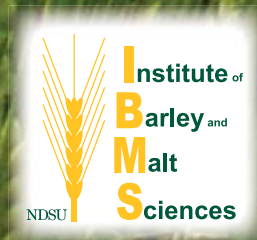


# B A R L E Y

## 2010 Crop Quality Report



# 2010 Regional Barley Crop Quality Report North Dakota and Minnesota

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## Introduction

This is the 32nd annual Regional Crop Quality Report for barley grown in North Dakota and northwestern Minnesota (Figure 1). The data in this report summarizes analytical information obtained from 248 barley samples collected at farms and elevators during the 2010 barley harvest. The U.S. Department of Agriculture (USDA), North Dakota Agricultural Statistics Service, Fargo, N.D., coordinated sample collection. Grain quality evaluations were performed by the Department of Plant Sciences at North Dakota State University (NDSU), grade determinations were made by the North Dakota Grain Inspection Service Inc., Fargo, N.D. and financial support was provided by the North Dakota Barley Council, Fargo, N.D.

## Weather, Growing Season and Harvest

Early seeding and adequate to excess moisture during the 2010 growing season helped produce a good to excellent regional barley crop. In North Dakota, the month of April was warm, and dry. At this time, precipitation was about one-half inch below normal (the 1971-2000 average). This allowed an early start to planting and by April 25, seeding had begun. Planting was nearly complete (97 percent planted) by May 30, well ahead of the previous year (77 percent planted) and the five year average (94 percent planted). A cooler

than average May and early June slowed crop growth. A return to warmer temperatures pushed the crop along, although precipitation amounts began climbing at that time. By June 14, ninety-eight percent of the crop had emerged (compared to 86 percent in 2009 and the five year average of 97 percent). Throughout the summer, the northern crop reporting districts (CRD- 1, CRD- 2 and CRD- 3) received abundant rainfall. Regionally, annual precipitation can range from under 12 inches in the west to over 24 inches in east. By September 12, the total average seasonal precipitation in all crop reporting districts ranged from two to four inches above the 1971-2000 average. By this time, harvest was 97 percent complete, compared to 82 percent complete in 2009 and the five year average of 96 percent complete.

In Minnesota, ninety-eight percent of the crop was seeded by May 9. This was well ahead of the 28 percent seeded by this date in 2009 and ahead of the five year average of 57 percent seeded. By May 24, ninety-eight percent of the crop had emerged (compared to 27 percent in 2009 and the five year average of 61 percent). Severe thunderstorms with localized hail and wind impacted the barley crop in mid to late June, just as the crop was heading. Warmer and drier conditions in July and August pushed the crop to develop ahead of average. By the end of August, the seasonal rainfall in the northwestern district of Minnesota (CRD-1) was about 2 inches above normal (the 1971-2000 average).

Figure 1. Crop Reporting Districts (CRD) in North Dakota and Minnesota.

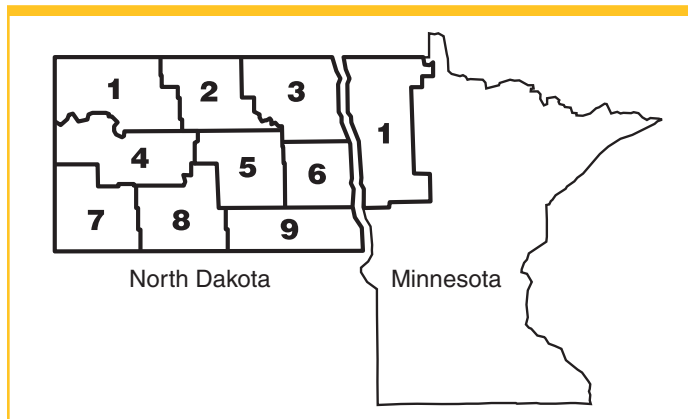
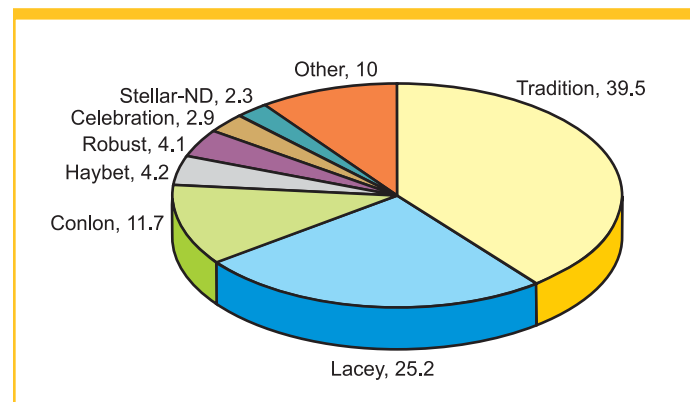


Figure 2. 2010 Regional Barley Variety Distribution (Percentage by Acreage)



Harvest was essentially complete (99 percent) by August 30, this compares to 37 percent complete in 2009 and the five year average of 84 percent complete.

#### Resources:

- National Agricultural Statistics Service. 2010. Statistics by State [Online]. Available at USDA-NASS Minnesota Statistics. [http://www.nass.usda.gov/Statistics\\_by\\_State/Minnesota/index.asp](http://www.nass.usda.gov/Statistics_by_State/Minnesota/index.asp) (Verified 6 Oct. 2010)
- National Agricultural Statistics Service. 2010. Statistics by State [Online]. Available at USDA-NASS North Dakota Statistics. [http://www.nass.usda.gov/Statistics\\_by\\_State/North\\_Dakota/index.asp](http://www.nass.usda.gov/Statistics_by_State/North_Dakota/index.asp) (Verified 6 Oct. 2010)
- National Agricultural Statistics Service. 2010. Small Grain Annual Summary [Online]. Available at USDA-NASS Small Grain Annual Summary. <http://usda.mannlib.cornell.edu/usda/current/SmalGraiSu/SmalGraiSu-09-30-2010.pdf> (Verified 6 Oct. 2010)
- National Agricultural Statistics Service. 2010. Weekly Weather and Crop Bulletin [Online]. Available at USDA World Agricultural Outlook Board. <http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1393> (Verified 6 Oct. 2010)
- North Dakota Agricultural Weather Network Center. 2010. Monthly Data Table [Online]. Available at NDAWN Center. <http://ndawn.ndsu.nodak.edu/monthly-table-form.html>. (Verified 14 Oct. 2010)

## Production and Varieties

The USDA (Sept. 30, 2010) estimated 2010 barley production in North Dakota and Minnesota at 48.2 million bushels (1.05 million metric tons). This represents a decrease of approximately 35.8 million bushels (780 thousand metric tons) from the 2009 crop year. Decreased production, in the survey region, was primarily the result of a 38 percent reduction in both planted and harvested acreage. Planted acreage fell from 1.3 million acres in 2009 to 805 thousand acres in 2010. Of the acres planted, 705 thousand were harvested. Contributing to the reduced production, the average yield of the North Dakota crop fell from the 2009 level of 70 bushels per acre (bu/acre) (3.8 metric tons per hectare, mt/ha) to 65 bu/acre (3.5 mt/ha). In Minnesota, the average yield was estimated at 62 bu/acre (3.3 mt/ha), similar to that observed in 2009.

According to the USDA/National and State Agricultural Statistics Services Tradition and Lacey were the most widely planted barley varieties in the North Dakota and northwestern Minnesota survey region. The six-rowed barley varieties, Tradition, Lacey, Robust, Celebration and Stellar-ND accounted for 40, 25, 4, 3, and 2 percent, respectively, of barley acres planted (Figure 2).

Two-rowed barley varieties are grown primarily in the western crop reporting districts of North Dakota. Conlon remained the most widely planted two-rowed variety, accounting for 12 percent of the planted acreage. Total acres planted to the two-rowed forage variety, Haybet, increased in 2010. Four percent of the region's acreage is planted with Haybet.

## Materials and Methods

Samples weighing from 1 to 2 pounds each were collected during harvest from all counties in North Dakota and selected counties in Minnesota. Samples were collected from farms and country elevators. The objective was to collect a representative number of samples from each selected county within the survey region. This number was determined from the projected barley production for each county. Two- and six-rowed samples were differentiated based upon varietal identification by the grower or kernel morphology.

The survey region includes a total of ten crop reporting districts. This includes one district in Minnesota and nine districts in North Dakota. Two hundred seventeen six-rowed barley samples were collected in eight crop reporting districts of North Dakota and in the northwestern district of Minnesota (Figure 1). Thirty-one two-rowed barley samples were collected from seven districts within North Dakota. Data was averaged for districts only where significant amounts of two-rowed barley were produced. The North Dakota state averages were based on data from all 31 two-rowed barley samples. The total number of six- and two-rowed samples collected within each county is shown in Appendix 1.

Upon receipt, the initial barley moisture content was recorded and samples in excess of 13.5 percent were allowed to air-dry prior to subsequent analyses. A small portion (50 grams) of each sample was removed and bulked according to district. These district composite samples were submitted to the North Dakota Grain Inspection Service Inc. for determination of grade. Dockage content was determined on each district composite sample.

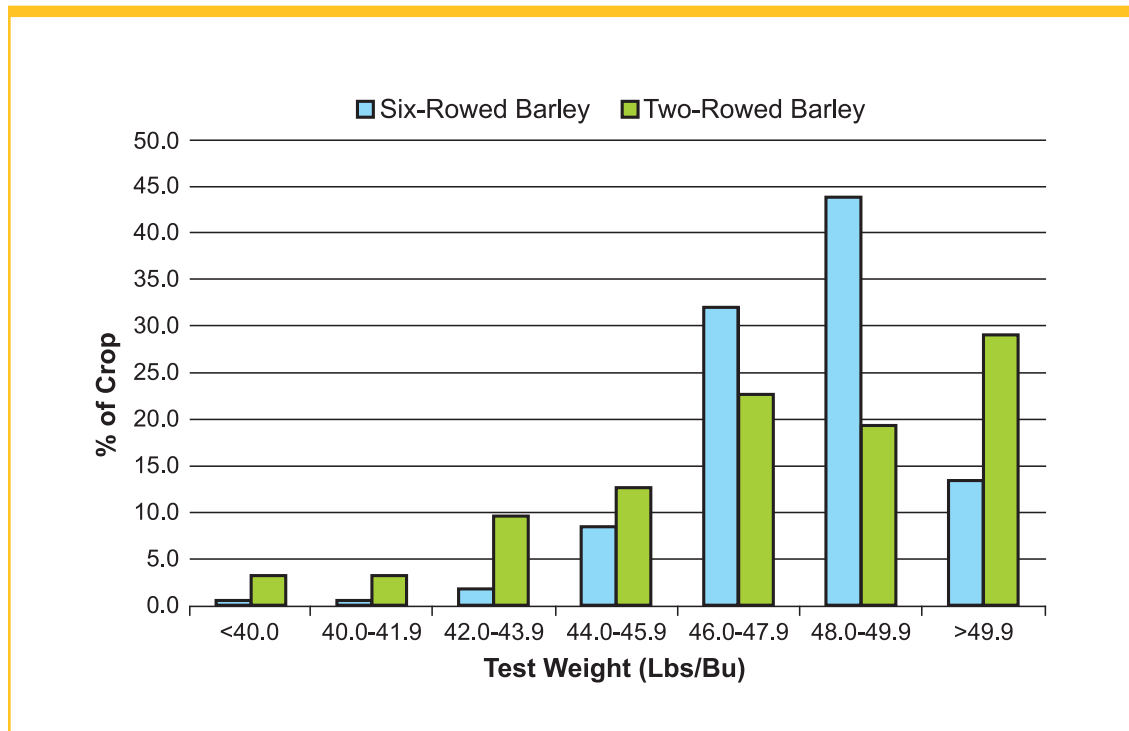
Prior to further analysis, all samples collected were cleaned on a Carter dockage tester. Test weight, protein, kernel assortment, 1,000 kernel weight and kernel color were determined for each of the dockage-free samples. The values for district, state and regional averages represent the average of all individual sample results

**Table 1. 2010 Regional Six-Rowed Barley Crop Quality.**

State and Crop Reporting District (CRD)	Dockage (%)	Moisture Content (%)	Test Weight		1000 Kernel Weight (g)	Protein Content (%)	Color Score*	Kernel Assortment**	
			(lbs/bu)	(kg/hl)				% Plump	% Thin
<b>North Dakota</b>									
CRD-1	0.3	14.3	47.9	61.7	38.5	12.4	7	90.0	1.4
CRD-2	0.3	14.0	48.4	62.3	39.4	12.3	7	93.3	0.8
CRD-3	0.5	13.8	47.9	61.7	37.8	12.0	7	87.6	1.6
CRD-4	0.3	13.1	47.7	61.4	37.0	12.3	6	85.7	2.1
CRD-5	0.9	13.4	48.4	62.3	37.3	12.4	7	87.9	1.4
CRD-6	0.3	13.8	47.7	61.4	38.0	12.3	6	91.7	1.1
CRD-8	2.7	12.7	47.0	60.5	33.9	12.7	6	73.5	7.7
CRD-9	0.7	13.0	46.9	60.3	35.1	12.5	6	82.1	2.4
<b>ND State Average</b>	<b>0.6</b>	<b>13.7</b>	<b>48.0</b>	<b>61.7</b>	<b>37.8</b>	<b>12.3</b>	<b>7</b>	<b>88.4</b>	<b>1.7</b>
<b>Minnesota</b>									
CRD-1	0.6	14.1	48.4	62.3	38.9	12.1	7	89.9	1.3
<b>MN State Average</b>	<b>0.6</b>	<b>14.1</b>	<b>48.4</b>	<b>62.3</b>	<b>38.9</b>	<b>12.1</b>	<b>7</b>	<b>89.9</b>	<b>1.3</b>
<b>Regional Average</b>	<b>0.6</b>	<b>13.8</b>	<b>48.0</b>	<b>61.8</b>	<b>37.9</b>	<b>12.3</b>	<b>7</b>	<b>88.6</b>	<b>1.6</b>

\*The lower the color score the brighter the barley (scale 1 to 10).

\*\*% Plump: kernels retained on or above a 6/64 x 3/4 inch (2.4 x 19 mm) slotted sieve. % Thin: kernels passing through a 5/64 x 3/4 inch (2.0 x 19 mm) slotted sieve.



**Figure 3.**  
**2010 Regional**  
**Barley**  
**Test Weight**  
**Distribution.**

within their respective area. Separate district, state and regional averages were calculated for two- and six-rowed barley.

## Crop Quality

### Test Weight

The 2010 regional six-rowed barley crop exhibited an average test weight of 48.0 pounds per bushel (lbs/bu) or 61.8 kilograms per hectoliter (kg/hl) (Table 1). North Dakota and Minnesota state averages were 48.0

and 48.4 lbs/bu (61.8 and 62.3 kg/hl), respectively. District averages ranged from 46.9 to 48.4 lbs/bu (60.3 to 62.3 kg/hl). Only North Dakota's south-central and southeastern districts (CRD-8 and CRD-9) reported average test weight below 47.7 lbs/bu (61.4 kg/hl). Test weights of individual samples ranged from 38.3 to 53.2 lbs/bu (49.3 to 68.5 kg/hl). Regionally, 89 percent of the six-rowed barley samples had test weights at or above 46 lbs/bu. Fifty-seven percent of the six-rowed samples exhibited test weights of 48 lbs/bu (61.8 kg/hl) or greater (Figure 3).

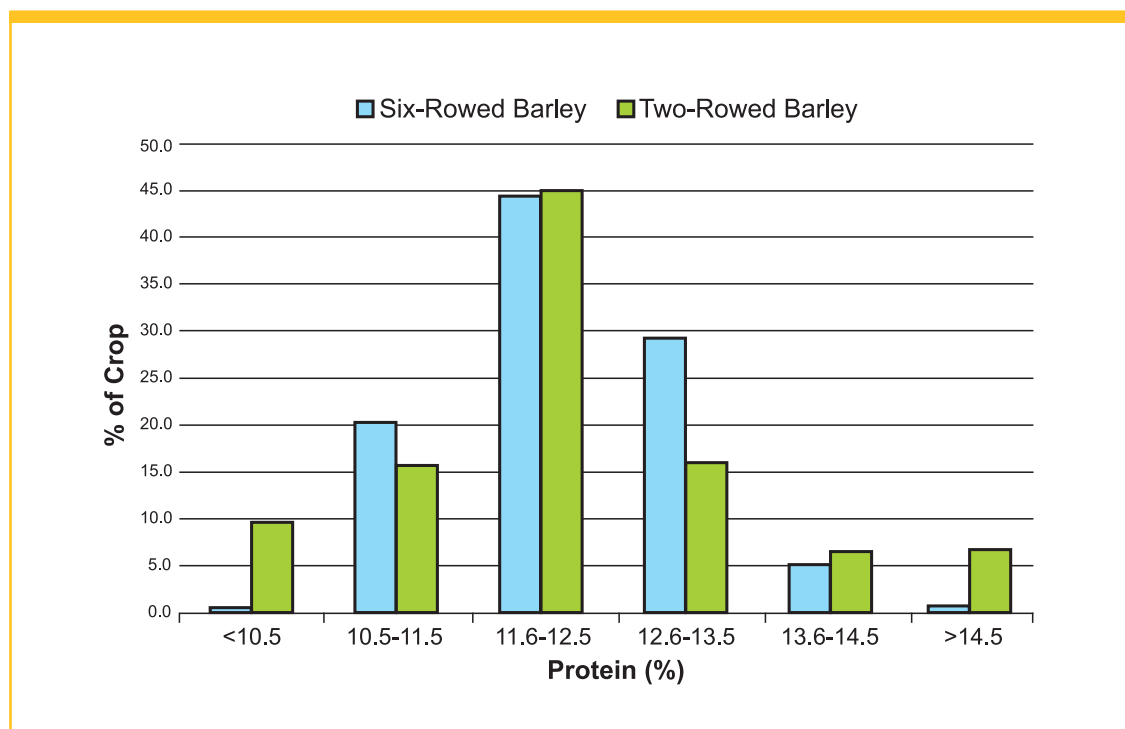
**Table 2. 2010 North Dakota Two-Rowed Barley Crop Quality.**

State and Crop Reporting District (CRD)	Dockage (%)	Moisture Content (%)	Test Weight		1000 Kernel Weight (g)	Protein Content (%)	Color Score*	Kernel Assortment**	
			(lbs/bu)	(kg/hl)				% Plump	% Thin
<b>North Dakota</b>									
CRD-2	0.3	14.6	50.7	65.2	51.3	10.9	7	96.0	0.9
CRD-7	0.3	11.9	47.4	61.1	43.6	12.5	7	79.4	5.6
CRD-8	2.5	12.1	47.1	60.6	40.9	11.9	6	81.6	3.8
All Other Districts	0.4	13.2	44.9	57.8	42.1	12.1	7	76.3	6.2
<b>ND State Average</b>	<b>0.7</b>	<b>12.6</b>	<b>47.3</b>	<b>60.9</b>	<b>44.0</b>	<b>12.0</b>	<b>7</b>	<b>81.8</b>	<b>4.6</b>

\*The lower the color score the brighter the barley (scale 1 to10).

\*\*% Plump: kernels retained on or above a 6/64 x 3/4 inch (2.4 x 19 mm) slotted sieve. % Thin: kernels passing through a 5/64 x 3/4 inch (2.0 x 19 mm) slotted sieve.

**Figure 4. 2010 Regional Barley Protein Distribution.**



The regional two-rowed barley average test weight was 47.3 lbs/bu (60.9 kg/hl) (Table 2). North Dakota's north-central district (CRD-2) produced the highest two-rowed barley average of 50.7 lbs/bu (65.2 kg/hl). Forty-eight percent of the regional two-rowed barley samples displayed test weight values of 48 lbs/bu (61.8 kg/hl) or greater (Figure 3).

## Protein

The average protein content of the 2010 regional six-rowed barley crop was 12.3 percent (Table 1). The North Dakota and Minnesota state averages were 12.3 percent and 12.1 percent, respectively. The highest district average protein content (12.7 percent) was observed in North Dakota's south-central district (CRD-8). North Dakota's northeastern district (CRD-3) reported the lowest average protein content of 12.0 percent. All districts within the region reported averages below 13.0 percent protein. Only six percent of the regional six-rowed samples tested above 13.5 percent protein (Figure 4). Eighty-four percent of the samples tested between 10.5 percent and 13.0 percent protein.

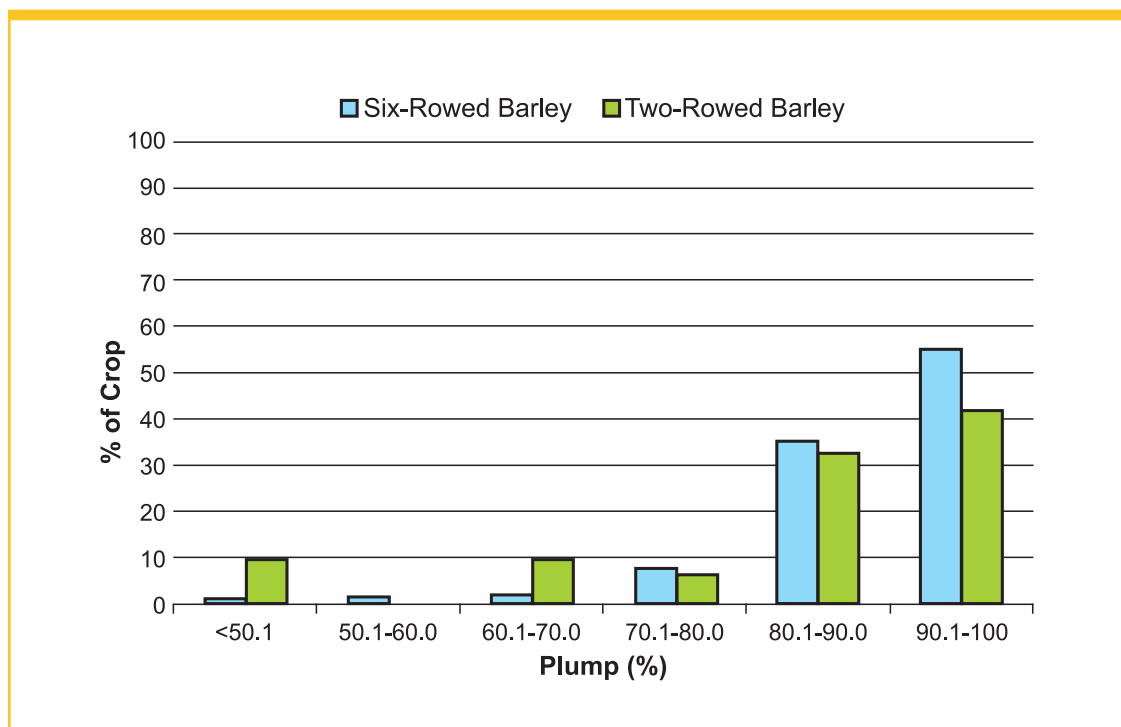
The average protein content in the 2010 two-rowed barley crop was 12.0 percent (Table 2). The north-central district of North Dakota (CRD-2) observed the lowest district average two-rowed barley protein content of 10.9 percent. The highest average protein content of

12.5 percent was found in the state's south-central district (CRD-8). Sixty-one percent of the two-rowed barley samples were between 10.5 percent and 12.5 percent protein (Figure 4). Nineteen percent of the two-rowed barley crop samples were above 13.0 percent protein.

## Kernel Plumpness

The regional average kernel plumpness for the 2010 six-rowed barley crop was 88.6 percent (Table 1). Average kernel plumpness in North Dakota and Minnesota was 88.4 percent plump and 89.9 percent plump, respectively. Ninety percent of the regional six-rowed barley samples exhibited kernel plumpness in excess of 80 percent plump (Figure 5). Three North Dakota districts, northwestern (CRD-1), north-central (CRD-2) and east-central (CRD-6), reported average kernel plumpness of 90 percent or greater. Average kernel plumpness was lowest, 73.5 percent plump, in the south-central district (CRD-8) of North Dakota.

Average kernel plumpness for the two-rowed barley crop was 81.8 percent plump (Table 2). The north-central district (CRD-2) of North Dakota displayed the highest average kernel plumpness of 96.0 percent. Approximately 42 percent of the two-rowed barley samples analyzed were in excess of 90 percent plump (Figure 5).



**Figure 5.**  
2010 Regional Barley Kernel Plumpness Distribution.

**Table 3. Grade and Grade Requirements for Six-Rowed Malting Barley and Six-Rowed Blue Malting Barley.**

Grade	Minimum limits of-				Maximum limits of-				
	Test Weight		Suitable Malting Type (%)	Sound Barley* (%)	Damaged Kernels* (%)	Foreign Material (%)	Other Grains (%)	Skinned and Broken Kernel (%)	Thin Barley** (%)
	(lbs/bu)	(kg/hl)							
U.S. No. 1	47.0	60.5	95.0	97.0	2.0	0.5	2.0	4.0	7.0
U.S. No. 2	45.0	57.9	95.0	94.0	3.0	1.0	3.0	6.0	10.0
U.S. No. 3	43.0	55.3	95.0	90.0	4.0	2.0	5.0	8.0	15.0
U.S. No. 4	43.0	55.3	95.0	87.0	5.0	3.0	5.0	10.0	15.0

\*Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels or considered against sound barley.

Notes: Malting barley shall not be infested, blighted, ergoty, garlicky, smutty, or contain any special grades. Upon request, malting barley varieties may be inspected and graded in accordance with standards established for the class Barley. Six-rowed Malting and Six-Rowed Blue Malting barley that does not meet the requirements for U.S. Nos. 1, 2, 3, or 4 Malting shall be graded under the Barley standards (see Table 5).

\*\* Use the 5/64 x 3/4 slotted-hole sieve.

Information from: United States Department of Agriculture, Grain Inspection, Packers and Stockyards Administration, Federal Grain Inspection Service, Grain Inspection Handbook, Book II, Barley, August 9, 2004

**Table 4. Grading Information for the 2010 Six-Rowed Barley Crop in North Dakota, Minnesota and the Region.**

State and Crop Reporting District (CRD)	Test Weight		Suitable Malting Type (%)	Sound Barley* (%)	Damaged Kernels* (%)	Foreign Material (%)	Other Grains (%)	Skinned & Broken Kernels (%)	Thin Barley (%)	Grade
	(lbs/bu)	(kg/hl)								
<b>North Dakota</b>										
CRD-1	48.5	62.4	>95.0	98.6	0.4	0.0	1.0	2.6	0.9	U.S. No. 1 Six-Rowed Malting Barley
CRD-2	48.9	62.9	>95.0	99.3	0.0	0.0	0.7	3.0	0.5	U.S. No. 1 Six-Rowed Malting Barley
CRD-3	48.6	62.6	>95.0	99.7	0.0	0.0	0.3	3.1	1.1	U.S. No. 1 Six-Rowed Malting Barley
CRD-4	47.8	61.5	>95.0	99.6	0.2	0.0	0.2	3.7	1.3	U.S. No. 1 Six-Rowed Malting Barley
CRD-5	49.0	63.1	>95.0	99.5	0.2	0.0	0.5	3.0	0.7	U.S. No. 1 Six-Rowed Malting Barley
CRD-6	48.1	61.9	>95.0	99.8	0.0	0.0	0.2	2.2	0.8	U.S. No. 1 Six-Rowed Malting Barley
CRD-8	47.3	60.9	>95.0	99.7	0.2	0.0	0.3	2.8	5.8	U.S. No. 1 Six-Rowed Malting Barley
CRD-9	47.1	60.6	>95.0	99.2	0.2	0.0	0.6	1.2	1.6	U.S. No. 1 Six-Rowed Malting Barley
<b>State</b>										
<b>Average</b>	<b>48.2</b>	<b>62.0</b>	<b>&gt;95.0</b>	<b>99.4</b>	<b>0.2</b>	<b>0.0</b>	<b>0.5</b>	<b>2.7</b>	<b>1.6</b>	<b>U.S. No. 1 Six-Rowed Malting Barley</b>
(An average of the CRD composites)										
<b>Minnesota</b>										
CRD-1	49.0	63.1	>95.0	99.6	0.0	0.0	0.4	3.0	0.8	U.S. No. 1 Six-Rowed Malting Barley
<b>State</b>										
<b>Average</b>	<b>49.0</b>	<b>63.1</b>	<b>&gt;95.0</b>	<b>99.6</b>	<b>0.0</b>	<b>0.0</b>	<b>0.4</b>	<b>3.0</b>	<b>0.8</b>	<b>U.S. No. 1 Six-Rowed Malting Barley</b>
(An average of the CRD composites)										
<b>Regional</b>										
<b>Average</b>	<b>48.3</b>	<b>62.1</b>	<b>&gt;95.0</b>	<b>99.4</b>	<b>0.1</b>	<b>0.0</b>	<b>0.5</b>	<b>2.7</b>	<b>1.5</b>	<b>U.S. No. 1 Six-Rowed Malting Barley</b>
(An average of the CRD composites)										

\*Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels or considered against sound barley.

## 1000 Kernel Weight

The 2010 regional six-rowed barley crop exhibited an average 1,000 kernel weight of 37.9 grams (Table 1). The state average 1000 kernel weight observed in North Dakota was 37.8 grams and in Minnesota it was 38.9 grams. North Dakota's north-central district (CRD-2) exhibited the highest average 1,000 kernel weight of 39.4 grams. The lowest average six-rowed barley 1,000 kernel weight of 35.1 grams was observed in North Dakota's southeastern district (CRD-9).

The 2010 two-rowed barley crop average 1,000 kernel weight was 44.0 grams (Table 2). The north-central district of North Dakota (CRD-2) exhibited the highest two-rowed barley 1,000 kernel weight of 51.3 grams.

## Color

Barley color score is based on a scale of 1 to 10, with a lower score indicating brighter barley. The 2010 regional six-rowed barley crop observed an average color score of 7 (Table 1). The brightest six-rowed barley (average color score of 6) was produced in North Dakota's west-central (CRD-4), east-central (CRD-6), south-central (CRD-8), and southeastern (CRD-9) districts. The average color score for the two-rowed barley crop was 7 and North Dakota's south-central district (CRD-8) observed the brightest average color score of 6 (Table 2).

## Grade

A portion of each sample collected within a district was blended to prepare district composite samples, which were submitted for determination of an average

district grade. Separate composites were prepared for two- and six-rowed barley.

Six-rowed barley district composite samples were graded using the requirements of six-rowed malting barley (Table 3). The average 2010 regional six-rowed barley grade was U.S. No. 1 Six-Rowed Malting Barley (Table 4). All six-rowed barley district composite samples received the grade of U.S. No. 1 Six-Rowed Malting Barley.

The 2010 regional two-rowed barley district composite samples were a mixture of malting and feed varieties. These samples were graded according to the requirements of two-rowed barley (Table 5). The combined districts of the regional two-rowed barley crop earned the grade of U.S. No. 1 Two-Rowed Barley (Table 6). Individually, each two-rowed barley district composite sample received the grade of U.S. No. 1 Two-Rowed Barley.

## Historical Results

Crop quality data for the 2006-2010 regional six-rowed barley crop is presented in Table 7. This data indicates that the quality of the 2010 six-rowed barley crop is comparable to that of the 2009 crop. The 2010 average regional test weight of 48.0 lbs/bu (61.8 kg/hl) was comparable to that seen in 2009. This test weight, however, was heavier than those observed in 2006 -2008. Additionally, the 2010 regional average one thousand kernel weight of 37.9 grams was one of the highest observed in the past five years. The 2010 regional averages of 12.3 percent protein and 88.6 percent kernel plumpness were indicators of excellent crop quality.



**Table 5. Grade and Grade Requirements for Barley.**

Grade	Minimum limits of -			Maximum limits of -				
	Test Weight		Sound Barley*	Damaged Kernels*	Heat Damage Kernels	Foreign Material	Broken Kernels	Thin Barley**
	(lbs/bu)	(kg/hl)						
U.S. No. 1	47.0	60.5	97.0	2.0	0.2	1.0	4.0	10.0
U.S. No. 2	45.0	57.9	94.0	3.0	0.3	2.0	8.0	15.0
U.S. No. 3	43.0	55.3	90.0	4.0	0.5	3.0	12.0	25.0
U.S. No. 4	40.0	51.5	85.0	8.0	1.0	4.0	18.0	35.0
U.S. No. 5	36.0	46.3	75.0	10.0	3.0	5.0	28.0	75.0

**U. S. Sample grade:**

U. S. Sample grade shall be barley that:

- (a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, 4 or 5; or
- (b) Contains 8 or more stones or any number of stones which have a aggregate weight in excess of 0.2 percent of the sample weight , 2 or more pieces of glass, 3 or more crotalaria seeds (Crotalaria spp.), 2 or more castor beans (Ricinus communis L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 8 or more cocklebur (Xanthium spp.) or similar seeds singly or in combination, 10 or more rodent pellets, bird droppings, or equivalent quality of other animal filth per 1-1/8 to 1-1/4 quarts of barley; or
- (c) Has a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or
- (d) Is heating or otherwise of distinctly low quality.

\*Includes heat-damaged kernels. Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels.

\*\* Use the 5/64 x 3/34 slotted hole sieve.

Information from: United States Department of Agriculture, Grain Inspection, Packers and Stockyards Administration, Federal Grain Inspection Service, Grain Inspection Handbook, Book II, Barley, August 9, 2004

**Table 6. Grading Information for the 2010 Two-Rowed Barley Crop in North Dakota.**

State and Crop Reporting District (CRD)	Test Weight		Sound Barley (%)	Damaged Kernels (%)	Heat Damaged Kernels (%)	Foreign Material (%)	Broken Kernels (%)	Thin Barley*	Grade
	(lbs/bu)	(kg/hl)							
<b>North Dakota</b>									
CRD-2	50.8	65.4	100.0	0.0	0.0	0.0	0.2	0.5	U.S. No. 1 Two-Rowed Barley
CRD-4	48.2	62.0	100.0	0.0	0.0	0.0	0.3	3.7	U.S. No. 1 Two-Rowed Barley
CRD-7	47.7	61.4	98.0	0.0	0.0	0.1	0.3	1.9	U.S. No. 1 Two-Rowed Barley
<b>State Average</b>									
<b>Average</b>	<b>48.9</b>	<b>62.9</b>	<b>99.3</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.3</b>	<b>2.0</b>	<b>U.S. No. 1 Two-Rowed Barley</b>

\*% Thin: kernels passing through a 5/64 x 3/4-inch (2.0 x 19 mm) slotted sieve.

**Table 7. Regional (North Dakota and Minnesota) Six-Rowed Barley Crop Quality Data, 2006-2010.**

Year	Samples	Moisture Content (%)	Test Weight		1000 Kernel Weight (g)	Protein Content (%)	Color Score*	Kernel Assortment**	
			(lbs/bu)	(kg/hl)				% Plump	% Thin
2010	217	13.8	48.0	61.8	37.9	12.3	7	88.6	1.6
2009	236	13.7	48.5	62.4	40.3	11.9	7	91.2	1.0
2008	242	13.0	46.9	60.4	36.7	12.6	6	77.2	3.7
2007	248	12.3	46.7	60.1	35.8	12.5	5	74.7	4.2
2006	233	12.0	45.9	59.1	32.3	12.8	3	58.7	7.7

\*The lower the color score the brighter the barley (scale 1 to 10).

\*\*% Plump: kernels retained on or above a 6/64 x 3/4 inch (2.4 x 19 mm) slotted sieve. % Thin: kernels passing through a 5/64 x 3/4 inch (2.0 x 19 mm) slotted sieve.

# Methods Employed and Definition of Terms and Symbols

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**TEST WEIGHT** - Test weight was determined on dockage-free barley and was expressed in pounds per bushel. In the event sample moisture exceeded 13.5 percent, the sample was allowed to air-dry prior to test weight determination.

**MOISTURE** - Moisture was expressed as a percentage of total weight and was determined with a Motomco Model 919ES flow-through moisture meter.

**PROTEIN** - Percent total protein, reported on a dry-matter basis, was determined by near infrared transmittance on a Foss Infratec 1241 grain analyzer.

**KERNEL ASSORTMENT** - Barley (100 gram) kernel assortment was determined by standard ASBC method Barley 2-B (Methods of Analysis of the American Society of Brewing Chemists, 1992) using a Eureka-Niagara sample barley grader.

**1,000 KERNEL WEIGHT** - 1,000 kernel weight was determined by ASBC method Barley-2D (Methods of Analysis of the American Society of Brewing Chemists, 1992) with an electronic kernel counter.

**COLOR** - Color was determined by a modification of ASBC standard method, Barley-9 (Methods of Analysis of the American Society of Brewing Chemists, 1992) using the L-value obtained from a HunterLab ColorFlex Model CFLX-45 spectrophotometer. The L-value was converted to a color score (1-10), with a score of 1 representing bright barley and a score of 10 representing dark or heavily stained barley.

## Appendix 1. Barley Samples Collected by Type and Location.

Location	Six-Rowed	Two-Rowed
<b>North Dakota</b>		
CRD 1	36	3
CRD 2	36	5
CRD 3	39	1
CRD 4	15	2
CRD 5	33	0
CRD 6	11	0
CRD 7	0	13
CRD 8	8	6
CRD 9	10	1
<b>State Total</b>	<b>188</b>	<b>31</b>
<b>Minnesota</b>		
CRD 1	29	0
<b>State Total</b>	<b>29</b>	<b>0</b>
<b>Regional Total</b>	<b>217</b>	<b>31</b>

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## Conversions

### U.S. to Metric

Quarts (QT)	
Wet x 0.946 = Liters (L)	
Dry x 1.101 = Liters	
Gallons (GAL)	
Wet x 3.785 = Liters	
Wet x 0.038 = Hectoliters (HL)	
Dry x 4.404 = Liters	
Dry x 0.044 = Hectoliters	
Bushels (BU) x 0.352 = Hectoliters	
Acres (A) x 0.405 = Hectares (HA)	
Pounds (LB) x 0.454 = Kilograms (KG)	
Miles (MI) x 1.609 = Kilometers (KM)	
LB/BU x 1.287 = KG/HL	
BU/A x 0.870 = HL/HA	
BU/A (Barley) x 0.054 = MT/HA	
BU (Barley) x 0.022 = MT	
BU (Malt) x 0.015 = MT	

### Metric to U.S.

Liters (L)	
Wet x 1.057 = Quarts (QT)	
Dry x 0.908 = Quarts	
Wet x 0.264 = Gallons (GAL)	
Dry x 0.227 = Gallons	
Hectoliter (HL)	
Wet x 26.418 = Gallons	
Dry x 22.700 = Gallons	
Dry x 2.838 = Bushels (BU)	
Hectares (HA) x 2.471 = Acres (A)	
Kilograms (KG) x 2.205 = Pounds (LB)	
Kilometers (KM) x 0.621 = Miles (MI)	
KG/HL x 0.777 = LB/BU (Test Wt.)	
HL/HA x 1.149 = BU/A (Yield)	
MT/HA (Barley) x 18.587 = BU/A	
MT (Barley) x 45.929 = BU	
MT (Malt) x 64.842 = BU	

## Standards

	LB/BU	KG/BU	KG/HL	Seeds/Pound	
				Range	Average
Malt	34	15.42	43.76		
Barley	48	21.77	61.78	10,000–15,000	13,000
Wheat	60	27.21	77.22	8,000–24,000	16,000
Corn	56	25.40	72.07	900–1,500	1,200
Flax	56	25.40	72.07	65,000–120,000	80,000
Oats	32	14.51	41.18	11,000–17,000	14,000
Sorghum	56	25.40	72.07	10,000–21,000	20,000
Rye	56	25.40	72.07	10,000–21,000	18,000
Sunflower	30	13.61	38.61	4,500–8,000	
Soybeans	60	27.21	77.22	2,500–3,500	

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