 | 59 |
| Trial Mean | 24 | 58 | 1.2 | 12.7 | 38 | 60 |
| C.V. % | 9.1 | 3.3 | 18.0 | 12.1 | 5.5 | 2.7 |
| LSD .05 | 3 | 3 | 0.3 | 3.2 | 4 | 3 |

Growth Stage at harvest: Soft Dough.

¹CP=Crude Protein, ADF=Acid Detergent Fiber, TDN =Total Digestible Nutrients.²Harvested at Late Milk stage.

2004 Cool Season Forage Trial - Chemical Fallow

Dickinson, ND

| Variety | Height | Harvest | DM | | | | |
|--------------------|--------|-------------------------|-----------------|----------------------------|-----|-----|-----------------|
| | | Moisture -----%----- | Yield Ton/ac | CP ¹ ---%--- | ADF | TDN | Nitrates ppm |
| Bestford barley | 22 | 68 | 1.1 | 19.5 | 33 | 64 | 1402 |
| Harrington barley | 23 | 67 | 1.2 | 16.9 | 28 | 68 | 411 |
| Haybet barley | 21 | 66 | 1.4 | 18.6 | 29 | 66 | 546 |
| Hays barley | 18 | 67 | 1.2 | 19.8 | 32 | 65 | 580 |
| Logan barley | 24 | 66 | 1.0 | 17.2 | 27 | 69 | 321 |
| Moravain 37 barley | 17 | 64 | 1.3 | 16.8 | 27 | 68 | 297 |
| Valier barley | 22 | 66 | 1.6 | 18.6 | 27 | 68 | 649 |
| Westford barley | 22 | 69 | 1.1 | 18.7 | 35 | 62 | 1204 |
| Everleaf 114 oat | 27 | 63 | 1.4 | 13.2 | 39 | 59 | 2465 |
| Everleaf 126 oat | 25 | 65 | 1.4 | 15.0 | 36 | 61 | 2400 |
| Maverick oat | 20 | 56 | 1.4 | 9.6 | 38 | 60 | 2552 |
| Monico oat | 24 | 54 | 1.3 | 7.8 | 41 | 58 | 2277 |
| Otana oat | 30 | 59 | 1.2 | 9.7 | 40 | 58 | 2601 |
| Paul oat | 28 | 58 | 1.5 | 10.3 | 39 | 59 | 2345 |
| Lucile emmer | 30 | 59 | 1.1 | 14.2 | 39 | 60 | 497 |
| Red 1 triticale | 31 | 53 | 1.5 | 7.4 | 44 | 55 | 353 |
| SK3P speltz | 34 | 52 | 1.7 | 9.2 | 42 | 57 | 474 |
| Trial Mean | 24 | 61 | 1.3 | 14.1 | 35 | 62 | 1130 |
| C.V. % | 10.5 | 3.3 | 15.5 | 6.2 | 7.8 | 3.2 | 32.9 |
| LSD .05 | 4 | 3 | 0.3 | 1.8 | 6 | 4 | 777 |

Growth Stage at harvest: Soft Dough.

¹CP=Crude Protein, ADF=Acid Detergent Fiber, TDN =Total Digestible Nutrients.

Everest Herbicide + Tank Mix Additives in Spring Wheat at Hettinger

Reeder hard red spring wheat was seeded on April 15. Treatments were applied to 3 ½ leaf wheat and to tillering Japanese brome, downy brome that was heading and to 2 ½ leaf wild oats on May 20 with 43°F, 94 % RH, clear sky and 2 mph NW wind. Treatments were applied with a tractor mounted CO² propelled plot sprayer delivering 10 gpa at 40 psi through 8001.5 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. 10 oz/A 2,4-D + 0.5 oz/A Aim was applied on May 28 to control broadleaf weeds. The trial sustained frost on May 13 (16°F) and on June 18 (25°F), and received a total of 5.4 inches of growing season rainfall (April 1 - July 31). Populations of downy brome and wild oats were not uniform across the trial. Evaluations for crop injury were on June 3, and for weed control on June, 17 and July 13. The trial was not harvested.

| Treatment | Rate | June 6 | June 17 | | July 13 | | | |
|--------------------------|-------------------|--------|-----------------------|------|---------|------|------|--|
| | | HRSW | Jabr | dobr | Jabr | dobr | wiot | |
| Product + Additive* | oz/A | | ----- % Control ----- | | | | | |
| 1 Everest | 0.30 | 2.5 | 99 | 74 | 96 | 75 | 98 | |
| 2 Everest | 0.15 | 0.5 | 99 | 99 | 93 | 65 | 96 | |
| 3 Everest + NIS | 0.15 + 0.25% | 3.8 | 99 | 70 | 95 | 90 | 96 | |
| 4 Everest + MVO | 0.15% + 1% | 0.5 | 99 | 20 | 96 | 25 | 96 | |
| 5 Everest + AMS | 0.15 + 1% | 2.5 | 98 | 70 | 93 | 50 | 90 | |
| 6 Everest + UAN | 0.15 + 1% | 1.2 | 99 | 80 | 99 | 85 | 99 | |
| 7 Everest + NIS + AMS | 0.15 + 0.25% + 1% | 5.0 | 94 | 85 | 99 | 80 | 99 | |
| 8 Everest + MSO + AMS | 0.15 + 1% + 1% | 2.5 | 99 | 50 | 99 | 25 | 99 | |
| 9 Everest + Puma | 0.15 + 2.0 | 3.8 | 99 | 90 | 95 | 90 | 99 | |
| 10 Everest + Discover NG | 0.15 + 3.0 | 2.5 | 98 | 58 | 98 | 65 | 99 | |
| 11 Everest + Silverado | 0.15 + 0.6 | 1.2 | 99 | 80 | 98 | 90 | 99 | |
| 12 Untreated | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| C.V. % | | 104 | 3.1 | 58.0 | 4.9 | 36.0 | 4.2 | |
| LSD 5% | | NS | 4 | NS | 7 | NS | 6 | |

*Tank mix additive: NIS = non-ionic surfactant, MVO = methylated vegetable oil, AMS = ammonium sulfate, UAN = urea ammonium nitrate.

Summary

Crop injury was relatively minor for all herbicide treatments. All Everest treatments provided excellent season long Japanese brome and wild oat control regardless of tank mix additive. The addition of Puma or Silverado to Everest may enhance the control of downy brome.

Late Fall and Early Spring Pre-plant Applications of Everest Herbicide in Spring Wheat.

Fall treatments (trts 2,3 and 4) were applied on October 15, 2003. Early pre-plant treatments (trts 9 and 10) were applied on March 24, 2004 and a pre-plant treatment (trt 8) was applied on April 14. Pre-emergence treatments (trts 5,6 and 7) were applied on April 20. Sequential (trts 4 and 7) and post-emergence treatments (trts 10,11 and 12) were applied to 3 ½ leaf wheat, to 2 ½ leaf wild oats and to tillering Japanese brome on May 20 with 43°F, 94 % RH, clear sky and 2 mph NW wind. Reeder hard red spring wheat was seeded into no-till HRSW stubble on April 15. All treatments were applied with a tractor mounted CO² propelled plot sprayer delivering 10 gpa at 40 psi through 8001.5 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. 10 oz/A 2,4-D + 0.5 oz/A Aim was applied on May 28 to control broadleaf weeds. Wild oat and Japanese brome populations were 1 and 4 plants per sq. ft, respectively. The trial sustained frost on May 13 (16°F) and on June 18 (25°F), and received a total of 5.4 inches of growing season rainfall (April 1 - July 31). Evaluations for crop injury were on June 6, and for weed control on June 17 and July 13. The trial was harvested on August 6.

| Treatment | Rate | Timing | June 6 | 6/17 | July 13 | 8/6 | |
|----------------------|-----------|-----------------|-----------------------|------|---------|------|-------|
| | | | HRSW | Jabr | Jabr | Wiot | Yield |
| | oz/A | | ----- % Control ----- | | | | bu/A |
| 1 Untreated | 0 | | 0 | 0 | 0 | 0 | 14.6 |
| 2 Everest | 0.6 | Fall | 0 | 98 | 99 | 91 | 19.7 |
| 3 Everest | 0.3 | Fall | 0 | 98 | 99 | 82 | 16.5 |
| 4 Everest / Everest | 0.3 / 0.3 | Fall / POST | 0 | 99 | 99 | 97 | 14.3 |
| 5 Everest | 0.6 | PE | 0 | 99 | 99 | 94 | 15.3 |
| 6 Everest | 0.3 | PE | 1 | 99 | 97 | 76 | 16.6 |
| 7 Everest / Everest | 0.3 / 0.3 | PE / POST | 1 | 99 | 99 | 98 | 15.1 |
| 8 Everest | 0.6 | PP | 0 | 96 | 97 | 82 | 15.0 |
| 9 Everest | 0.3 | Early PP | 2 | 99 | 99 | 82 | 14.2 |
| 10 Everest / Everest | 0.3 / 0.3 | Early PP / POST | 4 | 99 | 99 | 94 | 15.1 |
| 11 Everest | 0.3 | POST | 2 | 99 | 99 | 96 | 16.1 |
| 12 Everest | 0.6 | POST | 2 | 99 | 99 | 99 | 13.6 |
| C.V. % | | | 178 | 2.5 | 1.6 | 5.4 | 14.6 |
| LSD 5% | | | NS | 3 | 2 | 6 | NS |

Summary

Crop injury was relatively minor on all herbicide treatments. All Everest treatments provided excellent Japanese brome control regardless of application rate or the timing of the application. The higher application rate (0.6 oz/A) provided excellent season long wild oat control with the exception of the pre-plant treatment (trt 8). The lower application rate (0.3 oz/A) did not provide adequate season long wild oat control except when applied post-emergence. Sequential applications (trts 4, 7 and 10) did not significantly enhance weed control compared to the post-applied treatments (trts 11 and 12). Grain yields were poor and reflected weather conditions rather than herbicide treatments.

2004 Control of Japanese Brome in Spring Wheat at Hettinger. (Eriksmoen) Reeder hard red spring wheat was seeded on April 15. Treatments 1 - 8 were applied to 3 ½ leaf wheat and to Japanese brome that was tillering on May 20 with 43° F, 94% RH, clear sky and 2 mph NW wind. Sequential treatments 7 and 8 were applied to 4 leaf wheat and to tillering Japanese brome on May 28 with 54° F, 91% RH, clear sky and calm wind. All treatments were applied with a tractor mounted CO² propelled plot sprayer delivering 10 gpa at 40psi through 8001.5 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. Japanese brome population was 4 plants per sq. foot. The trial sustained frost on May 13 (16° F) and on June 18 (25° F), and received a total of 5.4 inches of growing season rainfall (April 1 - July 31). Evaluations for crop injury were on June 6 and for Japanese brome control on June 17 and July 13. The trial was not harvested.

| Treatment | Rate | 6/6 | 6/17 | 7/13 |
|--|----------------------|-----------------------|------|------|
| | | HRSW | Jabr | Jabr |
| | oz/A | ----- % Control ----- | | |
| 1 Assert + Bronate Adv. + MSO | 16 + 12.8 + 24 | 2.5 | 83 | 65 |
| 2 Everest + Bronate Adv + Basic Blend | 0.45 + 12.8 + 1% | 1.2 | 98 | 99 |
| 3 Silverado + Bronate Adv. + MSO | 1.75 + 12.8 + 1% | 0 | 92 | 75 |
| 4 Discover NG + Bronate Adv. | 12.8 + 12.8 | 1.2 | 20 | 25 |
| 5 Puma + Bronate Adv. | 10.6 + 12.8 | 0 | 23 | 7 |
| 6 Achieve + Bronate Adv. + S'Chrg + AMS | 7.25+ 12.8+ 0.5%+ 1% | 1.2 | 33 | 43 |
| 7 Everest + Basis Blend / Discover NG + Bronate Adv. | 0.16 + 1% / 4 + 12.8 | 5 | 98 | 98 |
| 8 Silverado + MSO / Discover NG + Bronate Adv. | 0.58 + 1% / 4 + 12.8 | 0 | 25 | 26 |
| 9 Untreated | 0 | 0 | 0 | 0 |
| C.V. % | | 215 | 60.5 | 60.3 |
| LSD 5% | | NS | 47 | 44 |

Summary

Crop injury was minor for all herbicide treatments. Treatments containing Everest (trts 2 and 7) had excellent season long control of Japanese brome. Treatments 1 and 3 also provided significant Japanese brome control over the untreated check. All other treatments showed relatively minor activity on Japanese brome.

Discover NG Herbicide Tank Mixes in Spring Wheat at Hettinger

Reeder hard red spring wheat was seeded on April 15. Treatments were applied to 3 ½ leaf wheat and to 2 ½ leaf wild oats on May 20 with 43°F, 94 % RH, clear sky and 2 mph NW wind. Treatments were applied with a tractor mounted CO² propelled plot sprayer delivering 10 gpa at 40 psi through 8001.5 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. 10 oz/A 2,4-D + 0.5 oz/A Aim was applied on May 28 to control broadleaf weeds. Wild oat populations were 3 plants per sq. foot. A strip of quackgrass was observed in one rep and data was collected from those plots. The trial sustained frost on May 13 (16°F) and on June 18 (25°F), and received a total of 5.4 inches of growing season rainfall (April 1 - July 31). Evaluations for crop injury were on June 3, and for weed control on July 13. The trial was harvested on August 6.

| Treatment | Rate | June 6 | July 13 | 8/6 | |
|--|-----------------------|-----------------------|---------|------|-------|
| | | HRSW | Wiot | Qugr | Yield |
| Product | oz/A | ----- % Control ----- | | | bu/A |
| 1 Discover NG | 12.8 | 2.5 | 98 | 95 | 13.9 |
| 2 Discover NG + Bronate Adv. | 12.8 + 12.8 | 3.8 | 99 | 0 | 16.9 |
| 3 Discover NG + Bronate Adv. + Quilt | 12.8 + 12.8 + 7 | 1.2 | 99 | 90 | 19.4 |
| 4 Discover EC + DSV + Bronate Adv. + Quilt | 3.2 + 10.2 + 12.8 + 7 | 0 | 99 | 95 | 12.7 |
| 5 Discover NG + WideMatch | 12.8 + 12 | 0 | 99 | 95 | 12.8 |
| 6 Discover NG + Harmony GT + MCPE | 12.8 + 0.3 + 12 | 0 | 99 | 50 | 14.0 |
| 7 Discover NG + Harmony GT + Starane | 12.8 + 0.3 + 5.28 | 1.2 | 99 | 90 | 13.1 |
| 8 Discover NG + Starane + Affinity | 12.8 + 5.28 + 0.6 | 1.2 | 99 | 80 | 12.4 |
| 9 Discover NG + Clarity + MCPE | 12.8 + 2 + 8 | 2.5 | 99 | 85 | 13.3 |
| 10 Puma + Bronate Adv. | 10.56 + 12.8 | 0 | 99 | 0 | 15.5 |
| 11 Untreated | 0 | 0 | 0 | 0 | 12.6 |
| C.V. % | | 164 | 0.7 | -- | 11.7 |
| LSD 5% | | NS | 1 | -- | 2.4 |

Summary

Crop injury was minor for all herbicide treatments. All herbicide treatments and tank mix combinations provided excellent season long wild oat control. Very good quackgrass control was observed although the Discover Herbicide label does not list any activity on this weed. Additional studies are needed to verify this control. Although significant differences in grain yield were observed, these differences did not correspond with crop injury or weed control. Grain yields were poor and probably reflected weather conditions rather than effects of the herbicide treatments.

Broadleaf Weed Control in Spring Wheat at Hettinger. Reeder hard red spring wheat was seeded on April 15. Treatments were applied to 3 ½ leaf wheat, to 2 leaf wild buckwheat and to ½ inch tall kochia on May 20 with 43°F, 94% RH, clear sky and 2 mph NW wind. Treatments were applied with a tractor mounted CO² propelled plot sprayer delivering 10 gpa at 40 psi through 8001.5 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. Wild buckwheat and kochia populations were 0.3 and 1 plants per sq. foot, respectively. The trial sustained frost on May 13 (16°F) and on June 18 (25°F), and received a total of 5.4 inches of growing season rainfall (April 1 - July 31). Evaluations for crop injury were on June 3 and for weed control on July 13. The trial was not harvested.

| Treatment | Rate | June 6 July 13 | | |
|--------------------------------|------------|-----------------------|------|------|
| | | HRSW | Wibw | kocz |
| Product | oz/A | ----- % Control ----- | | |
| 1 Salvo | 16 | 0 | 80 | 45 |
| 2 Sward | 12.3 | 0 | 33 | 60 |
| 3 Bronate Advance | 12.8 | 0 | 99 | 99 |
| 4 Aim + Salvo | 0.5 + 12.8 | 3.8 | 50 | 92 |
| 5 Aim + Clarity | 0.5 + 2 | 0.5 | 96 | 83 |
| 6 Aim + Harmony XP | 0.5 + 0.3 | 0 | 65 | 28 |
| 7 WideMatch | 16 | 0 | 98 | 83 |
| 8 WideMatch | 11 | 1.2 | 99 | 99 |
| 9 WideMatch + Aim | 11 + 0.5 | 0 | 99 | 99 |
| 10 WideMatch + Harmony XP | 11 + 0.3 | 0 | 99 | 99 |
| 11 WideMatch + Express XP | 11 + 0.24 | 0 | 94 | 98 |
| 12 WideMatch + Bronate Advance | 11 + 9.6 | 0 | 99 | 99 |
| 13 Untreated | 0 | 0 | 0 | 0 |
| C.V. % | | 242 | 35.7 | 35.1 |
| LSD 5% | | 1.5 | 47 | 45 |

Summary

Crop injury was relatively minor for all herbicide treatments. Bronate Advance (trt 3), Aim + Clarity (trt 5) and WideMatch treatments (trts 7 - 12) provided excellent wild buckwheat control. Bronate Advance (trt 3), Aim + Salvo (trt 4) and Widematch treatments (trts 8 - 12) provided excellent kochia control. Salvo and Sward treatments (trts 1 and 2) were deficient in providing both wild buckwheat and kochia control. The tank mix combination of Aim + Harmony XP may have antagonistic affects on broadleaf weed control.

Broadleaf Weed Control with ET Herbicide in Spring Wheat at Hettinger. Reeder hard red spring wheat was seeded on April 15. Treatments were applied to 4 leaf wheat, to ½" tall kochia, 5 leaf dandelion, 2" tall wild buckwheat, 1" tall Russian thistle, 4" long field bindweed and to 6" tall alfalfa on May 28 with 54°F, 91% RH, clear sky and calm wind. Treatments were applied with a tractor mounted CO² propelled plot sprayer delivering 10 gpa at 40 psi through 8001.5 flat fan nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The experiment was a randomized complete block design with four replications. Kochia, dandelion, wild buckwheat, Russian thistle, field bindweed and alfalfa populations were 50+, 0.75, 1, 3, 0.25 and 0.1 plants per sq. foot, respectively. The trial sustained frost on May 13 (16°F) and on June 18 (25°F), and received a total of 5.4 inches of growing season rainfall (April 1 - July 31). Evaluations for crop injury were on June 3 and July 13, and for weed control on June 17 and July 13. The trial was not harvested.

| Treatment | Rate | June 3 | | June 17 | | | | July 13 | | |
|--------------------------|--------------------|-----------------------|------|---------|------|------|------|---------|------|------|
| | | HRSW | kocz | fibw | dand | ruth | alfa | wibw | HRSW | kocz |
| | oz/A | ----- % Control ----- | | | | | | | | |
| 1 Untreated | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 ET | 0.5 | 1.2 | 62 | 63 | 59 | 60 | 65 | 82 | 0 | 22 |
| 3 ET | 1.5 | 7.5 | 74 | 40 | 65 | 84 | -- | 81 | 5.0 | 65 |
| 4 ET + MVO | 0.5 + 1% | 7.5 | 72 | 47 | 58 | 88 | 33 | 90 | 5.0 | 30 |
| 5 ET + MVO | 1.5 + 1% | 13.8 | 92 | 40 | 75 | 96 | 68 | 81 | 5.0 | 80 |
| 6 ET + NIS | 0.5 + 0.25% | 1.2 | 65 | 69 | 78 | 93 | 65 | 87 | 5.0 | 50 |
| 7 ET + NIS | 1.5 + 0.25% | 5.5 | 89 | 37 | 38 | 96 | -- | 63 | 7.5 | 54 |
| 8 ET + 2,4-D ester + NIS | 0.5 + 8 + 0.25% | 14.2 | 89 | 94 | 94 | 96 | 90 | 95 | 10.0 | 68 |
| 9 ET + Clarity + NIS | 0.5 + 2 + 0.25% | 3.0 | 94 | 90 | 91 | 96 | 90 | 93 | 5.0 | 94 |
| 10 ET+Bronate Adv.+NIS | 0.5 + 12.8 + 0.25% | 11.2 | 96 | 90 | 89 | 99 | 90 | 99 | 0.0 | 82 |
| 11 ET+Harmony GT+NIS | 0.5 + 0.3 + 0.25% | 5.0 | 76 | 40 | 68 | 97 | 50 | 97 | 10.0 | 40 |
| 12 ET + 2,4-D ester | 1.5 + 8 | 7.5 | 81 | 85 | 91 | 96 | 92 | 92 | 1.2 | 70 |
| 13 ET + Clarity | 1.5 + 2 | 6.8 | 93 | 78 | 89 | 94 | 95 | 95 | 0.0 | 92 |
| 14 ET + Bronate Advance | 1.5 + 12.8 | 15.0 | 96 | 70 | 81 | 97 | 87 | 99 | 16.2 | 92 |
| 15 ET+Harmony GT+NIS | 1.5 + 0.3 + 0.25% | 10.0 | 92 | 20 | 87 | 99 | 65 | 98 | 2.5 | 79 |
| 16 2,4-D ester | 8 | 6.2 | 58 | 83 | 79 | 94 | 92 | 86 | 8.8 | 55 |
| 17 Clarity | 2 | 6.8 | 90 | 40 | 35 | 70 | -- | 90 | 21.2 | 66 |
| 18 Bronate Advance | 12.8 | 4.2 | 84.8 | 87 | 80 | 97 | -- | 97 | 0.0 | 86 |
| 19 Harmony GT + NIS | 0.3 + 0.25% | 3.8 | 28 | 15 | 45 | 90 | 60 | 92 | 15.0 | 48 |
| C.V. % | | 89.8 | 17.8 | 30.3 | 29.5 | 15.5 | 21.3 | 14.7 | 166 | 35.9 |
| LSD 5% | | 8.8 | 19 | 24 | 29 | 19 | 23 | 18 | NS | 31 |

Summary

Crop injury was observed on all herbicide treatments on June 3. This injury tended to diminish over time except for Harmony GT treatments 15 and 19 and Clarity treatment 17 which tended to increase. Kochia control was significantly higher for the higher rate of ET herbicide alone (trt 3) and ET + adjuvant (trts 5 and 7) than for the lower rate of ET herbicide alone (trt 2) or ET + adjuvant (trts 4 and 6). Weed control tended to not be as rate dependant for ET herbicide when applied in a tank mix. The addition of either a non-ionic surfactant (NIS) or methylated vegetable oil (MVO) to ET herbicide tended to enhance weed control. All tank mix combinations (trts 8 - 15) tended to have enhanced weed control over individual components applied alone.

Varietal Tolerance to Treflan Herbicide at Hettinger. (Eriksmoen)

| HRSW | 2004 | 2003 | 2002 | 2000 | Durum | 2004 | 2003 | 2002 | 2000 |
|-------------|------|------|------|------|-------------|------|------|------|------|
| Keene | 0 | 0 | 0 | 0 | Rugby | + | 0 | 0 | 0 |
| Russ | + | 0 | 0 | + | Monroe | + | 0 | 0 | 0 |
| Oxen | 0 | 0 | 0 | 0 | Renville | 0 | 0 | 0 | 0 |
| Gunner | 0 | 0 | 0 | 0 | Munich | 0 | 0 | 0 | 0 |
| Reeder | + | 0 | 0 | 0 | Ben | 0 | 0 | 0 | + |
| Parshall | 0 | 0 | 0 | 0 | Belzer | 0 | 0 | 0 | 0 |
| Ingot | + | 0 | 0 | 0 | Maier | 0 | 0 | 0 | 0 |
| Norpro | 0 | 0 | 0 | + | Mountrail | 0 | 0 | 0 | 0 |
| Mercury | 0 | 0 | ? | 0 | Pierce | + | 0 | 0 | 0 |
| Alsen | 0 | 0 | 0 | 0 | Dilse | + | 0 | 0 | 0 |
| Knudson | + | 0 | + | | Lebsock | 0 | 0 | 0 | 0 |
| AC Superb | 0 | 0 | 0 | | Plaza | + | 0 | 0 | 0 |
| Briggs | 0 | 0 | 0 | | AC Avonlea | 0 | 0 | | |
| Hanna | 0 | 0 | 0 | | Primo D'Oro | 0 | | | |
| Dapps | 0 | 0 | 0 | | 1AS/1D2 | | | | 0 |
| Granite | + | 0 | 0 | | AC Melita | | | | 0 |
| Outlook | 0 | 0 | 0 | | Plenty | | | | 0 |
| Steele ND | 0 | 0 | 0 | | Kari | | | | 0 |
| AC Amizon | 0 | 0 | | | Dressler | | | | 0 |
| Laser | 0 | 0 | | | | | | | |
| Freyer | 0 | | | | | | | | |
| Banton | 0 | | | | | | | | |
| Trooper | + | | | | | | | | |
| Dandy | | 0 | + | + | | | | | |
| McKenzie | | 0 | 0 | 0 | | | | | |
| Keystone | | 0 | 0 | | | | | | |
| Zeke | | 0 | + | | | | | | |
| Hank | | 0 | 0 | | | | | | |
| AC Corinne | | 0 | | | | | | | |
| AC Glenavon | | 0 | | | | | | | |
| Walworth | | | 0 | | | | | | |
| Ernest | | | | 0 | | | | | |
| Butte 86 | | | | + | | | | | |
| Ivan | | | | + | | | | | |
| Grandin | | | | + | | | | | |
| Aurora | | | | + | | | | | |
| Conan | | | | + | | | | | |
| Scholar | | | | + | | | | | |

Application Date: 4/3/04, 4/1/03, 4/11/02, 4/4/00

Seeding Date: 4/5/04, 4/8/03, 4/11/02, 4/4/00

Application Rate: 0.75 lb/a ai (1.5 pt/A product)

Stand reduction: + = susceptible, 0 = tolerant

HRSW Varietal Tolerance to Far-Go Herbicide at Hettinger. (Eriksmoen)

| Variety | 5/26/04 | 6/10/03 | 5/24/02 | 5/22/01 | 5/22/00 | 6/9/99 | 5/26/98 | 6/18/97 | 6/20/96 | 6/9/95 |
|------------------|---------|---------|---------|---------|---------|--------|---------|---------|---------|--------|
| Keene | 0 | 0 | + | + | 0 | 0 | + | 0 | + | 0 |
| Russ | 0 | 0 | 0 | 0 | 0 | 0 | ? | 0 | 0 | 0 |
| Oxen | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gunner | 0 | 0 | 0 | + | 0 | 0 | 0 | 0 | + | |
| Reeder | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Parshall | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Ingot | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| Norpro | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| Mercury | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| Alsen | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| Dapps | 0 | 0 | + | + | ? | 0 | | | | |
| Knudson | 0 | + | 0 | + | | | | | | |
| AC Superb | 0 | ? | 0 | + | | | | | | |
| Briggs | 0 | 0 | 0 | 0 | | | | | | |
| Hanna | 0 | 0 | 0 | 0 | | | | | | |
| Granite | + | 0 | ? | | | | | | | |
| Outlook | + | 0 | + | | | | | | | |
| Steele ND | 0 | 0 | 0 | | | | | | | |
| Laser | + | 0 | | | | | | | | |
| AC Amazon | 0 | 0 | | | | | | | | |
| Freyer | 0 | | | | | | | | | |
| Banton | 0 | | | | | | | | | |
| Trooper | 0 | | | | | | | | | |
| Dandy | | 0 | 0 | 0 | 0 | 0 | | | | |
| McKenzie | | 0 | 0 | + | + | 0 | | | | |
| Keystone | | + | 0 | 0 | | | | | | |
| Zeke | | 0 | 0 | 0 | | | | | | |
| Hank | | 0 | 0 | | | | | | | |
| AC Corinne | | 0 | | | | | | | | |
| AC Glenavon | | 0 | | | | | | | | |
| Walworth | | | 0 | 0 | | | | | | |
| Grandin | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ivan | | | | + | + | 0 | + | | | |
| Butte 86 | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| 2375 | | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| Ernest | | | | | + | 0 | ? | 0 | + | 0 |
| AC Barrie | | | | | | 0 | ? | 0 | + | + |
| Argent | | | | | | 0 | 0 | 0 | 0 | 0 |
| Amidon | | | | | | 0 | + | + | + | + |
| Trenton | | | | | | 0 | 0 | 0 | 0 | 0 |
| Hammer | | | | | | 0 | + | 0 | + | + |
| Application Date | 4/3 | 4/1 | 4/11 | 4/16 | 3/27 | 4/12 | 4/3 | 4/3 | 4/18 | 3/24 |
| Seeding Date | 4/5 | 4/8 | 4/11 | 4/17 | 4/4 | 4/13 | 4/8 | 4/29 | 4/19 | 4/7 |
| Rate (product) | 3 pt | 3 pt | 3 pt | 3 pt | 3 pt | 3 pt | 3 pt | 3 pt | 2 pt | 2 pt |

Stand reduction: + = susceptible, ? = questionable, 0 = tolerant

2004 Small Grain Variety Tolerance to ET Herbicide at Hettinger. Varieties of HRSW, durum, barley and oat were seeded on April 5. ET Herbicide was applied at rates of 1 ounce and 2 ounces pre acre to 4 leaf small grain varieties on May 27 with 59° F, 68% RH, clear sky and 3 mph W wind. Treatments were applied with a pickup mounted sprayer delivering 20 gpa at 40 psi through 8004 flat fan nozzles to a 6 foot wide area the width of 11 by 120 foot plots. The experiment was not replicated. Varieties were evaluated for crop injury on May 29, June 4 and on June 22.

| HRSW | Durum | Barley | Oat |
|-----------|-------------|-------------|---------------|
| Oxen | Rugby | Morex | AC Assiniboia |
| Mercury | Monroe | Robust | Beach |
| Parshall | Renville | Excel | Buff |
| Reeder | Munich | Stander | CDC Dancer |
| Alsen | Ben | Foster | Ebeltoft |
| Briggs | Belzer | Drummond | AC Gwen |
| Granite | Maier | Lacey | Hyttest |
| Dapps | Mountrail | Legacy | HiFi |
| Keene | Lebsock | Tradition | Jerry |
| Gunner | Plaza | Bowman | AC Kaufman |
| Russ | Pierce | Conlon | Killdeer |
| Ingot | Dilse | Eslick | AC Medallion |
| Norpro | AC Avonlea | Harrington | Monida |
| AC Amizon | Primo D'Oro | Logan | Morton |
| AC Superb | | AC Metcalfe | Otana |
| Knudson | | Stark | CDC Pacer |
| Hanna | | Valier | AC Pinnacle |
| Steele ND | | Haxby | Paul |
| Freyr | | | Reeves |
| Banton | | | AC Ronald |
| Laser | | | Sesqui |
| Outlook | | | Stark |
| Trooper | | | Youngs |

Summary

All varieties exhibited severe leaf chlorosis and necrosis on May 29. New plant growth was evident on all varieties on June 4. There was no noticeable injury (plant stunting, head deformity, leaf chlorosis or necrosis) to any variety on June 22.

Foliar Fungicide Application and Timing Guidelines

Roger Ashley and Dwain Barondeau

Southwest North Dakota is known for its production of quality hard red spring wheat. This is due in part to weather conditions that can be characterized as dry during mid-grain fill to maturity. These conditions inhibit the presence and severity of various foliar diseases. Wheat is often grown continuously or in “stacked” rotations in southwest North Dakota resulting in 65% of the wheat grown in fields that had been in wheat the previous year (McMullen, 2004). In addition to wheat intense rotations, producers have moved to reduced-till and no-till systems that have helped improve grain yields through improved water retention and reduced soil erosion.

Tan spot (*Pyrenophora tritici-repentis*), a fungal disease, primarily attacks winter wheat, spring wheat, durum, bromegrass species, wheatgrass species, and rye but barley appears to be resistant and oat is immune to this disease. Tan spot persists on host residue and will release spores while growing on residue during the current and following growing season. The incidence of infections in wheat is directly related to the proximity of the wheat plant to infected host residues. Spore production, releases and germination on host plants are promoted by rain or dew from a few to several hours. Spores require about a 6 to 48 hour wet period after they land on the leaf or stem of a susceptible host before they germinate and infect the plant. This disease can easily be controlled through crop rotation with non-host crops. Clean tillage will reduce the incidence and severity of infection but considering infection can occur from spores carried in the wind from plant tissue in adjacent areas and yield loss from tillage, this option is generally considered not very practical for southwestern North Dakota.

Fungicides applications in the eastern part of North Dakota have been used to protect the flag-leaf of the crop from infection. Early experiments in southwest North Dakota where the foliar fungicide was applied to the crop at flag-leaf have shown little or no response in terms of yield. This may have been due to low yield potential or conditions that did not favor infection. Demonstrations in 2000 and 2004 have provided producers an opportunity to learn to recognize conditions of when foliar fungicides are needed.

During the growing season in 2000, Tilt (propiconazole) fungicide was applied at the 2 Fl oz/acre rate to hard red spring wheat at the four- to six-leaf growth stage in three fields in southwest North Dakota with various cropping histories (Table 1). Precipitation during the growing seasons for three sites is presented in Table 2. In a field where continuous wheat was grown near Huff, ND, significant differences in yield and test weight were detected between the Tilt and Check treatments (Table 3). A significant difference in test weight was detected in a continuous wheat field near Regent. No significant difference was detected in yield or test weight where wheat was grown in rotation with non-host crops.

During the 2004 growing season, Stratego (propiconazole + trifloxystrobin), Folicur (tebuconazole), Headline (pyraclostrobin), and Tilt fungicides were applied at the three- to five-leaf development stage of the crop and the only flag-leaf application made was Stratego at two application rates (Table 4). Grain yield from the early-applied Folicur treatment was not significantly better than the Check. Folicur is not registered for the control of tan spot in wheat but is registered for the control of Fusarium head rot. Grain yield for the early season application of Stratego was significantly higher than the Check treatment though not significantly different to the early season application of Headline. No significant grain yield improvement with either the high or low rates of Stratego at flag-leaf or the Check was detected.

Foliar fungicides should be applied only if they are expected to provide a grain yield sufficient to support the cost of the application and a return to the producer’s labor and management. Southwest North Dakota producers should only consider the application of a foliar fungicide to control tan spot under the following conditions. 1) Wheat is grown following wheat in a reduced-till or no-till system. Wheat following non-host crops will not have the spore levels nor develop the severity of the disease to cause economic infections. Though high wheat residue levels in reduced-till and no-till systems harbor tan spot, crop residue left in place will provide greater benefit than the damage caused by tan spot. 2) Wheat yields are expected to be at least 35 to 40 bushels per acre. Producers who do not regularly obtain grain yields of 35 bushel per acre or higher probably have other problems which will overshadow losses caused by tan spot. These problems may include planting a non-adapted or low-yielding variety, low fertility, poor weed control, drought, etc. 3) Application of fungicide can be made at the three- to five leaf stage of crop development. Weather conditions during the early part of the growing season are generally cool and moist. The fungus does best at temperatures in the range of 55 to 65°F and infections are initiated when spores on wheat leaves are exposed to rain and dew for a minimum of six hours. Wheat spikelet formation, which occurs at the 4-to 5 ½-leaf stage, is very sensitive to stress conditions. Disease can cause stress. A flag-leaf application of foliar fungicide protects the flag-leaf but does nothing towards protecting the plant during early head development.

If Stratego fungicide is tank mixed with an herbicide, no additional application cost will be generated other than the cost of the fungicide, about \$4.60 per acre (\$146/gallon). Given the above conditions for foliar fungicide application are met producers should expect about four extra bushels per acre above what the field would produce without the foliar fungicide or about \$7.40 per acre given a wheat price of \$3.00 per bushel.

Table 1. Cropping history, wheat variety, crop stage, and disease rating at fungicide application, 2000.

| Location | Cropping history | Hard red spring wheat variety – 2000 | Fungicide application date | Crop stage fungicide application | Disease rating at application ¹ |
|----------|--|--------------------------------------|----------------------------|----------------------------------|--|
| Beach | 1999 sunflower 1998 wheat 1997 mustard | Ernest | 5/10/00 | Haun 4.0 – 5.0 | % Incidence 10 Severity < 1 |
| Huff | 1999 wheat 1998 wheat 1997 barley | Oxen | 5/26/00 | 4.0 – 5.0 | Incidence 70 Severity 15 |
| Regent | 1999 wheat 1998 wheat 1997 wheat | 2398 | 5/19/00 | 4.5 – 5.2 | Incidence 60 Severity 10 |

¹ This is a combined rating for tan spot (*Pyrenophora tritici-repentis*) and septoria leaf blotch (*Septoria nordorum*) at the four-to six-leaf stage.

Table 2. Precipitation received at Beach, Regent, and Mandan for the months of May through August, 2000.

| Month | Beach ¹ | Mandan ² | Regent ³ |
|--------------------|--------------------|---------------------|---------------------|
| ----- inches ----- | | | |
| May | 1.39 | 2.73 | 1.74 |
| June | 1.08 | 5.69 | 2.25 |
| July | 4.58 | 5.80 | 2.10 |
| August | 0.58 | 1.30 | 0.37 |
| Total May - August | 7.63 | 15.52 | 6.46 |

¹ North Dakota Agricultural Weather Network site near Beach.

² National Oceanic and Atmospheric Administration site at the Mandan Experiment Station.

³ Rainwise self tipping bucket and Hobo® event logger on site.

Table 3. Yield and test weight of hard red spring wheat treated with Tilt in the four- to six-leaf stage at Beach, Huff, and Regent, ND, 2000.

| Treatment | ----Beach---- | | ---- Huff ---- | | ---- Regent ---- | |
|-------------------|---------------|-------------|----------------|-------------|------------------|-------------|
| | Yield | Test weight | Yield | Test weight | Yield | Test weight |
| | bu/acre | lb/bu | bu/acre | lb/bu | bu/acre | lb/bu |
| Tilt | 45.3 | 63.6 | 61.2 | 61.5 | 40.8 | 62.5 |
| Check | 45.2 | 63.6 | 54.3 | 59.5 | 36.3 | 59.9 |
| Mean | 45.2 | 63.6 | 57.8 | 60.5 | 38.5 | 61.2 |
| CV% | 3.6 | -- | 3 | 1.2 | 5.8 | 1.1 |
| LSD ₀₅ | NS | NS | 3.9 | 1.6 | NS | 1.6 |

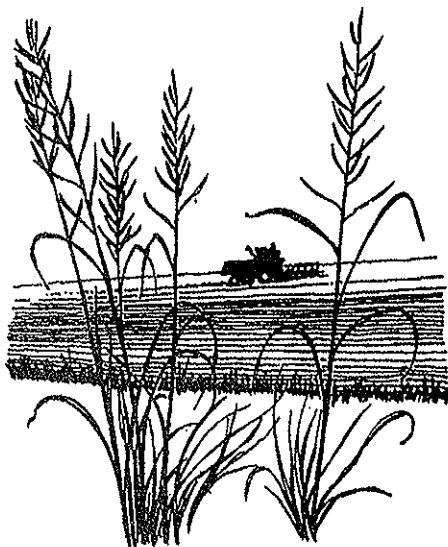
Table 4. Foliar fungicide application for the control of tan spot in Reeder hard red spring wheat on the Vernon Mayer Farm, Regent, 2004.

| Treatment ¹ | ---Early Season Evaluation ² --- | | | --- Late Season Evaluation ³ --- | | | --- Grain --- | |
|------------------------|---|-----------|----------|---|-----------|----------|---------------|-------------|
| | Crop Injury | Incidence | Severity | Crop Injury | Incidence | Severity | Yield | Test weight |
| | % | % | % | % | % | % | bu/a | lb/bu |
| Check | 0 | 85.0 | 13.0 | 0.00 | 100 | 27.8 | 41.9 | 60.4 |
| Stratego 5 floz/FGS2 | 0 | 48.0 | 2.0 | 0.00 | 100 | 16.0 | 46.5 | 60.4 |
| Stratego 4 floz/FGS2 | 0 | 60.0 | 4.0 | 0.00 | 100 | 16.3 | 46.2 | 60.1 |
| Stratego 5 floz/FGS10 | - | - | - | 0.75 | 100 | 7.3 | 43.0 | 60.5 |
| Stratego 10 floz/FGS10 | - | - | - | 1.25 | 100 | 7.5 | 44.0 | 60.5 |
| Folicur 2 floz/FGS2 | 0 | 48.0 | 4.0 | 0.00 | 100 | 12.3 | 41.0 | 60.8 |
| Headline 3 floz/FGS2 | 0 | 48.0 | 1.8 | 0.00 | 100 | 18.5 | 44.1 | 60.8 |
| Tilt 2 floz/FGS2 | 0 | 50.0 | 4.0 | 0.00 | 100 | 22.3 | 45.7 | 60.9 |
| Mean | 0 | 56.5 | 4.8 | 0.25 | 100 | 16.0 | 44.0 | 60.6 |
| CV % | - | 17.2 | 38.3 | 97.6 | - | 31.6 | 5.0 | 1.0 |
| LSD .05 | - | 16.0 | 4.1 | 0.35 | NS | 7.4 | 3.2 | NS |

¹ Treatment includes fungicide, rate of application per acre and crop growth stage at time of application. FGS2 = application made when crop was 3-leaf to 5-leaf stage on May 27 and FGS10 = Feekes growth stage 10 (flag-leaf) on June 25.

² Early season evaluation of treatments on June 2, 2004.

³ Late season evaluation of all treatments on July 16, 2004.



Yield, test weight, protein, head density and plant height of Parshall hard red spring wheat treated with various seed treatment fungicides on the Jay Elkin Farm, Taylor, ND, 2004.

| Treatment | Head density | Height | ----- Grain ¹ ----- | | |
|-----------------------------------|--------------------|--------|--------------------------------|-------------|---------|
| | | | Yield | Test weight | Protein |
| | no m ⁻² | mm | bu/a | lb/bu | % |
| CHECK | 295.3 | 792.9 | 38.4 | 56.8 | 16.1 |
| Raxil MD | 296.5 | 801.7 | 39.2 | 56.8 | 16.0 |
| Raxil MD + Gaucho480 ² | 261.3 | 804.6 | 40.1 | 57.3 | 16.0 |
| Raxil MD Extra | 284.6 | 800.8 | 40.0 | 56.8 | 15.8 |
| Dividend RTA | 283.6 | 811.7 | 38.5 | 55.0 | 16.1 |
| Mean | 283.8 | 796.2 | 39.2 | 56.5 | 16.0 |
| CV% | 6.9 | 2.6 | 3.7 | 2.2 | 1.8 |
| LSD .05 | NS | NS | NS | NS | NS |
| Reps | 4 | 4 | 4 | 4 | 4 |

¹ Grain yield, test weight, and protein adjusted to 12% moisture basis

² Gaucho 480 is an insecticide.

Pythium, Fusarium, and Rhizoctonia propagule counts from this site were found to be in the moderate levels.

Combined analysis of various seed treatments on spring wheat seeded during 2000 - 2002 in southwest North Dakota.

| Treatment | Head density | Height | ----- Grain ¹ ----- | | |
|-------------|-----------------|--------|--------------------------------|---------|---------|
| | | | Test weight | Yield | Protein |
| | m ⁻² | mm | lb/bu | bu/acre | % |
| Check | 178 | 803 | 61.1 | 45.2 | 15.6 |
| DB Green L | 188 | 807 | 60.5 | 46.0 | 15.9 |
| Dividend XL | 184 | 809 | 60.4 | 45.9 | 15.8 |
| Raxil MD | 187 | 813 | 60.6 | 47.7 | 15.7 |
| Mean | 184 | 808 | 60.7 | 46.1 | 15.7 |
| CV% | 8.1 | 2.9 | 1.9 | 5.9 | 2.7 |
| LSD .05 | NS | NS | NS | 1.8 | NS |

¹Grain test weight, protein, and yield are adjust to a 12% moisture basis.

Dectes Long Horn Beetle – Pest of Sunflower

Roger Ashley

Area Extension Agronomist

Dectes taxanus texanus or more commonly called the Dectes Long Horn Beetle is becoming a major pest in sunflower in southwestern North Dakota. The pest in the past has been primarily confined to the southern and central Great Plains but more recently it has been found in South Dakota and now North Dakota. In the fall of 2001, NDSU IPM field scouts detected trace levels of this pest during the National Sunflower Association field survey. However, by 2003 nearly 60 percent of the fields in Adams, Grant, Hettinger, and Stark Counties had infestations of at least 10% and in some fields up to 30% of the sunflower plants in a field were infested with this pest.

In addition to sunflower, Dectes Long Horn Beetle is a pest of soybean and will readily feed on wild sunflower, cocklebur, and other broadleaf weeds.

Clues of the presence of this pest in sunflower are stalks lodged near the base of the plant giving the field the appearance that the stalks have been cut off at ground level. To the casual observer it truly does look like someone took a knife and cut the stalk off at ground level but with more aggressive scouting techniques, one can find the tunnel that the larva excavated and stuffed with frass as well as the larva in the crown of the plant just below the ground surface. Stalks which have lodged from this pest's activity are impossible to pick up with the combine so yield loss is certain and severe.

Scouting during July and August can provide producers warning of the presence and damage this insect will cause. The adult is a 3/8 inch long grayish colored long-horned beetle. It has prominent black and gray-banded antennae, and like others of the family, the antennae are as long as or longer than the length of the body. The larva is white, legless, elongate and cylindrical. The body is deeply segmented like an accordion and conspicuously enlarged near the head, then gradually tapers toward the rear end.

Adults are active from late June to early September. Observations suggest numbers are higher initially around the margins of a field, but soon spread throughout the field. Eggs are deposited in leaf petioles. By August, first instar larvae begin to migrate into the pith of the stalk. By the time the plants reach physiological maturity, larvae will have tunneled down to the base of the plant. In preparation for over-wintering, many of the larvae will girdle the interior surface of the stem near or just above the soil line. This causes weakened stems that break easily where the girdling occurred near the soil surface.

While varieties may vary in their susceptibility to damage, none are known to be resistant. For insecticides to be effective, control needs to be targeted against the adults before the larvae hatch and enter the stem. While field trials have shown that insecticides applied when adults are present will temporarily reduce numbers, the amount of control obtained has not been sufficient to obtain a significant reduction in stem borer damage. Insecticide treatment is not considered to be a practical method of control since egg laying by adults occurs over a major portion of the growing season. Infestations tend to be more severe in areas with 1) a history of sunflower production, 2) several consecutive drier than normal growing seasons, and 3) reduced or no-till sunflower production. Tilling sunflower fields in the fall will expose plant roots and crowns to severe winter weather conditions but efficacy of control and the risk of severe wind erosion to the field

makes this practice less than practical. Lodging may be more severe in early-planted fields. Recent observations suggest that crop rotation may not be as effective as previously thought. Frequently, losses can be reduced in infested fields can be harvested before the amount of girdling and lodging has reached significant proportions. Also locating fields a minimum distance of three miles from a known infested field the previous season will reduce the chances of significant damage from this pest.

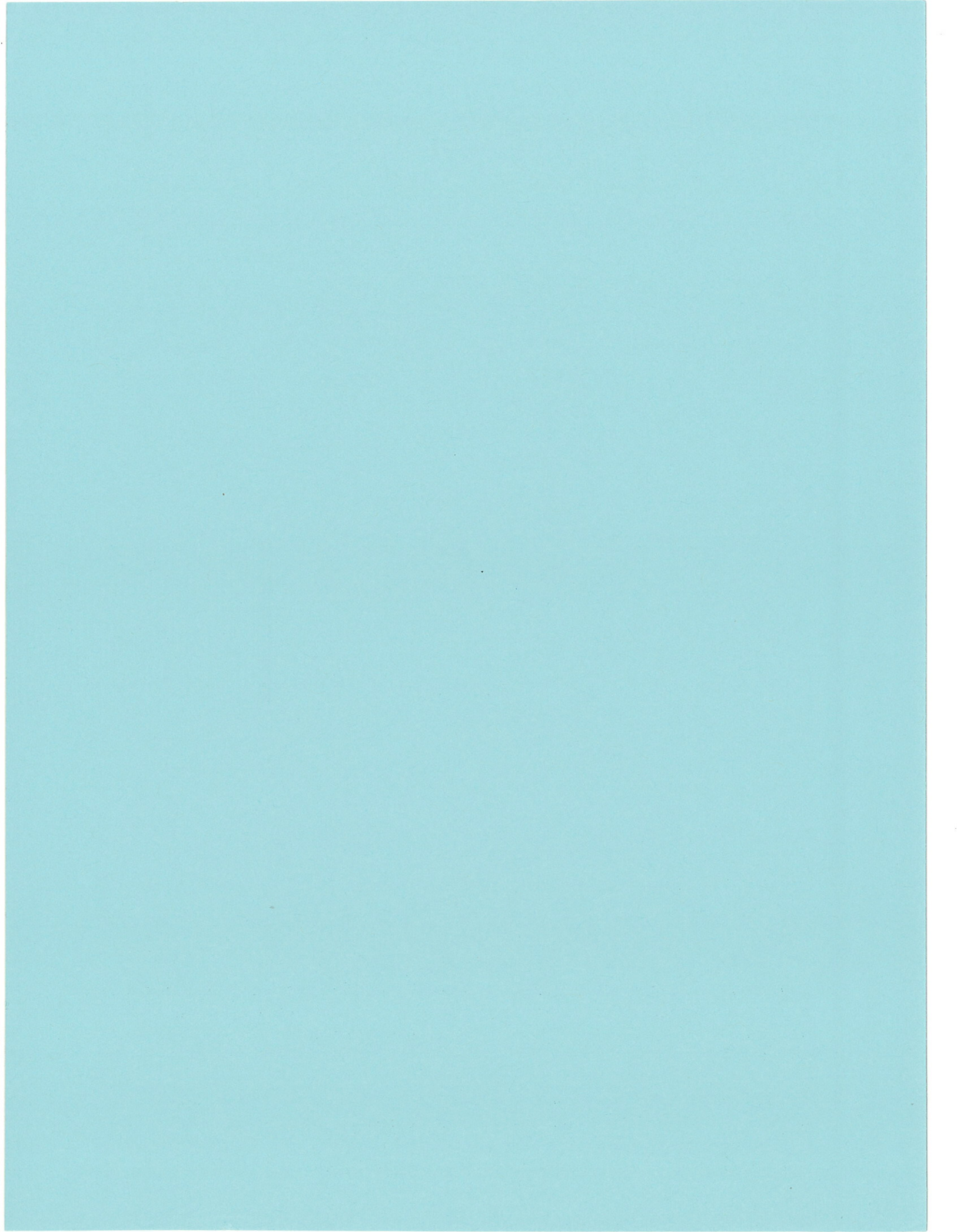


Figure 1) *Dectes* Long Horn Beetle larva in cross section of sunflower crown.



Figure 2) Symptom of infestation by *Dectes* Long Horn Beetle larva. Note plants that have lodged at ground level.

Notes



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