

B A R L E Y

2007 Crop Quality Report



North Dakota Barley Council
505 40th St. SW., Suite E
Fargo, ND 58103

Phone: (701) 239-7200

Fax: (701) 239-7280

Email: ndbarley@ndbarley.net

Internet: www.ndbarley.net

2007 Regional Barley Crop Quality Report North Dakota and Minnesota

J.M. Barr and P.B. Schwarz - Department of Plant Sciences - North Dakota State University, Fargo, ND 58105

Introduction

This is the 29th 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 281 barley samples collected at farms and elevators during the 2007 barley harvest. The U.S. Department of Agriculture (USDA), North Dakota Agricultural Statistics Service, Fargo, N.D., coordinated sample collection.

The Department of Plant Sciences at North Dakota State University (NDSU) conducted grain quality evaluations. The North Dakota Grain Inspection Service Inc., Fargo, N.D., performed grade determinations. The North Dakota Barley Council, Fargo, N.D., provided financial support.

Production and Varieties

The USDA (Sept. 28, 2007) estimated 2007 barley production in North Dakota and Minnesota at 84 million bushels (1.8 million metric tons), an increase of approximately 30 million bushels (650,000 metric tons) from the 2006 crop year. The increased production was the result of increases in planted and harvested acreage. Planted acreage rose 33 percent to 1.6 million acres

and harvested acreage rose 38 percent to 1.5 million acres. In North Dakota, the average yield increased 20 percent, from 49 to 56 bushels per acre (bu/acre) or from 2.6 to 3 metric ton per hectare (mt/ha). The average yield of 56 bu/acre (3 mt/ha) in Minnesota was less than that observed in 2006 (60 bu/acre).

According to the USDA/National and State Agricultural Statistics Services, the six-rowed malting varieties Tradition, Robust, Lacey, Stellar-ND, Legacy and Drummond accounted for 29 percent, 16 percent, 15 percent, 10 percent, 7 percent and 3 percent, respectively, of barley acres planted in the North Dakota and Minnesota survey regions in 2007 (Figure 2). This is the second year Tradition was the most widely planted six-rowed variety.

Two-rowed varieties are grown primarily in the western crop reporting districts of North Dakota. The percentage of the crop planted to two-rowed feed and malting varieties was relatively unchanged from 2006. Once more, the leading two-rowed malting varieties were Conlon and CDC Copeland. These malting varieties accounted for 9 percent and 3 percent of the total regional barley acreage, respectively.

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

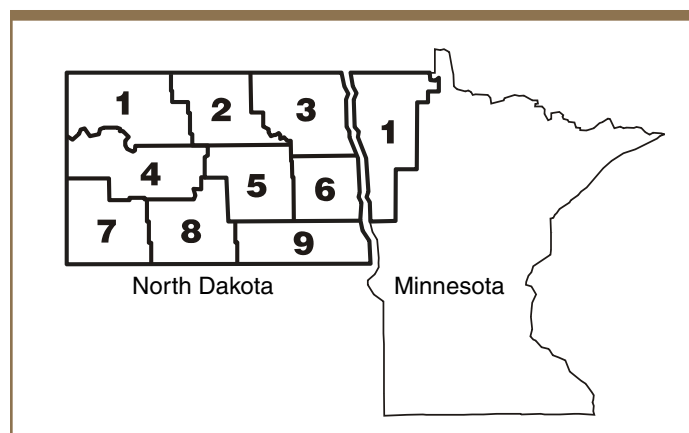
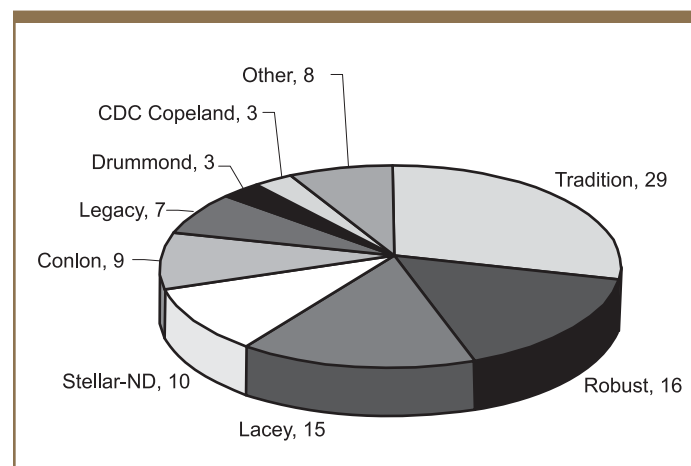


Figure 2. 2007 Regional Barley Variety Distribution (Percentage by Acreage)



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.

In this report, 248 six-rowed barley samples were collected and analyzed from nine crop reporting districts (CRD) of North Dakota and in the northwestern district of Minnesota (Figure 1). Thirty-three two-rowed barley samples were collected and analyzed from seven districts within North Dakota. District averages, from districts where significant amounts of two-rowed barley were produced, and a statewide two-rowed barley average, including all 33 samples, are presented in this report. 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 used to prepare district composite samples. Prior to further analysis, all samples 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 281 dockage-free samples. The values for district, state and regional averages represent the average of all individual sample results within their respective area. Separate district, state and regional averages were calculated for two- and six-rowed barley. 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.

Crop Quality

Test Weight

The 2007 regional six-rowed barley crop exhibited an average test weight of 46.7 pounds per bushel (lbs/bu) or 60.1 kilograms per hectoliter (kg/hl) (Table 1). North Dakota and Minnesota state averages were 46.6 and 47.3 lbs/bu (60 and 60.9 kg/hl), respectively. Individual district averages ranged from 44 to 48.7 lbs/bu (56.6 to 62.7 kg/hl). The heaviest district average test weight of 48.7 lbs/bu (62.7 kg/hl) was observed in the west-central district of North Dakota (CRD-4). Test weights of individual samples ranged from 37.6 to 51.4 lbs/bu (48.4 to 66.2 kg/hl). Regionally, 64 percent of the six-rowed barley samples collected in 2007 exhibited test weights of 46 lbs/bu (59.2 kg/hl) or greater (Figure 3).

Test weight in the two-rowed barley crop averaged 47.3 lbs/bu or 60.9 kg/hl (Table 2). The north-central North Dakota district (CRD 2) produced the highest average two-rowed barley test weight of 50 lbs/bu (64.3 kg/hl). More than 60 percent of the regional two-rowed barley samples weighed at least 48 lbs/bu (61.8 kg/hl) (Figure 3).

Protein

Average protein content of the 2007 regional six-rowed barley crop was 12.5 percent (Table 1). North Dakota's north-central and northeastern districts (CRD-2 and CRD-3) had the lowest average protein level of 12.3 percent. The highest average protein content of 12.8 percent was observed in North Dakota's northwestern, south-central and southeastern districts (CRD-1, CRD-8 and CRD-9). All 10 districts within the region reported averages below 13 percent protein and 42 percent of the regional six-rowed samples tested between 11.6 percent and 12.5 percent protein (Figure 4).

The average protein content in the 2007 two-rowed barley crop was 12.7 percent (Table 2). The district average for two-rowed barley protein content was lowest (12.1 percent) in the north-central district (CRD-2) and the highest (13 percent) was in the west-central and southwestern districts (CRD-4 and CRD-7). Approximately 82 percent of the two-rowed barley crop samples were at or below 13.5 percent protein (Figure 4).

Table 1. 2007 Regional Six-Rowed Barley Crop Quality.

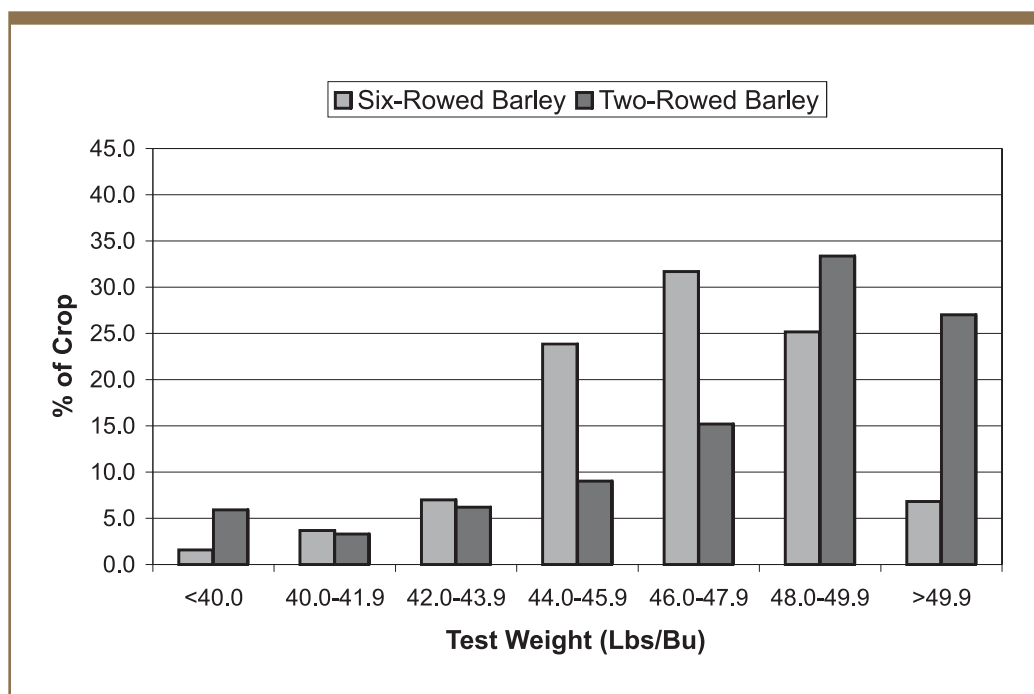
State and Crop Reporting District (CRD)	Dockage (%)	Moisture Content (%)	Test Weight		1000 Kernel Weight (g)*	Protein Content (%)	Color Score**	Kernel Assortment***	
			(lbs/bu)	(kg/hl)				% Plump	% Thin
North Dakota									
CRD-1	0.4	11.6	46.3	59.6	35.2	12.8	3	65.8	5.9
CRD-2	0.5	12.3	47.3	60.8	36.8	12.3	5	78.0	3.0
CRD-3	0.5	13.2	46.7	60.1	37.8	12.3	6	81.6	2.7
CRD-4	0.1	10.8	48.7	62.7	35.2	12.5	3	73.7	3.5
CRD-5	0.3	11.8	47.1	60.6	34.8	12.4	5	75.2	3.9
CRD-6	0.2	12.9	45.7	58.8	37.1	12.5	6	79.5	4.0
CRD-8	0.6	12.1	46.0	59.2	32.8	12.8	3	66.7	7.6
CRD-9	0.8	13.5	44.0	56.6	33.4	12.8	5	70.0	6.0
ND State Average	0.4	12.3	46.6	60.0	35.8	12.5	5	74.5	4.2
Minnesota									
CRD-1	0.3	12.4	47.3	60.9	36.1	12.4	5	77.5	3.8
MN State Average	0.3	12.4	47.3	60.9	36.1	12.4	5	77.5	3.8
Regional Average	0.4	12.3	46.7	60.1	35.8	12.5	5	74.7	4.2

*1000 kernel weight was determined on every third sample collected.

**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.
2007 Regional
Barley
Test Weight
Distribution.**

Kernel Plumpness

The regional average kernel plumpness for the 2007 six-rowed barley crop was 74.7 percent (Table 1). Thirty-eight percent of the regional six-rowed barley samples exhibited kernel plumpness in excess of 80 percent (Figure 5). Regionally, the northeastern district of North Dakota (CRD-3) had the plumpest barley at 81.6 percent plump. Average kernel plumpness below 70 percent plump was found in the northwestern and

south-central districts of North Dakota (CRD-1 and CRD-8). State averages for kernel plumpness in North Dakota and Minnesota were 74.5 percent and 77.5 percent, respectively.

Average kernel plumpness for the two-rowed barley crop was 78.5 percent (Table 2). The north-central district (CRD-1) of North Dakota displayed the highest average kernel plumpness of 92.7 percent. Approximately 73 percent of the two-rowed barley samples analyzed were in excess of 80 percent plump (Figure 5).

Table 2. 2007 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
North Dakota									
CRD-2	0.2	12.7	50.0	64.3	48.7	12.1	5	92.7	1.3
CRD-4	0.4	11.5	47.4	61.0	45.0	13.0	5	80.6	3.9
CRD-7	0.5	10.6	47.5	61.1	40.0	13.0	5	73.1	7.0
All Other Districts	0.4	12.2	44.3	57.0	42.7	12.9	4	67.8	8.0
ND State Average	0.4	11.8	47.3	60.9	44.0	12.7	5	78.5	5.2

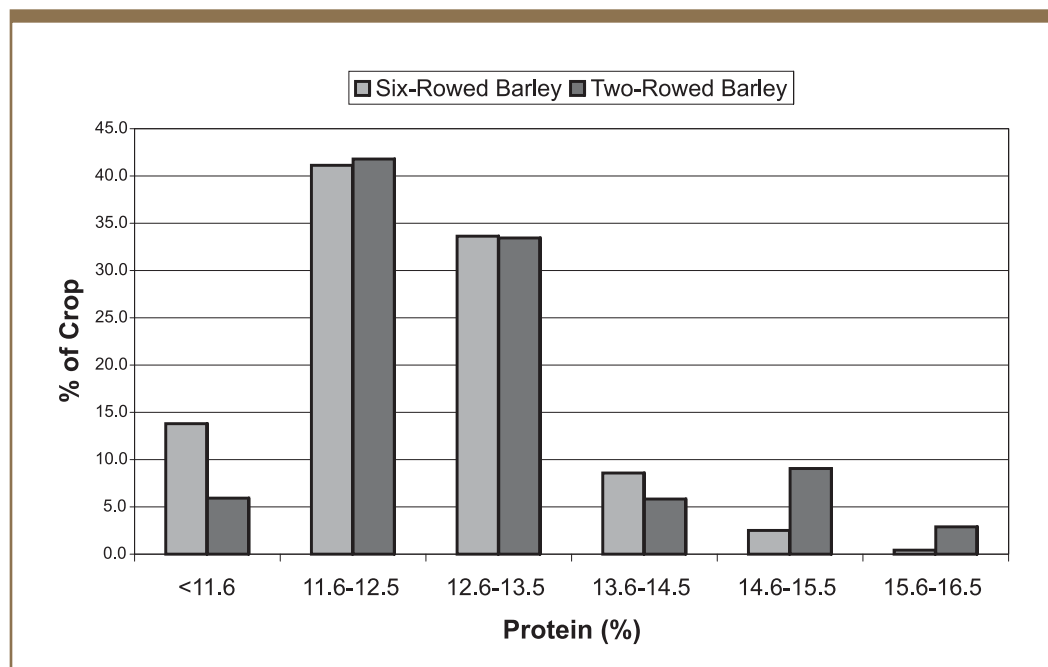
*1000 kernel weight was determined on every third sample collected.

**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 4. 2007 Regional Barley Protein Distribution.



1000 Kernel Weight

The 2007 regional six-rowed barley crop exhibited an average 1,000 kernel weight of 35.8 grams (Table 1). The northeastern and east-central districts of North Dakota (CRD-3 and CRD-6) had the best 1,000 kernel weights, with district averages above 37 grams. The lowest average six-rowed barley 1,000 kernel weight of 32.8 grams was observed in North Dakota's south-central district (CRD-8).

The 2007 two-rowed barley crop had an average 1,000 kernel weight of 44 grams. All two-rowed crop reporting districts observed averages at or above 40 grams. North Dakota's north-central district (CRD-2) produced the highest 1,000 kernel weight for two-rowed barley (48.7 grams) (Table 2).

Color

Barley color score is based on a scale of 1 to 10, with a lower score indicating brighter barley. An average color score of 5 was observed in the regional six-rowed barley crop (Table 1). In 2007, the brightest six-rowed barley (average color score of 3) was produced in North Dakota's northwestern, west-central

and south-central districts (CRD-1, CRD-4 and CRD-8). The average 2007 two-rowed barley color score also was 5 (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 2007 regional six-rowed barley grade was U.S. No. 2 Six-Rowed Malting Barley (Table 4). Six-rowed barley composites from North Dakota's north-central (CRD-2), northeastern (CRD-3), west-central (CRD-4) and central (CRD-5) districts and Minnesota's northwestern (CRD-1) district were graded as U.S. No. 1 Six-Rowed Malting Barley. Several districts observed grades of U.S. No. 2 Six-Rowed Malting Barley or U.S. No. 3 Six-Rowed Malting Barley. These grades were the result of test weight

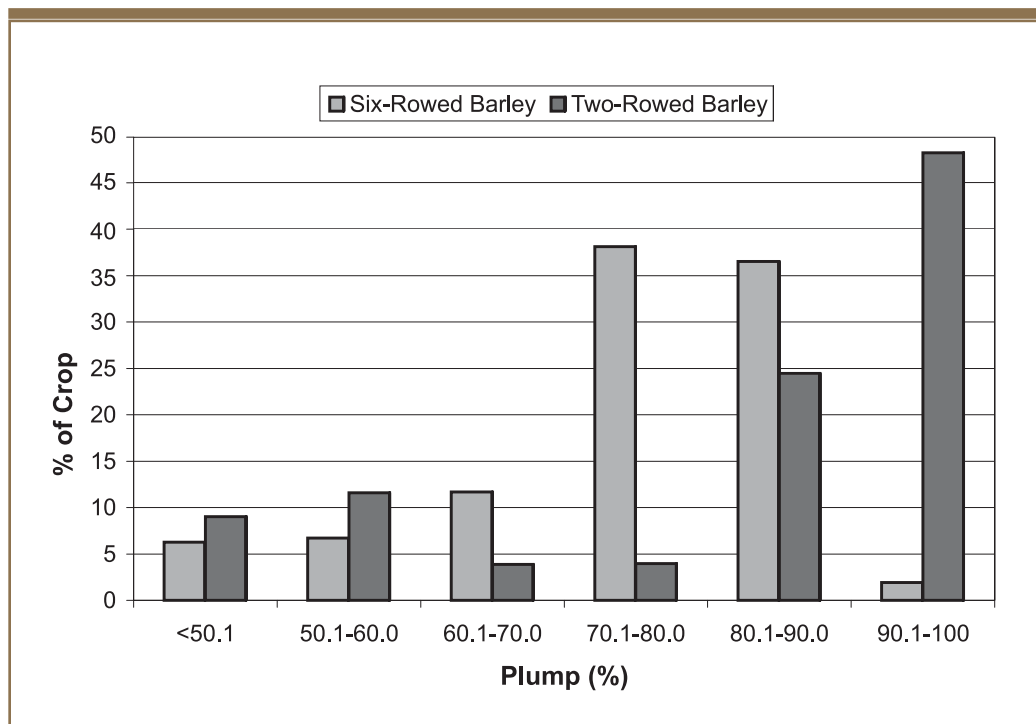


Figure 5.
2007 Regional
Barley Kernel
Plumpness
Distribution.

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. Information from: United States Department of Agriculture, Grain Inspection, Packers and Stockyards Administration, Federal Grain Inspection Service, Official United States Standards for Grain - June 1, 1997

Table 4. Grading Information for the 2007 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)						(%)	(%)		
North Dakota											
CRD-1	46.4	59.7	>95.0	100.0	0.0	0.0	0.0	1.3	4.6	U.S. No. 2 Six-Rowed Malting Barley	
CRD-2	47.1	60.6	>95.0	100.0	0.0	0.0	0.0	1.5	3.2	U.S. No. 1 Six-Rowed Malting Barley	
CRD-3	47.0	60.5	>95.0	99.7	0.3	0.1	0.0	2.2	2.9	U.S. No. 1 Six-Rowed Malting Barley	
CRD-4	48.6	62.6	>95.0	100.0	0.0	0.0	0.0	3.3	2.7	U.S. No. 1 Six-Rowed Malting Barley	
CRD-5	48.0	61.8	>95.0	100.0	0.0	0.0	0.0	1.2	3.2	U.S. No. 1 Six-Rowed Malting Barley	
CRD-6	45.9	59.1	>95.0	100.0	0.0	0.0	0.0	2.3	3.6	U.S. No. 2 Six-Rowed Malting Barley	
CRD-8	46.4	59.7	>95.0	100.0	0.0	0.1	0.0	2.0	6.1	U.S. No. 2 Six-Rowed Malting Barley	
CRD-9	44.5	57.3	>95.0	100.0	0.1	0.1	0.0	2.0	4.4	U.S. No. 3 Six-Rowed Malting Barley	
State Average											
Average	46.7	60.2	>95.0	100.0	0.0	0.0	0.0	2.0	3.8	U.S. No. 2 Six-Rowed Malting Barley	
(An average of the CRD composites)											
Minnesota											
CRD-1	47.7	61.4	>95.0	100.0	0.0	0.1	0.0	1.7	3.4	U.S. No. 1 Six-Rowed Malting Barley	
State Average											
Average	47.7	61.4	>95.0	100.0	0.0	0.1	0.0	1.7	3.4	U.S. No. 1 Six-Rowed Malting Barley	
(An average of the CRD composites)											
Regional Average											
Average	46.8	60.3	>95.0	100.0	0.0	0.0	0.0	1.9	3.8	U.S. No. 2 Six-Rowed Malting Barley	
(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.

values below 47 lbs/bu (60.5 kg/hl) or 45 lbs/bu (57.9 kg/hl), respectively.

As the two-rowed barley district composite samples were a mixture of malting and feed varieties, they were graded according to the requirements of two-rowed barley (Table 5). The average grade of the 2007 North Dakota barley crop was U.S. No. 1 Two-Rowed Barley (Table 6). Each of the two-rowed barley district composite samples received the grade of U.S. No. 1 Two-Rowed Barley.

Historical Results

Crop quality data for the 2003-07 regional six-rowed barley crop is presented in Table 7. Several quality factors of the 2007 crop display an improvement in quality from the 2006 crop. The 2007 test weight of 46.7 lbs/bu or 60.1 kg/hl is up slightly from 45.9 lbs/bu (59.1 kg/hl) observed in 2006. The 1,000 kernel weight, in 2007, was 35.8 grams, compared with 32.3 grams in 2006. Regional average kernel plumpness increased by 27 percent from 58.7 percent plump in 2006 to 74.7 percent plump in 2007. The 2007 barley crop average protein content of 12.5 percent is the lowest and best observed during the past five years.

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.

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

Information from:

United States Department of Agriculture
 Grain Inspection, Packers and Stockyards Administration
 Federal Grain Inspection Service
 Official United States Standards for Grain
 June 1, 1997

Table 6. Grading Information for the 2007 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)							
North Dakota									
CRD-2	50.5	65.0	100.0	0.0	0.0	0.0	0.3	0.9	U.S. No. 1 Two-Rowed Barley
CRD-4	48.2	62.0	99.8	0.0	0.0	0.1	0.4	2.8	U.S. No. 1 Two-Rowed Barley
CRD-7	48.4	62.3	99.7	0.0	0.0	0.1	0.3	4.7	U.S. No. 1 Two-Rowed Barley
State Average									
	49.0	63.1	99.8	0.0	0.0	0.1	0.3	2.8	U.S. No. 1 Two-Rowed Barley
(An average of the CRD composites)									

*% 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, 2003-2007.

Year	Samples	Moisture Content (%)	Test Weight		1000 Kernel Weight (g)*	Protein Content (%)	Color Score**	Kernel Assortment***	
			(lbs/bu)	(kg/hl)				% Plump	% Thin
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
2005	246	12.8	46.0	59.2	34.5	12.9	5	75.7	4.1
2004	274	14.2	47.5	61.1	36.2	12.6	7	80.4	2.7
2003	266	12.4	47.7	61.5	36.3	12.8	6	76.5	3.5

*1000 kernel weight was determined on every third sample collected.

**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.

Methods Employed and Definition of Terms and Symbols

NORTH DAKOTA STATE UNIVERSITY
N.D. Agricultural Experiment Station • Department of Plant Sciences

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.

1000 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 Pacific Scientific XL-800 Series Gardner colorimeter with XL-845 circumferential sensor. 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
North Dakota		
CRD 1	40	3
CRD 2	43	10
CRD 3	45	2
CRD 4	17	4
CRD 5	38	1
CRD 6	15	0
CRD 7	2	10
CRD 8	11	3
CRD 9	18	0
State Total	229	33
Minnesota		
CRD 1	19	0
State Total	19	0
Regional Total	248	33

Acknowledgements

We wish to thank all of the members of the North Dakota National Agricultural Statistics Service involved with the collection of samples, as well as James Gillespie and Karen Hertsgaard for assistance in sample preparation and analysis. We thank the North Dakota Barley Council for financial support. Without the support and excellent cooperation of the barley producers and country elevator operators, this survey would not have been possible.

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	

North Dakota Barley Council
505 40th St. SW., Suite E
Fargo, ND 58103

Non-Profit Org.
U.S. Postage
PAID
Fargo, ND
Permit No. 1848



North Dakota Barley Council

505 40th St SW, Suite E

Fargo, ND 58103

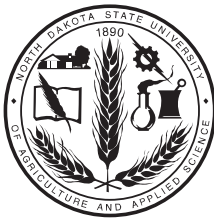
Phone: (701) 239-7200

Fax: (701) 239-7280

Contact: Steven Edwardson, Executive Administrator

Email: ndbarley@ndbarley.net

Internet: www.ndbarley.net



North Dakota State University

Department of Plant Sciences

166 Loftsgard Hall

Fargo, ND 58105

Phone: (701) 231-7732

Contact: Dr. Paul Schwarz, Professor

Email: Paul.Schwarz@ndsu.edu

Contact: John Barr, Chemist

Email: John.Barr@ndsu.edu