**PROJECT TITLE:** Evaluation of spring wheat, durum, and barley varieties under minimum-till, continuous cropping conditions – 2011 (4W2756)

**PRINCIPAL INVESTIGATOR:**
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**OBJECTIVE:** To determine the best adapted varieties of spring wheat, durum, and barley for production under no-till continuous cropping conditions in eastern Montana.

**Methods:**
Soil type: Williams clay loam
Previous crops: 2010- spring wheat, 2009- safflower, 2008 - small grain plots
Residual soil N to 3 ft: 22 lb/bu
Residual soil P to 6 in: 37 ppm
Applied fertilizer: 40 lb N/ac as liquid 28-0-0
Herbicides: Brox M, 1.5 pt/ac and Axial 16 oz/ac , applied June 13
Precipitation April – August, 2011: 12.80 in
Ave (62 yr) precipitation April – August: 9.55 in
Precipitation September 2010 – August 2011:19.62 in
Ave (62 yr) precipitation September – August: 14.06 in

It was generally a cool and very wet summer.

| Experiment | Planting date | Harvest date | Plot size |
|---|---|---|---|
| recrop spring wheat | May 6 | August 9 | 100 $ft^2$, entire plot harvested |
| recrop durum | May 6 | August 18 | 100 $ft^2$, entire plot harvested |
| recrop barley | May 6 | August 18 | 100 $ft^2$, entire plot harvested |

**RESULTS:**
**Spring wheat:** Eighteen lines and varieties of spring wheat were tested under dryland recrop conditions (Table 1). Thirteen varieties yielded significantly less than the check variety, Vida. Five-year summaries for yield, test weight, height, and protein content are shown in Tables 2 through 5.

**Durum:** Fifteen durum lines and varieties were tested under dryland recrop conditions (Table 6). Three lines or varieties yielded significantly lower than the check variety, Mountrail. Five-year summaries for yield, test weight, height, protein content, and NIR hardness are shown in Tables 7 through 11.

**Barley:** Sixteen barley lines and varieties were tested under dryland recrop conditions. (Table 12). Eight lines yielded significantly lower than the check variety, Haxby. Five-year summaries for yield, test weight, height, and protein content are shown in Tables 13 through 16.

**SUMMARY:** The experiments reported under this project are all of the replicated small plot type. The three-year crop rotation is commercial small grain, small grain yield trials, safflower.

**FUNDING SUMMARY:** Expenditure information to be provided by OSP. No other grants support this project.

**MWBC FY2012 GRANT SUBMISSION PLANS:** It is planned to submit this project for funding consideration in the next fiscal year.

Table 1. Agronomic data obtained from a dryland recrop spring wheat yield trial conducted at the Eastern Agricultural Research Center, Sidney, MT.

| entry | heading* | height, cm | height, in | grain protein, % | test wt, lb/bu | yield, bu/ac | |
|---|---|---|---|---|---|---|---|
| Vida | 56.3 | 61.7 | 24.3 | 16.20 | 61.2 | 43.1 | |
| McNeal | 58.3 | 67.0 | 26.4 | 14.72 | 60.1 | 40.1 | |
| Outlook | 57.0 | 62.3 | 24.5 | 14.51 | 59.7 | 40.1 | |
| Reeder | 56.0 | 60.7 | 23.9 | 16.52 | 60.9 | 38.6 | |
| O'Neal | 56.7 | 56.3 | 22.2 | 14.33 | 62.0 | 36.9 | |
| Ap604CL | 54.0 | 62.7 | 24.7 | 13.70 | 63.0 | 36.6 | x |
| IMICHT79 | 55.3 | 62.0 | 24.4 | 15.62 | 61.3 | 36.1 | x |
| Mott | 57.0 | 63.3 | 24.9 | 16.04 | 61.7 | 36.0 | x |
| SY Tyra | 55.0 | 54.3 | 21.4 | 14.93 | 61.4 | 36.0 | x |
| Duclair | 54.3 | 60.0 | 23.6 | 14.68 | 58.6 | 34.6 | x |
| Corbin | 56.3 | 60.3 | 23.8 | 14.92 | 62.5 | 34.5 | x |
| Volt | 57.3 | 57.7 | 22.7 | 14.99 | 63.6 | 34.4 | x |
| Jedd | 54.7 | 55.3 | 21.8 | 14.21 | 62.6 | 34.3 | x |
| Prosper | 58.3 | 60.7 | 23.9 | 16.01 | 61.9 | 33.8 | x |
| Gunnison | 57.3 | 58.0 | 22.8 | 14.10 | 61.2 | 33.6 | x |
| Kelby | 54.0 | 58.3 | 23.0 | 15.76 | 62.8 | 33.3 | x |
| Choteau | 56.7 | 59.0 | 23.2 | 14.82 | 60.4 | 32.6 | x |
| Kuntz | 57.3 | 58.7 | 23.1 | 14.19 | 63.3 | 22.5 | x |
| mean | 56.2 | 59.9 | 23.6 | 15.01 | 61.6 | 35.4 | |
| Probability | 0.052 | 0.019 | 0.019 | | | <0.001 | |
| CV (S/mean) | 3.1 | 5.9 | 5.9 | | | 10.8 | |
| CV (SE/mean) | 1.8 | 3.4 | 3.4 | | | 6.2 | |
| LSD 0.05 | 2.9 | 5.9 | 2.3 | | | 6.3 | |

*days from planting
x indicates significantly lower yield than check variety, Vida, at probability of <0.05

Table 2. Relative yielding abilities of spring wheat varieties in bu/ac as compared to Vida when grown under dryland continuous cropping at the EARC, Sidney, Montana.

| Cultivar | 2007 | 2008 | 2009 | 2010 | 2011 | Ave | as % of Vida |
|---|---|---|---|---|---|---|---|
| Vida | 38.1 | 6.3 | 29.8 | 53.8 | 43.1 | 34.2 | 100.0 |
| Outlook | 40.4 | 6.5 | 21.7 | 47.6 | 40.1 | 31.3 | 91.4 |
| Reeder | 35.9 | 7.9 | 21.9 | 46.9 | 38.6 | 30.2 | 88.4 |
| O'Neal | -- | 8.7 | 27.6 | 43.9 | 36.9 | 29.3 | 88.0 |
| Duclair | -- | -- | -- | 49.4 | 34.6 | 42.0 | 86.7 |
| IMICHT79 | -- | -- | -- | -- | 36.1 | 36.1 | 83.8 |
| SY Tyra | -- | -- | -- | -- | 36.0 | 36.0 | 83.5 |
| McNeal | 28.2 | 8.4 | 24.5 | 40.1 | 40.1 | 28.3 | 82.6 |
| AP604CL | -- | -- | 21.6 | 45.1 | 36.6 | 34.4 | 81.5 |
| Prosper | -- | -- | -- | -- | 33.8 | 33.8 | 78.4 |
| Mott | -- | -- | 16.1 | 46.9 | 36.0 | 33.0 | 78.1 |
| Jedd | -- | 8.5 | 20.2 | 40.8 | 34.3 | 26.0 | 78.0 |
| Gunnison | -- | -- | -- | -- | 33.6 | 33.6 | 78.0 |
| Volt | -- | 8.0 | 23.4 | 37.8 | 34.4 | 25.9 | 77.9 |
| Choteau | 29.5 | 7.7 | 20.0 | 43.2 | 32.6 | 26.6 | 77.7 |
| Kelby | -- | 6.7 | 17.6 | 42.6 | 33.3 | 25.1 | 75.3 |
| Corbin | -- | 6.7 | 12.6 | 43.7 | 34.5 | 24.4 | 73.3 |
| Kuntz | -- | 7.2 | 17.2 | 41.6 | 22.5 | 22.1 | 66.5 |

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety.

Table 3. Relative test weights of spring wheat varieties in lb/bu as compared to Vida when grown under dryland continuous cropping at the EARC, Sidney, Montana.

| Cultivar | 2007 | 2008 | 2009 | 2010 | 2011 | Ave | as % of Vida |
|---|---|---|---|---|---|---|---|
| Jedd | -- | 59.3 | 63.3 | 61.0 | 62.6 | 61.6 | 103.1 |
| Kelby | -- | 58.8 | 61.7 | 61.5 | 62.8 | 61.2 | 102.5 |
| Volt | -- | 56.0 | 63.5 | 61.0 | 63.6 | 61.0 | 102.2 |
| AP604CL | -- | -- | 63.5 | 59.5 | 63.0 | 62.0 | 101.7 |
| Kuntz | -- | 56.2 | 62.0 | 60.5 | 63.3 | 60.5 | 101.3 |
| Prosper | -- | -- | -- | -- | 61.9 | 61.9 | 101.1 |
| O'Neal | -- | 56.3 | 62.5 | 60.5 | 62.0 | 60.3 | 101.0 |
| Reeder | 62.0 | 57.0 | 61.3 | 61.5 | 60.9 | 60.5 | 100.6 |
| Choteau | 62.8 | 56.8 | 61.5 | 60.5 | 60.4 | 60.4 | 100.4 |
| SY Tyra | -- | -- | -- | -- | 61.4 | 61.4 | 100.3 |
| Corbin | -- | 56.5 | 61.0 | 59.5 | 62.5 | 59.9 | 100.3 |
| IMICHT79 | -- | -- | -- | -- | 61.3 | 61.3 | 100.2 |
| Vida | 62.0 | 56.0 | 61.7 | 60.0 | 61.2 | 60.2 | 100.0 |
| Gunnison | -- | -- | -- | -- | 61.2 | 61.2 | 100.0 |
| Mott | -- | -- | 60.7 | 60.0 | 61.7 | 60.8 | 99.7 |
| Duclair | -- | -- | -- | 59.5 | 58.6 | 59.1 | 97.4 |
| McNeal | 61.2 | 51.7 | 60.0 | 60.0 | 60.1 | 58.6 | 97.4 |
| Outlook | 60.5 | 52.0 | 60.3 | 59.5 | 59.7 | 58.4 | 97.0 |

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety.

Table 4. Relative heights of spring wheat varieties in inches as compared to Vida when grown under dryland continuous cropping at the EARC, Sidney, Montana.

| Cultivar | 2007 | 2008 | 2009 | 2010 | 2011 | Ave | as % of Vida |
|---|---|---|---|---|---|---|---|
| McNeal | 29 | 19 | 18 | 29 | 26 | 24.2 | 100.8 |
| Vida | 30 | 19 | 18 | 29 | 24 | 24.0 | 100.0 |
| AP604CL | -- | -- | 17 | 29 | 25 | 23.7 | 100.0 |
| Mott | -- | -- | 17 | 29 | 25 | 23.7 | 100.0 |
| IMICHT79 | -- | -- | -- | -- | 24 | 24.0 | 100.0 |
| Prosper | -- | -- | -- | -- | 24 | 24.0 | 100.0 |
| Duclair | -- | -- | -- | 28 | 24 | 26.0 | 98.1 |
| Outlook | 30 | 18 | 17 | 28 | 24 | 23.4 | 97.5 |
| O'Neal | -- | 20 | 18 | 27 | 22 | 21.8 | 96.7 |
| Gunnison | -- | -- | -- | -- | 23 | 23.0 | 95.8 |
| Kelby | -- | 19 | 18 | 26 | 23 | 21.5 | 95.6 |
| Corbin | -- | 18 | 16 | 28 | 24 | 21.5 | 95.6 |
| Reeder | 28 | 18 | 16 | 28 | 24 | 22.8 | 95.0 |
| Volt | -- | 18 | 17 | 26 | 23 | 21.0 | 93.3 |
| Kuntz | -- | 18 | 16 | 27 | 23 | 21.0 | 93.3 |
| Choteau | 28 | 17 | 16 | 27 | 23 | 22.2 | 92.5 |
| SY Tyra | -- | -- | -- | -- | 21 | 21.0 | 87.5 |
| Jedd | -- | 16 | 16 | 23 | 22 | 19.3 | 85.6 |

NOTE: Average heights in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety.

Table 5. Relative protein contents of spring wheat varieties in percent as compared to Vida when grown under dryland continuous cropping at the EARC, Sidney, Montana.

| Cultivar | 2007 | 2008 | 2009 | 2010 | 2011 | Ave | as % of Vida |
|---|---|---|---|---|---|---|---|
| Reeder | 15.7 | 17.1 | 19.2 | 13.2 | 16.5 | 16.3 | 105.6 |
| Kelby | -- | 16.6 | 18.6 | 13.5 | 15.8 | 16.1 | 103.4 |
| Corbin | -- | 17.1 | 19.1 | 11.8 | 14.9 | 15.7 | 100.8 |
| Mott | -- | -- | 18.2 | 12.6 | 16.0 | 15.6 | 100.4 |
| Vida | 15.0 | 15.8 | 17.8 | 12.6 | 16.2 | 15.5 | 100.0 |
| Prosper | -- | -- | -- | -- | 16.0 | 16.0 | 98.8 |
| IMICHT79 | -- | -- | -- | -- | 15.6 | 15.6 | 96.3 |
| Outlook | 14.1 | 14.8 | 18.4 | 11.8 | 14.5 | 14.7 | 95.1 |
| Kuntz | -- | 15.5 | 17.6 | 12.0 | 14.2 | 14.8 | 95.0 |
| Volt | -- | 15.8 | 16.7 | 11.2 | 15.0 | 14.7 | 94.1 |
| AP604CL | -- | -- | 17.6 | 12.0 | 13.7 | 14.4 | 92.9 |
| O'Neal | -- | 14.8 | 16.4 | 12.4 | 14.3 | 14.5 | 92.8 |
| Choteau | 12.4 | 15.4 | 17.7 | 11.5 | 14.8 | 14.4 | 92.8 |
| SY Tyra | -- | -- | -- | -- | 14.9 | 14.9 | 92.0 |
| McNeal | 11.3 | 15.1 | 17.2 | 11.7 | 14.7 | 14.0 | 90.4 |
| Jedd | -- | 14.5 | 17.2 | 10.3 | 14.2 | 14.1 | 90.1 |
| Duclair | -- | -- | -- | 11.0 | 14.7 | 12.9 | 89.2 |
| Gunnison | -- | -- | -- | -- | 14.1 | 14.1 | 87.0 |

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety.

Table 6. Agronomic data obtained from a dryland recrop durum yield trial conducted at the Eastern Agricultural Research Center, Sidney, MT.

| entry | heading* | height, cm | height, in | grain protein, % | HVAC | test wt, lb/bu | yield, bu/ac | |
|---|---|---|---|---|---|---|---|---|
| Divide | 61.3 | 63.3 | 24.9 | 13.08 | 83.9 | 62.0 | 39.8 | |
| Alkabo | 61.0 | 59.7 | 23.5 | 13.70 | 103.5 | 62.5 | 38.0 | |
| Westhope | 60.3 | 61.7 | 24.3 | 13.77 | 98.4 | 62.0 | 37.8 | |
| Grenora | 60.0 | 58.7 | 23.1 | 13.44 | 100.0 | 62.0 | 37.0 | |
| Strongfield | 61.0 | 64.3 | 25.3 | 14.31 | 99.8 | 62.0 | 36.9 | |
| Mountrail | 61.7 | 59.0 | 23.2 | 13.45 | 96.1 | 62.5 | 36.5 | |
| Pierce | 61.3 | 67.3 | 26.5 | 13.52 | 103.2 | 62.0 | 36.2 | |
| Tioga | 61.0 | 68.7 | 27.0 | 13.02 | 90.2 | 62.5 | 35.5 | |
| MT03012 | 58.0 | 58.0 | 22.8 | 14.01 | 97.4 | 62.0 | 34.3 | |
| MT05183 | 60.7 | 56.3 | 22.2 | 13.68 | 105.8 | 63.0 | 33.8 | |
| MT05166 | 59.7 | 53.3 | 21.0 | 12.97 | 90.2 | 62.0 | 32.8 | |
| Belfield | 58.0 | 55.3 | 21.8 | 13.62 | 96.8 | 61.5 | 32.8 | |
| MT04174 | 59.0 | 54.3 | 21.4 | 14.02 | 102.8 | 62.0 | 31.7 | x |
| Alzada | 58.3 | 57.0 | 22.4 | 13.88 | 101.3 | 61.0 | 31.6 | x |
| MT04340 | 59.0 | 53.3 | 21.0 | 13.92 | 97.4 | 60.0 | 27.9 | x |
| mean | 60.2 | 59.0 | 23.2 | 13.68 | 97.8 | 61.8 | 33.7 | |
| probability | <0.001 | <0.001 | <0.001 | | | | <0.001 | |
| CV (S/mean) | 1.9 | 5.4 | 5.4 | | | | 8.4 | |
| CV (SE/mean) | 1.1 | 3.1 | 3.1 | | | | 4.9 | |
| LSD 0.05 | 2.0 | 5.3 | 2.1 | | | | 4.7 | |

* days from planting
x indicates significantly lower yield than check variety, Mountrail, at p = 0.05

Table 7. Relative yields of durum varieties in bu/ac as compared to Mountrail when grown under dryland continuous cropping at the EARC, Sidney, Montana.

| Cultivar | 2007 | 2008 | 2009 | 2010 | 2011 | Ave | as % of Mountrail |
|---|---|---|---|---|---|---|---|
| Westhope | -- | -- | -- | -- | 37.8 | 37.8 | 103.6 |
| Divide | 38.8 | 7.3 | 37.9 | 48.6 | 39.8 | 34.5 | 102.3 |
| Tioga | -- | -- | -- | 46.0 | 35.5 | 40.8 | 101.6 |
| Alkabo | 48.5 | 8.5 | 31.5 | 44.3 | 38.0 | 34.2 | 101.4 |
| Mountrail | 43.6 | 6.5 | 38.2 | 43.7 | 36.5 | 33.7 | 100.0 |
| MT03012 | 36.4 | 6.9 | 38.8 | 44.4 | 34.3 | 32.2 | 95.4 |
| MT05183 | -- | -- | -- | -- | 33.8 | 33.8 | 92.6 |
| Grenora | 41.4 | 5.8 | 24.9 | 46.2 | 37.0 | 31.1 | 92.2 |
| Normanno | -- | -- | 31.1 | 42.8 | -- | 37.0 | 90.2 |
| MT05166 | -- | -- | -- | -- | 32.8 | 32.8 | 89.9 |
| Belfield | -- | -- | -- | -- | 32.8 | 32.8 | 89.9 |
| Strongfield | 28.7 | 6.6 | 36.5 | 42.7 | 36.9 | 30.3 | 89.9 |
| Alzada | 39.9 | 7.9 | 29.6 | 41.7 | 31.6 | 30.1 | 89.4 |
| MT04174 | -- | 5.7 | 31.2 | 41.9 | 31.7 | 27.6 | 88.5 |
| Pierce | 40.2 | 6.5 | 20.6 | 44.0 | 36.2 | 29.5 | 87.5 |
| MT04340 | -- | -- | -- | 38.6 | 27.9 | 33.3 | 82.9 |

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety.

Table 8. Relative test weights of durum varieties in lb/bu as compared to Mountrail when grown under dryland continuous cropping at the EARC, Sidney, Montana.

| Cultivar | 2007 | 2008 | 2009 | 2010 | 2011 | Ave | as % of Mountrail |
|---|---|---|---|---|---|---|---|
| Alkabo | 63.2 | 58.7 | 61.0 | 60.5 | 62.5 | 61.2 | 101.8 |
| MT05183 | -- | -- | -- | -- | 63.0 | 63.0 | 100.8 |
| Pierce | 62.2 | 57.5 | 60.3 | 61.0 | 62.0 | 60.6 | 100.8 |
| MT04174 | -- | 56.2 | 61.3 | 60.5 | 62.0 | 60.0 | 100.6 |
| Divide | 62.2 | 56.5 | 61.5 | 59.5 | 62.0 | 60.3 | 100.4 |
| MT03012 | 63.0 | 55.7 | 61.2 | 59.5 | 62.0 | 60.3 | 100.3 |
| Grenora | 62.8 | 56.0 | 60.5 | 60.0 | 62.0 | 60.3 | 100.2 |
| Mountrail | 62.0 | 54.8 | 60.8 | 60.5 | 62.5 | 60.1 | 100.0 |
| Strongfield | 62.2 | 56.2 | 60.7 | 59.0 | 62.0 | 60.0 | 99.8 |
| Alzada | 61.2 | 56.7 | 60.3 | 60.5 | 61.0 | 59.9 | 99.7 |
| Tioga | -- | -- | -- | 60.0 | 62.5 | 61.3 | 99.6 |
| Westhope | -- | -- | -- | -- | 62.0 | 62.0 | 99.2 |
| MT05166 | -- | -- | -- | -- | 62.0 | 62.0 | 99.2 |
| Normanno | -- | -- | 60.2 | 59.5 | -- | 59.9 | 98.7 |
| Belfield | -- | -- | -- | -- | 61.5 | 61.5 | 98.4 |
| MT04340 | -- | -- | -- | 58.0 | 60.0 | 59.0 | 95.9 |

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety.

Table 9. Relative heights of durum varieties in inches as compared to Mountrail when grown under dryland continuous cropping at the EARC, Sidney, Montana.

| Cultivar | 2007 | 2008 | 2009 | 2010 | 2011 | Ave | as % of Mountrail |
|---|---|---|---|---|---|---|---|
| Tioga | -- | -- | -- | 32 | 27 | 29.5 | 120.4 |
| Pierce | 35 | 18 | 20 | 31 | 26 | 26.0 | 112.1 |
| Divide | 32 | 20 | 21 | 29 | 25 | 25.4 | 109.5 |
| Alkabo | 32 | 19 | 19 | 28 | 24 | 24.4 | 105.2 |
| Westhope | -- | -- | -- | -- | 24 | 24.0 | 104.3 |
| Strongfield | 29 | 19 | 19 | 28 | 25 | 24.0 | 103.4 |
| Mountrail | 31 | 17 | 19 | 26 | 23 | 23.2 | 100.0 |
| Grenora | 29 | 18 | 18 | 27 | 23 | 23.0 | 99.1 |
| Alzada | 29 | 20 | 18 | 25 | 22 | 22.8 | 98.3 |
| MT04174 | -- | 18 | 17 | 26 | 21 | 20.5 | 96.5 |
| MT05183 | -- | -- | -- | -- | 22 | 22.0 | 95.7 |
| Belfield | -- | -- | -- | -- | 22 | 22.0 | 95.7 |
| MT03012 | 26 | 16 | 18 | 23 | 23 | 21.2 | 91.4 |
| MT05166 | -- | -- | -- | -- | 21 | 21.0 | 91.3 |
| MT04340 | -- | -- | -- | 23 | 21 | 22.0 | 89.8 |
| Normanno | -- | -- | 16 | 23 | -- | 19.5 | 86.7 |

NOTE: Average heights in this summary should not be compared to each other since they are not grown in the same years. Compare heights only to the check variety.

Table 10. Relative protein contents of durum varieties in percent as compared to Mountrail when grown under dryland continuous cropping at the EARC, Sidney, Montana.

| Cultivar | 2007 | 2008 | 2009 | 2010 | 2011 | Ave | as % of Mountrail |
|---|---|---|---|---|---|---|---|
| MT04340 | -- | -- | -- | 13.1 | 13.9 | 13.5 | 111.1 |
| Pierce | 14.2 | 14.8 | 16.6 | 12.3 | 13.5 | 14.3 | 104.2 |
| Tioga | -- | -- | -- | 12.2 | 13.0 | 12.6 | 103.7 |
| Strongfield | 12.6 | 15.5 | 15.7 | 12.7 | 14.3 | 14.2 | 103.4 |
| Westhope | -- | -- | -- | -- | 13.8 | 13.8 | 103.0 |
| MT04174 | -- | 15.8 | 15.0 | 11.4 | 14.0 | 14.1 | 102.4 |
| MT05183 | -- | -- | -- | -- | 13.7 | 13.7 | 102.2 |
| Belfield | -- | -- | -- | -- | 13.6 | 13.6 | 101.5 |
| Alzada | 13.6 | 14.8 | 15.3 | 11.3 | 13.9 | 13.8 | 100.6 |
| Grenora | 13.5 | 14.9 | 15.4 | 11.4 | 13.4 | 13.7 | 100.1 |
| Alkabo | 13.9 | 13.8 | 14.8 | 12.4 | 13.7 | 13.7 | 100.1 |
| Mountrail | 13.6 | 15.7 | 14.9 | 10.9 | 13.4 | 13.7 | 100.0 |
| Normanno | -- | -- | 14.7 | 11.0 | -- | 12.9 | 99.6 |
| MT03012 | 13.4 | 15.1 | 13.6 | 12.0 | 14.0 | 13.6 | 99.4 |
| Divide | 14.2 | 14.5 | 14.5 | 11.6 | 13.1 | 13.6 | 99.1 |
| MT05166 | -- | -- | -- | -- | 13.0 | 13.0 | 97.0 |

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety.

Table 11. Relative NIR hardness of durum varieties in percent as compared to Mountrail when grown under dryland continuous cropping at the EARC, Sidney, Montana.

| Cultivar | 2007 | 2008 | 2009 | 2010 | 2011 | Ave | as % of Mountrail |
|---|---|---|---|---|---|---|---|
| MT04340 | -- | -- | -- | 81.9 | 97.4 | 89.7 | 121.9 |
| Pierce | 85.3 | 74.0 | 102.9 | 74.8 | 103.2 | 88.0 | 111.4 |
| MT05183 | -- | -- | -- | -- | 105.8 | 105.8 | 110.1 |
| MT04174 | -- | 75.4 | 104.4 | 64.6 | 102.8 | 86.8 | 109.6 |
| MT03012 | 87.6 | 71.0 | 102.0 | 74.9 | 97.4 | 86.6 | 109.6 |
| Alzada | 85.7 | 72.4 | 98.6 | 71.1 | 101.3 | 85.8 | 108.6 |
| Alkabo | 84.9 | 66.4 | 103.9 | 64.9 | 103.5 | 84.7 | 107.2 |
| Strongfield | 69.1 | 69.5 | 105.3 | 74.2 | 99.8 | 83.6 | 105.8 |
| Tioga | -- | -- | -- | 63.1 | 90.2 | 76.7 | 104.2 |
| Grenora | 82.8 | 72.1 | 103.6 | 52.1 | 100.0 | 82.1 | 103.9 |
| Normanno | -- | -- | 93.6 | 65.2 | -- | 79.4 | 102.9 |
| Westhope | -- | -- | -- | -- | 98.4 | 98.4 | 102.4 |
| Divide | 84.5 | 66.9 | 105.3 | 57.9 | 83.9 | 79.7 | 100.9 |
| Belfield | -- | -- | -- | -- | 96.8 | 96.8 | 100.7 |
| Mountrail | 78.3 | 66.3 | 103.3 | 51.0 | 96.1 | 79.0 | 100.0 |
| MT05166 | -- | -- | -- | -- | 90.2 | 90.2 | 93.9 |

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety.

Table 12. Agronomic data obtained from a dryland recrop barley yield trial conducted at the Eastern Agricultural Research Center, Sidney, MT.

| entry | heading* | height, cm | height, in | grain protein | test wt, lb/bu | yield, bu/ac | |
|---|---|---|---|---|---|---|---|
| Goldeneye | 59.0 | 53.7 | 21.1 | 15.01 | 46.5 | 42.0 | |
| Haxby | 60.3 | 54.7 | 21.5 | 14.06 | 47.0 | 40.3 | |
| Pinnacle | 58.3 | 55.0 | 21.7 | 13.00 | 46.5 | 38.4 | |
| Metcalfe | 61.7 | 60.3 | 23.8 | 14.60 | 46.0 | 36.5 | |
| Conrad | 65.3 | 55.0 | 21.7 | 14.31 | 46.0 | 36.5 | |
| MT020155 | 57.7 | 52.7 | 20.7 | 11.84 | 45.5 | 36.2 | |
| Gallatin | 59.3 | 54.7 | 21.5 | 12.39 | 47.0 | 34.0 | |
| Hockett | 62.7 | 52.3 | 20.6 | 13.41 | 46.0 | 33.5 | |
| MT061035 | 63.0 | 52.3 | 20.6 | 14.27 | 47.5 | 32.0 | x |
| Geraldine | 64.7 | 49.0 | 19.3 | 13.52 | 47.0 | 31.5 | x |
| MT070175 | 63.3 | 53.3 | 21.0 | 11.65 | 47.0 | 31.2 | x |
| Harrington | 62.7 | 54.3 | 21.4 | 12.23 | 47.0 | 30.3 | x |
| MT020162 | 64.7 | 52.3 | 20.6 | 13.13 | 45.5 | 29.8 | x |
| MT010158 | 62.3 | 57.7 | 22.7 | 15.87 | 44.0 | 26.5 | x |
| Tradition | 59.7 | 56.3 | 22.2 | 11.65 | 47.0 | 25.2 | x |
| MT010160 | 64.0 | 56.0 | 22.0 | 12.72 | 46.0 | 21.5 | x |
| mean | 61.79 | 54.35 | 21.4 | 13.35 | 46.3 | 32.8 | |
| probability | <0.001 | 0.285 | 0.285 | | | <0.001 | |
| CV (S/mean) | 3.1 | 7.3 | 7.3 | | | 14.0 | |
| CV (SE/mean) | 1.8 | 4.2 | 4.2 | | | 8.1 | |
| LSD 0.05 | 3.2 | NS | NS | | | 7.7 | |

*days from planting
x indicates significantly lower yield than check variety, Haxby, at probability = 0.05

Table 13. Relative yields of barley varieties in bu/ac compared to Haxby when grown under dryland recrop conditions at the EARC, Sidney, Montana.

| Cultivar | 2006 | 2007 | 2008 | 2010 | 2011 | Ave | as % of Haxby |
|---|---|---|---|---|---|---|---|
| Goldeneye | -- | -- | -- | 62.0 | 42.0 | 52.0 | 113.9 |
| MT020155 | -- | -- | 8.4 | 65.7 | 36.2 | 36.8 | 111.0 |
| Haxby | 59.1 | 40.8 | 8.1 | 51.0 | 40.3 | 39.9 | 100.0 |
| Gallatin | -- | -- | -- | 54.6 | 34.0 | 44.3 | 97.0 |
| Hockett | 53.0 | 33.5 | 10.7 | 60.9 | 33.5 | 38.3 | 96.1 |
| Metcalfe | 54.0 | 39.9 | 6.4 | 53.1 | 36.5 | 38.0 | 95.3 |
| Conrad | 47.6 | 41.4 | 8.9 | 55.4 | 36.5 | 38.0 | 95.2 |
| Pinnacle | -- | -- | -- | 46.5 | 38.4 | 42.5 | 93.0 |
| Harrington | 51.4 | 36.5 | 7.4 | 54.0 | 30.3 | 35.9 | 90.1 |
| MT010160 | -- | -- | -- | 60.7 | 21.5 | 41.1 | 90.0 |
| Tradition | 54.4 | 41.1 | 8.3 | -- | 25.2 | 32.3 | 87.0 |
| Geraldine | 44.9 | 33.7 | 7.6 | 54.9 | 31.5 | 34.5 | 86.6 |
| Amsterdam | -- | -- | 7.8 | 47.8 | 26.5 | 27.4 | 82.6 |
| MT061035 | -- | -- | -- | -- | 32.0 | 32.0 | 79.4 |
| MT070175 | -- | -- | -- | -- | 31.2 | 31.2 | 77.4 |
| MT020162 | -- | -- | -- | -- | 29.8 | 29.8 | 73.9 |

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety. No trial in 2009.

Table 14. Relative test weights of barley varieties in lb/bu compared to Haxby when grown under dryland recrop conditions at the EARC, Sidney, Montana.

| Cultivar | 2006 | 2007 | 2008 | 2010 | 2011 | Ave | as % of Haxby |
|---|---|---|---|---|---|---|---|
| MT061035 | -- | -- | -- | -- | 47.5 | 47.5 | 101.1 |
| Haxby | 49.3 | 51.8 | 50.5 | 54.0 | 47.0 | 50.5 | 100.0 |
| MT070175 | -- | -- | -- | -- | 47.0 | 47.0 | 100.0 |
| Gallatin | -- | -- | -- | 51.0 | 47.0 | 49.0 | 97.0 |
| MT020162 | -- | -- | -- | -- | 45.5 | 45.5 | 96.8 |
| Pinnacle | -- | -- | -- | 51.0 | 46.5 | 48.8 | 96.5 |
| Goldeneye | -- | -- | -- | 50.0 | 46.5 | 48.3 | 95.5 |
| Geraldine | 46.2 | 50.5 | 47.0 | 50.0 | 47.0 | 48.1 | 95.3 |
| Hockett | 46.3 | 51.3 | 46.0 | 50.5 | 46.0 | 48.0 | 95.1 |
| MT010160 | -- | -- | -- | 50.0 | 46.0 | 48.0 | 95.0 |
| Tradition | 47.0 | 50.0 | 44.5 | -- | 47.0 | 47.1 | 94.9 |
| Conrad | 45.0 | 49.7 | 47.5 | 50.5 | 46.0 | 47.7 | 94.5 |
| Amsterdam | -- | -- | 47.0 | 52.0 | 44.0 | 47.7 | 94.4 |
| MT020155 | -- | -- | 46.0 | 50.5 | 45.5 | 47.3 | 93.7 |
| Metcalfe | 44.7 | 50.8 | 45.0 | 49.5 | 46.0 | 47.2 | 93.4 |
| Harrington | 44.0 | 50.0 | 43.5 | 49.5 | 47.0 | 46.8 | 92.6 |

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety. No trial in 2009.

Table 15. Relative heights of barley varieties in inches compared to Haxby when grown under dryland recrop conditions at the EARC, Sidney, Montana.

| Cultivar | 2006 | 2007 | 2008 | 2010 | 2011 | Ave | as % of Haxby |
|---|---|---|---|---|---|---|---|
| Gallatin | -- | -- | -- | 26 | 22 | 24.0 | 109.1 |
| Tradition | 27 | 25 | 20 | -- | 22 | 23.5 | 108.0 |
| MT020155 | -- | -- | 18 | 25 | 21 | 21.3 | 104.9 |
| Metcalfe | 26 | 22 | 18 | 24 | 24 | 22.8 | 104.6 |
| MT010160 | -- | -- | -- | 24 | 22 | 23.0 | 104.5 |
| Goldeneye | -- | -- | -- | 24 | 21 | 22.5 | 102.3 |
| Haxby | 26 | 22 | 17 | 22 | 22 | 21.8 | 100.0 |
| Amsterdam | -- | -- | 16 | 22 | 23 | 20.3 | 100.0 |
| Hockett | 24 | 20 | 17 | 25 | 21 | 21.4 | 98.2 |
| Harrington | 25 | 22 | 16 | 21 | 21 | 21.0 | 96.3 |
| MT061035 | -- | -- | -- | -- | 21 | 21.0 | 95.5 |
| MT070175 | -- | -- | -- | -- | 21 | 21.0 | 95.5 |
| MT020162 | -- | -- | -- | -- | 21 | 21.0 | 95.5 |
| Conrad | 24 | 20 | 16 | 22 | 22 | 20.8 | 95.4 |
| Pinnacle | -- | -- | -- | 19 | 22 | 20.5 | 93.2 |
| Geraldine | 23 | 18 | 15 | 21 | 19 | 19.2 | 88.1 |

NOTE: Average heights in this summary should not be compared to each other since they are not grown in the same years. Compare heights only to the check variety. No trial in 2009.

Table 16. Relative protein contents as percent of barley varieties compared to Haxby when grown under dryland recrop conditions at the EARC, Sidney, Montana.

| Cultivar | 2006 | 2007 | 2008 | 2010 | 2011 | Ave | as % of Haxby |
|---|---|---|---|---|---|---|---|
| Goldeneye | -- | -- | -- | 10.9 | 15.0 | 13.0 | 115.6 |
| Conrad | 11.9 | 10.9 | 10.9 | 10.7 | 14.3 | 11.7 | 102.1 |
| MT061035 | -- | -- | -- | -- | 14.3 | 14.3 | 101.4 |
| Geraldine | 11.4 | 10.4 | 13.0 | 9.7 | 13.5 | 11.6 | 100.9 |
| Metcalfe | 12.3 | 8.9 | 12.7 | 9.5 | 14.6 | 11.6 | 100.9 |
| Haxby | 10.7 | 10.9 | 13.5 | 8.3 | 14.1 | 11.5 | 100.0 |
| Amsterdam | -- | -- | 11.5 | 8.3 | 15.9 | 11.9 | 99.4 |
| Hockett | 10.7 | 9.3 | 12.3 | 9.4 | 13.4 | 11.0 | 95.8 |
| Gallatin | -- | -- | -- | 8.8 | 12.4 | 10.6 | 94.6 |
| Harrington | 10.9 | 9.9 | 12.3 | 9.0 | 12.2 | 10.9 | 94.4 |
| Pinnacle | -- | -- | -- | 8.1 | 13.0 | 10.6 | 94.2 |
| MT010160 | -- | -- | -- | 8.3 | 12.7 | 10.5 | 93.8 |
| MT020162 | -- | -- | -- | -- | 13.1 | 13.1 | 92.9 |
| MT020155 | -- | -- | 11.5 | 9.4 | 11.8 | 10.9 | 91.1 |
| Tradition | 10.1 | 10.2 | 10.2 | -- | 11.6 | 10.5 | 85.6 |
| MT070175 | -- | -- | -- | -- | 11.6 | 11.6 | 82.3 |

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety. No trial in 2009.