

**Project Title:** Evaluation of spring barley cultivar performance under continuous-crop and crop-crop-fallow systems in central Montana

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**Objective:**  
Evaluate the performance of spring barley cultivars in central Montana.

**Results:**  
The 2012 growing season was warmer and dryer than the long term average. These conditions commenced in mid-late June 2011. Warm spring growing conditions were interrupted with of freezing temperatures. At CARC, it froze five consecutive nights May 24-29, with a low of 24 F. The barley leaves showed loss of vigor as result of frost. Driving hail at CARC, on June 5, removed 20-30% of the leaf tissue. The 2012 Geraldine trial was the first in the past decade.

The 2012 NTCC spring barley grain yields at Moccasin, Denton and Geraldine followed precipitation levels. Moccasin had low precipitation levels and low yields, Denton was intermediate, and Geraldine had good precipitation and good yields. Feed barley Haxby, a dryland yield standard, was the top grain producer at the three barley locations (Tables 1, 2, 3). Champion, Conrad and line MT010160 (MT970148/Harrington) were other high yield entries.

Barley 2012 test weights were heavier than average at Moccasin and Geraldine locations while near average at Denton (Tables 1, 2, 3). Haxby consistently has a high test weight. The grain protein levels were high with the Moccasin trial mean at 17.3%, followed by Denton at 15.6 % and Geraldine at 13.2%. There was little consistency in grain protein ranking across locations. Malt cultivars, Conrad, Harrington and Metcalfe, ranked high for grain protein and Haxby ranked low (Tables 7 & 8). CDC Cowboy feed barley and Hockett malt had higher plump seed counts. Lavina, had the highest thin seed score in the more optimum plump seed environment near Geraldine. Protein and sieve size are determined from a single sample per location.

Haxby is used as the standard for multi-year yield, test weight and protein performance comparison in tables 4-9. Haxby generally has the highest mean yield and test weight. For grain protein, Haxby is often near the bottom in multi-year comparisons. The yield of other entries is compared to Haxby mean yield for the same years.

**Summary:**  
2012 Provided good conditions for assessing the relative performance of barley lines under moisture and heat stress. Growing conditions were less than optimum throughout the crop year. These conditions contributed to good root development and excellent grain test weights.

**Funding Summary:**  
Expenditure information to be provided by OSP. No other grant support was provided.

**MWBC FY2011 Grant Submission Plans:**  
It is planned to submit this project for funding consideration in the next fiscal year.

Table 1 2012 No-Till continuous crop barley variety trial near Moccasin.  
Exp 367011 Central Agricultural Research Center. Moccasin, Montana

| Experiment 1: Grain Yield, Protein, Test Weight, Grain Weight, Grain Moisture, Grain Plumpness |                        |                                                                                                                   |                                   |                    |       |                                    |             |             |             |             |
|------------------------------------------------------------------------------------------------|------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------|-------|------------------------------------|-------------|-------------|-------------|-------------|
| ID                                                                                             | Variety/Pedigree       | Entry                                                                                                             | Plant                             | Grain              | Grain | Test                               | Grain       | Plumpness   |             |             |
|                                                                                                |                        |                                                                                                                   | Height                            | Yield              | Yield | Weight                             | Protein     | Plump       | Mid         | Thin        |
|                                                                                                |                        |                                                                                                                   | cm                                | lbs/a              | bu/a  | lbs/bu                             | %           | %           | %           | %           |
| YU501385                                                                                       | Champion (Brnss/Camas) | 1                                                                                                                 | 53.0                              | 1315               | 27.4  | 52.7                               | 16.6        | 2.0         | 16.6        | 81.4        |
| COWBOY                                                                                         | CDC Cowboy             | 2                                                                                                                 | 67.0                              | 1193               | 23.2  | 52.7                               | 17.8        | <b>23.5</b> | <b>47.7</b> | 28.9        |
| MT910189                                                                                       | Hockett                | 3                                                                                                                 | 52.3                              | 1279               | 25.0  | 51.6                               | 16.6        | 3.8         | 28.5        | 67.6        |
| MT960101                                                                                       | Geraldine              | 4                                                                                                                 | 48.3                              | 1303               | 27.1  | 51.1                               | <b>18.8</b> | 0.5         | 13.8        | <b>85.7</b> |
| PI491534                                                                                       | Gallatin               | 5                                                                                                                 | 58.3                              | 1406               | 29.3  | 51.2                               | 17.1        | 1.7         | 23.7        | 74.6        |
| SK 76333                                                                                       | Harrington             | 6                                                                                                                 | 52.7                              | 1139               | 22.4  | 51.3                               | 17.9        | 6.2         | 32.2        | 61.6        |
| TR 232                                                                                         | Metcalfe               | 7                                                                                                                 | 51.3                              | 1233               | 24.5  | 51.7                               | 18.6        | 8.4         | 36.3        | 55.4        |
| <b>MT950186</b>                                                                                | <b>Haxby</b>           | <b>8</b>                                                                                                          | 59.3                              | <b>1703</b>        | 37.6  | <b>53.4</b>                        | 16.7        | 3.5         | 24.0        | 72.5        |
| MT010158                                                                                       | Amsterdam              | 9                                                                                                                 | 51.0                              | 1264               | 24.9  | 51.8                               | 18.7        | 12.8        | 38.3        | 49.0        |
| MT070158                                                                                       | MT970148/Klages        | 10                                                                                                                | 51.3                              | 1673               | 34.8  | 51.0                               | 16.6        | 22.2        | 42.0        | 35.8        |
| MT010160                                                                                       | MT920041/Harrington    | 11                                                                                                                | 58.7                              | <b>1697</b>        | 35.4  | 51.9                               | 16.8        | 5.5         | 31.8        | 62.7        |
| MT070159                                                                                       | MT970148/Klages        | 12                                                                                                                | 56.7                              | 1364               | 28.4  | 50.6                               | 17.5        | 9.5         | 33.0        | 57.5        |
| MT080279                                                                                       | MT970148/MT970116      | 13                                                                                                                | 51.7                              | <b>1686</b>        | 35.1  | 50.6                               | 17.3        | 10.5        | 28.5        | 61.0        |
| 6B952482                                                                                       | Tradition              | 14                                                                                                                | 58.3                              | 1349               | 28.1  | 49.7                               | 17.1        | 3.7         | 14.9        | 81.4        |
| CONRAD                                                                                         | Conrad                 | 15                                                                                                                | 46.7                              | 1441               | 30.0  | 51.8                               | 17.9        | 16.1        | 24.4        | 59.5        |
| MT960228                                                                                       | Eslick                 | 16                                                                                                                | 46.3                              | 1415               | 29.5  | 51.4                               | 17.4        | 6.7         | 26.7        | 66.6        |
| Idaho2007                                                                                      | Lenetah                | 17                                                                                                                | 56.0                              | 1655               | 34.5  | 50.9                               | 15.9        | 20.3        | 43.4        | 36.3        |
| MT981427                                                                                       | Lavina                 | 18                                                                                                                | 50.3                              | 1636               | 34.1  | 51.1                               | 15.3        | 8.2         | 37.0        | 54.8        |
| Mean                                                                                           |                        |                                                                                                                   | 53.85                             | 1431               | 29.52 | 51.46                              | 17.3        | 9.2         | 30.1        | 60.7        |
| P value                                                                                        |                        |                                                                                                                   | 0.006                             | 0.157              | 0.081 | 0.337                              |             |             |             |             |
| CV 1                                                                                           |                        |                                                                                                                   | 10.2                              | 19.2               | 21.0  | 2.1                                |             |             |             |             |
| LSD (0.05)                                                                                     |                        |                                                                                                                   | 9.11                              | ns                 | ns    | ns                                 |             |             |             |             |
| Seed Date:                                                                                     |                        | 4-Apr-12                                                                                                          | No-till CC in winter wheat stbbl. |                    |       | Soil: 2" temp 13C Moist Probe:15 " |             |             |             |             |
| Harvest Date:                                                                                  |                        | 1-Aug-12                                                                                                          | Precip:                           | Crop Year: 10.99   |       |                                    |             |             |             |             |
| Fertilizer:                                                                                    |                        | Top Dress urea 60 N                                                                                               | W/seed:                           | 50 lbs 20+20+20+10 |       |                                    |             |             |             |             |
| Weed control:                                                                                  |                        | Pre-plant glyphosate and MCPA+bromoxynil.                                                                         |                                   |                    |       |                                    |             |             |             |             |
| Comment:                                                                                       |                        | Surfuace soil condition was good for seeding. Wheat stubble residue caused stand variability.                     |                                   |                    |       |                                    |             |             |             |             |
|                                                                                                |                        | Freezing temperatures, May 24-29, with a low of 24 F caused severe stress for some plants.                        |                                   |                    |       |                                    |             |             |             |             |
|                                                                                                |                        | Wind driven hail June 5th caused 20-35% leaf loss. Persisting drought conditions further limited yield potential. |                                   |                    |       |                                    |             |             |             |             |

Table 2 2012 No-Till continuous crop barley variety trial near Denton.  
Exp 3671 Central Agricultural Research Center. Moccasin, Montana

| ID              | Variety                | Entry    | Plant  | Grain       | Grain | Test        | Grain       | Plumpness   |             |             |
|-----------------|------------------------|----------|--------|-------------|-------|-------------|-------------|-------------|-------------|-------------|
|                 |                        |          | Height | Yield       | Yield | Weight      | Protein     | Plump       | mid         | Thin        |
|                 |                        | #        | cm     | bu/a        | lbs/a | lbs/bu      | %           | %           | %           | %           |
| YU501385        | Champion (Brnss/Camas) | 1        | 56.3   | <b>2136</b> | 44.5  | 49.4        | 14.3        | 1.7         | 20.9        | 77.4        |
| COWBOY          | CDC Cowboy             | 2        | 67.3   | 1823        | 38.0  | 48.6        | 15.9        | <b>12.7</b> | <b>46.9</b> | 40.4        |
| MT910189        | Hockett                | 3        | 57.3   | 1950        | 40.6  | 49.1        | 14.8        | 5.2         | 24.3        | 70.5        |
| MT960101        | Geraldine              | 4        | 55.7   | 1915        | 39.9  | 46.7        | 15.9        | 1.4         | 11.9        | 86.7        |
| PI491534        | Gallatin               | 5        | 58.0   | 1931        | 40.2  | 49.7        | 15.4        | 2.0         | 21.8        | 76.2        |
| SK 76333        | Harrington             | 6        | 54.7   | 1710        | 35.6  | 44.9        | 16.7        | 3.6         | 19.0        | 77.4        |
| TR 232          | Metcalfe               | 7        | 57.0   | 1889        | 39.3  | 46.5        | <b>17.9</b> | 3.3         | 23.1        | 73.7        |
| <b>MT950186</b> | <b>Haxby</b>           | <b>8</b> | 53.7   | <b>2169</b> | 45.2  | 50.2        | 14.5        | 1.6         | 16.2        | 82.2        |
| MT010158        | Amsterdam              | 9        | 55.3   | 1620        | 33.7  | <b>51.6</b> | 16.8        | 12.2        | 39.7        | 48.1        |
| MT070158        | MT970148/Klages        | 10       | 55.7   | 2136        | 44.5  | 49.5        | 15.2        | 6.2         | 28.9        | 64.9        |
| MT010160        | MT920041/Harrington    | 11       | 61.0   | 2079        | 43.3  | 46.8        | 15.0        | 4.0         | 25.9        | 70.1        |
| MT070159        | MT970148/Klages        | 12       | 53.0   | 2029        | 42.3  | 47.5        | 15.3        | 6.6         | 30.5        | 62.9        |
| MT080279        | MT970148/MT970116      | 13       | 52.7   | 2050        | 42.7  | 50.2        | 15.0        | 6.7         | 27.0        | 66.2        |
| 6B952482        | Tradition              | 14       | 60.7   | 1877        | 39.1  | 50.3        | 13.8        | 10.6        | 35.8        | 53.5        |
| CONRAD          | Conrad                 | 15       | 54.0   | 2149        | 44.8  | 49.1        | 15.7        | 9.0         | 26.2        | 64.7        |
| MT960228        | Eslick                 | 16       | 51.7   | 1866        | 38.9  | 47.1        | 16.5        | 1.0         | 6.5         | 92.4        |
| Idaho2007       | Lenetah                | 17       | 55.0   | 1878        | 39.1  | 46.0        | 15.5        | 1.7         | 16.1        | 82.1        |
| MT981427        | Lavina                 | 18       | 54.3   | 1874        | 39.0  | 45.8        | 17.2        | 0.6         | 2.6         | <b>96.8</b> |
| Mean            |                        |          | 56.3   | 1949        | 40.6  | 48.25       | 15.6        | 5.0         | 23.5        | 71.5        |
| P value         |                        |          | 0.00   | 0.00        | 0.00  | 0.02        |             |             |             |             |
| CV 1            |                        |          | 4.7    | 6.9         | 6.895 | 3.407       |             |             |             |             |
| LSD (0.05)      |                        |          | 4.4    | 223.1       | 4.645 | 3.469       |             |             |             |             |

Seed Date: 25-Apr-12 No-till continuous crop into lentil stu Soil: 2" Temp 16 C Moist Probe:  
Harvest Date: 7-Aug-12  
Fertilizer: Top Dress urea 60 N W/seed: 50 lbs 20+20+20+10  
Comment: Seeding conditions were good. Lentil stubble provides an excellent spring seed bed. Precipitation was above average in April but lower through the balance of the growing season. Conditions were conducive to root growth which enabled the crop to endure below average precipitation and above average temperatures.

Table 3 2012 No-Till continuous crop barley variety trial near Geraldine.  
Exp 367011 Central Agricultural Research Center. Moccasin, Montana

| ID              | Variety/Pedigree       | Entry    | Plant  | Grain       | Grain | Test        | Grain       | Plumpness   |             |             |
|-----------------|------------------------|----------|--------|-------------|-------|-------------|-------------|-------------|-------------|-------------|
|                 |                        |          | Height | Yield       | Yield | Weight      | Protein     | Plump       | Mid         | Thin        |
|                 |                        |          | cm     | lbs/a       | bu/a  | lbs/bu      | %           | %           | %           | %           |
| YU501385        | Champion (Brnss/Camas) | 1        | 57     | <b>2867</b> | 59.7  | 54.1        | 11.4        | 45.8        | 38.0        | 16.2        |
| COWBOY          | CDC Cowboy             | 2        | 66     | 2301        | 48.0  | 53.8        | 13.3        | 72.0        | 20.3        | 7.7         |
| MT910189        | Hockett                | 3        | 82     | 2577        | 53.7  | 54.2        | 11.3        | <b>79.1</b> | 14.8        | 6.1         |
| MT960101        | Geraldine              | 4        | 67     | 2510        | 52.3  | 53.2        | 12.7        | 28.5        | 39.0        | 32.5        |
| PI491534        | Gallatin               | 5        | 65     | 2418        | 50.4  | 51.9        | 12.6        | 54.5        | 30.4        | 15.0        |
| SK 76333        | Harrington             | 6        | 69     | 2544        | 53.0  | 52.1        | 13.0        | 46.8        | 30.4        | 22.8        |
| TR 232          | Metcalf                | 7        | 66     | 2454        | 51.1  | 52.7        | 13.8        | 54.5        | 30.2        | 15.3        |
| <b>MT950186</b> | <b>Haxby</b>           | <b>8</b> | 67     | <b>3100</b> | 64.6  | <b>56.1</b> | 12.1        | 33.5        | <b>42.8</b> | 23.8        |
| MT010158        | Amsterdam              | 9        | 66     | 2152        | 44.8  | 54.1        | 15.0        | 61.2        | 23.9        | 14.9        |
| MT070158        | MT970148/Klages        | 10       | 69     | 2555        | 53.2  | 53.1        | 14.0        | 49.9        | 33.9        | 16.3        |
| MT010160        | MT920041/Harrington    | 11       | 58     | 2747        | 57.2  | 52.0        | 13.7        | 36.9        | 35.5        | 27.6        |
| MT070159        | MT970148/Klages        | 12       | 60     | 2649        | 55.2  | 51.6        | 13.1        | 49.8        | 33.6        | 16.6        |
| MT080279        | MT970148/MT970116      | 13       | 76     | 2660        | 55.4  | 50.6        | 12.8        | 40.6        | 36.3        | 23.1        |
| 6B952482        | Tradition              | 14       | 67     | 2714        | 56.5  | 51.4        | 12.8        | 28.8        | 41.7        | 29.5        |
| CONRAD          | Conrad                 | 15       | 58     | 2748        | 57.3  | 51.4        | 13.5        | 63.9        | 22.4        | 13.7        |
| MT960228        | Eslick                 | 16       | 61     | 2394        | 49.9  | 52.7        | 12.9        | 26.2        | 39.2        | 34.6        |
| Idaho2007       | Lenetah                | 17       | 66     | 2743        | 57.1  | 50.7        | 13.0        | 40.9        | 35.8        | 23.4        |
| MT981427        | Lavina                 | 18       | 70     | 2759        | 57.5  | 48.9        | <b>16.0</b> | 4.5         | 21.4        | <b>74.1</b> |
| Mean            |                        |          | 98.7   | 2605        | 54.3  | 52.5        | 13.2        | 45.4        | 31.6        | 22.9        |
| P value         |                        |          |        | 0           | 0.0   | 0.0         |             |             |             |             |
| CV 1            |                        |          |        | 5.136       | 5.1   | 2.9         |             |             |             |             |
| LSD (0.05)      |                        |          |        | 222         | 4.6   | 3.2         |             |             |             |             |

Seed Date: 25-Apr-12 No-till continuous crop into heavy winter wheat stubble.  
Harvest Date: 13-Aug-12 Soil: 2" temp: 12C Moist Probe: 18"  
Fertilizer: Top Dress urea 45 N W/seed: 50 lbs 20+20+20+10  
Comment: Surface soil moisture conditions were good for seeding. Crop residue was heavy, so some seedlings did not establish leaving occasional small gaps in stand.

Table 4 Moccasin multi-year spring barley variety grain yields in no-till CC.

Exp 3670 Central Agricultural Research Center. Moccasin, Montana

| Selected entries | 2007      | 2008      | 2009      | 2010      | 2011      | 2012        | Haxby average | Same Yrs    |
|------------------|-----------|-----------|-----------|-----------|-----------|-------------|---------------|-------------|
|                  |           |           |           |           | bu/a      |             |               |             |
| Champion         |           | 45        | 49        | 51        |           | 27.4        | 43.2          | 46.8        |
| Conrad           | 39        | 41        | 51        | 56        | 36        | 30.0        | 42.1          | 45.2        |
| Gallatin         |           |           | <b>46</b> | 60        | 31        | 29.3        | 41.4          | 45.3        |
| Geraldine        | 45        | 44        | 47        | 56        | 29        | 27.1        | 41.1          | 45.2        |
| Harrington       | 38        | 41        | 46        | 40        | 28        | 22.4        | 35.9          | 45.2        |
| <b>Haxby</b>     | <b>48</b> | <b>42</b> | <b>48</b> | <b>59</b> | <b>36</b> | <b>37.6</b> | <b>45.2</b>   | <b>45.2</b> |
| Hockett          | 34        | 45        | 41        | 56        | 32        | 25.0        | 38.9          | 45.2        |
| Metcalfe         | 34        | 30        | 42        | 46        | 29        | 24.5        | 34.1          | 45.2        |
| MT010158 Amstr   |           | 51        | 53        | 48        | 34        | 37.6        | 44.6          | 44.7        |
| Tradition        |           |           |           |           | 31        | 28.1        | 29.6          | 37.0        |
| Means            | 40.8      | 41.0      | 47.9      | 55.27     | 32        | 29.52       |               |             |

Varieties with multi-year mean > than Haxby for the same years are in **bold**.

Table 5 Denton multi-year spring barley variety grain yields in no-till CC.

Exp 36701 Central Agricultural Research Center. Moccasin, Montana

| Selected entries | 2007      | 2008      | 2009      | 2010      | 2011      | 2012        | Haxby average | Same Yrs    |
|------------------|-----------|-----------|-----------|-----------|-----------|-------------|---------------|-------------|
|                  |           |           |           |           | bu/a      |             |               |             |
| Champion         |           | 38        | 58        | 50        |           | 44.5        | <b>47.7</b>   | 44.9        |
| Conrad           | 29        | 35        | 41        | 56        | 21        | 44.8        | 37.7          | 38.1        |
| Gallatin         |           |           | 42        | 52        | 21        | 40.2        | 38.7          | 41.1        |
| Geraldine        | 31        | 37        | 45        | 51        | 23        | 39.9        | 37.6          | 38.1        |
| Harrington       | 27        | 33        | 38        | 47        | 20        | 35.6        | 33.3          | 38.1        |
| <b>Haxby</b>     | <b>28</b> | <b>36</b> | <b>40</b> | <b>58</b> | <b>21</b> | <b>45.2</b> | <b>38.1</b>   | <b>38.1</b> |
| Hockett          | 28        | 38        | 46        | 47        | 23        | 40.6        | 36.9          | 38.1        |
| Metcalfe         | 29        | 36        | 42        | 49        | 19        | 39.3        | 35.6          | 38.1        |
| MT010158         |           | 34        | 41        | 58        | 20        | 33.7        | 37.5          | 40.1        |
| Tradition        |           |           |           |           | 21        | 39.1        | 30.2          | 39.8        |
| Mean             | 30.0      | 35.9      | 43.4      | 53.2      | 21.32     | 40.6        |               |             |

Varieties with multi-year mean > than Haxby for the same years are in **bold**.

Table 6 Moccasin multi-year barley variety grain test weight on no-till CC.  
Exp 3670 Central Agricultural Research Center. Moccasin, Montana

| Selected entries | 2007        | 2008        | 2009        | 2010        | 2011        | 2012        | Average     | Haxby Same Yrs |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------|
| Champion         |             | 51.7        | 54.2        | 51.3        |             | 52.7        | 52.5        | 53.4           |
| Conrad           | 52          | 49.2        | 52.9        | 50.5        | 50.7        | 51.8        | 51.2        | 53.7           |
| Gallatin         |             |             | 53.3        | 51.1        | 52.8        | 51.2        | 52.1        | 53.8           |
| Geraldine        | 52.3        | 49.0        | 53.3        | 51.5        | 52.0        | 51.1        | 51.5        | 53.7           |
| Harrington       | 51.3        | 47.7        | 53.1        | 50.5        | 50.6        | 51.3        | 50.7        | 53.7           |
| <b>Haxby</b>     | <b>54.6</b> | <b>52.2</b> | <b>54.6</b> | <b>53.2</b> | <b>54.1</b> | <b>53.4</b> | <b>53.7</b> | <b>53.7</b>    |
| Hockett          | 52.7        | 49.4        | 54.3        | 52.4        | 52.6        | 51.6        | 52.2        | 53.7           |
| Metcalfe         | 51.5        | 49.7        | 54.1        | 50.7        | 51.8        | 51.7        | 51.6        | 53.7           |
| MT010158         |             | 50.5        | 53.4        | 51.0        | 50.7        | 51.8        | 51.5        | 53.5           |
| Tradition        |             |             |             |             | 50.9        | 49.7        | 50.3        | 53.8           |
| Means            | 51.93       | 49.0        | 53.6        | 51.45       | 51.53       | 51.46       |             |                |

Varieties with multi-year mean > than Haxby for the same years are in **bold**.

Table 7 Denton multi-year spring barley variety test weights in no-till CC.  
Exp 36701 Central Agricultural Research Center. Moccasin, Montana

| Selected entries | 2007        | 2008        | 2009        | 2010        | 2011        | 2012        | Average     | Haxby Same Yrs |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------|
|                  |             |             |             | lbs/bu      |             |             |             |                |
| Champion         |             | 52.4        | 56.5        | 54.9        |             | 49.4        | 53.3        | 53.2           |
| Conrad           | 46.1        | 49.9        | 55.0        | 53.0        | 53.0        | 49.1        | 51.0        | 52.4           |
| Gallatin         |             |             | 55.1        | 53.5        | 52.5        | 49.7        | 52.7        | 52.7           |
| Geraldine        | 46.7        | 51.1        | 54.3        | 53.0        | 53.0        | 46.7        | 50.8        | 52.4           |
| Harrington       | 46.8        | 52.3        | 55.4        | 53.1        | 53.5        | 44.9        | 51.0        | 52.4           |
| <b>Haxby</b>     | <b>50.2</b> | <b>53.4</b> | <b>55.0</b> | <b>54.2</b> | <b>51.5</b> | <b>50.2</b> | <b>52.4</b> | <b>52.4</b>    |
| Hockett          | 49.6        | 51.5        | 55.8        | 53.9        | 54.0        | 49.1        | 52.3        | 52.4           |
| Metcalfe         | 47.0        | 51.2        | 55.6        | 52.8        | 53.0        | 46.5        | 51.0        | 52.4           |
| MT010158         |             | 51.8        | 54.3        | 54.5        | 54.0        | 51.6        | 53.2        | 52.9           |
| Tradition        |             |             |             |             | 51.0        | 50.3        | 50.7        | 50.8           |
| Mean             | 46.98       | 50.87       | 55.0        | 53.6        | 52.41       | 48.25       |             |                |

Varieties with multi-year mean > than Haxby for the same years are in **bold**.

Table 8 Moccasin multi-year barley variety grain protein on no-till CC.

Exp 3670 Central Agricultural Research Center. Moccasin, Montana

| Selected entries | 2007        | 2008        | 2009        | 2010        | 2011        | 2012        | average     | Haxby Same Yrs |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------|
|                  |             | %           |             |             |             |             |             |                |
| Champion         |             | 13.0        | 14.2        | 11.1        |             | 16.6        | 13.7        | 13.8           |
| Conrad           | 16.0        | 14.0        | 16.1        | 12.8        | 15.5        | 17.9        | <b>15.4</b> | 13.8           |
| Gallatin         |             |             | <b>15.1</b> | 10.9        | 15.6        | 17.1        | <b>14.7</b> | 14.2           |
| Geraldine        | 16.4        | 13.7        | 15.0        | 12.1        | 17.0        | 18.8        | <b>15.5</b> | 13.8           |
| Harrington       | 15.5        | 14.0        | 15.0        | 12.1        | 16.2        | 17.9        | <b>15.1</b> | 13.8           |
| <b>Haxby</b>     | <b>13.8</b> | <b>12.6</b> | <b>14.8</b> | <b>10.9</b> | <b>14.2</b> | <b>16.7</b> | <b>13.8</b> | <b>13.8</b>    |
| Hockett          | 15.8        | 13.2        | 14.4        | 12.0        | 15.1        | 16.6        | <b>14.5</b> | 13.8           |
| Metcalfe         | 17.3        | 15.2        | 15.5        | 11.6        | 16.1        | 18.6        | <b>15.7</b> | 13.8           |
| MT010158         |             | 13.3        | 15.4        | 11.8        | 16.0        | 18.7        | <b>15.0</b> | 13.8           |
| Tradition        |             |             |             |             | 14.6        | 17.1        | <b>15.9</b> | 15.5           |

Means 15.51 13.10 14.60 11.37 15.3 17.3

Varieties with multi-year mean > than Haxby for the same years are in **bold**.

Table 9 Denton multi-year barley variety protein content on no-till CC.

Exp 36701 Central Agricultural Research Center. Moccasin, Montana

| Selected entries | 2007        | 2008        | 2009        | 2010        | 2011        | 2012        | average     | Haxby Same Yrs |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------|
|                  |             | %           |             |             |             |             |             |                |
| Champion         |             | 13.3        | 13.4        | 12.4        |             | 14.3        | 13.4        | 13.4           |
| Conrad           | 16.5        | 13.7        | 15.0        | 12.5        | 14.4        | 15.7        | <b>14.6</b> | 13.7           |
| Gallatin         |             |             | 14.4        | 12.7        | 14.8        | 15.4        | <b>14.3</b> | 13.7           |
| Geraldine        | 15.3        | 14.2        | 14.1        | 13.3        | 14.8        | 15.9        | <b>14.6</b> | 13.7           |
| Harrington       | 15.7        | 13.6        | 14.4        | 13.9        | 17.0        | 16.7        | <b>15.2</b> | 13.7           |
| <b>Haxby</b>     | <b>13.7</b> | <b>13.4</b> | <b>13.7</b> | <b>12.1</b> | <b>14.6</b> | <b>14.5</b> | <b>13.7</b> | <b>13.7</b>    |
| Hockett          | 13.5        | 13.2        | 13.5        | 12.2        | 14.1        | 14.8        | 13.6        | 13.7           |
| Metcalfe         | 15.0        | 14.0        | 14.9        | 13.4        | 15.1        | 17.9        | <b>15.1</b> | 13.7           |
| MT010158         |             | 14.5        | 14.8        | 13.4        | 13.6        | 16.8        | <b>14.6</b> | 13.7           |
| Tradition        |             |             |             |             | 13.3        | 13.8        | 13.6        | 14.6           |

Mean 14.36 13.59 13.80 12.56 14.2 15.6

Varieties with multi-year mean > than **Haxby** for the same years are in **bold**.