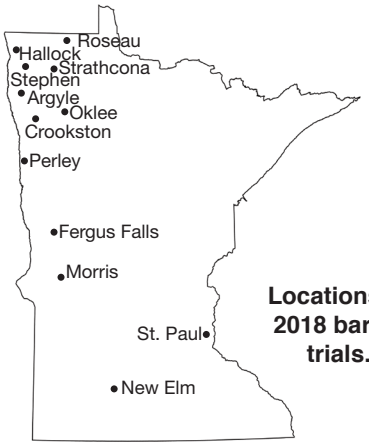
2018 Barley Field Crop Trials Results

Minnesota Agricultural Experiment Station and the College of Food, Agricultural and Natural Resource Sciences

Spring barley varieties were evaluated in 2018 in replicated trials at Argyle, Crookston, Hallock, Oklee, Perley, Stephen, Roseau and Strathcona in the northern part of the state and Fergus Falls, Morris, New Ulm and St. Paul in the south. Data collected from these trials should be used to make comparisons only among those varieties included in the trials. Yield is reported for 2018 and multi-year averages as percent of the mean of the trial. In 2018, the lowest yielding trial was at Morris and the highest yielding at Hallock. LSD numbers beneath the yield columns indicate whether the difference between yields is due to genetics or to other factors, such as variations in environment. If yield difference between two entries equals or exceeds the LSD value the higher-yielding entry probably was superior in yield. A difference less than the LSD value was probably due to environmental factors.

Variety Selection Criteria

Most barley producers in the region grow barley for malt and select varieties approved by the American Malting Barley Association (AMBA). The most important industry specifications for making malting grade are low grain protein (11.5% - 13.5%), kernel plumpness (>80%) and low deoxynivalenol or DON content (<2 ppm). DON is the toxin produced by the Fusarium Head Blight (FHB) pathogen. Additional information about FHB can be found at https://scabsmart.org. Please consult the AMBA recommended varieties for the most current information about industry acceptance of malting barley varieties at www.ambainc.org. Variety selection will also be influenced by contracts made available by malting and brewing companies and these vary from year to year.



Locations of 2018 barley trials.

In addition to yield and acceptable malt quality, disease resistance plays an important role in variety selection. Disease evaluations are carried out in inoculated field and/or greenhouse experiments. Disease ratings are based on the results of two or more experiments and are scored on a 1–9 scale where 1 = most resistant and 9 = most susceptible. For most producers the disease FHB and the presence of DON

Table 1. Origin and agronomic characteristics of barley varieties in multiple-year comparisons (2016-2018).

Entry	Origin[1]	Year of Release	Legal Status	Days to Heading (Days)	Plant Height (Inches)	Straw Strength[2] (1-9)	Plump (%)	Protein (%)
2-row								
ABI Balster	ABI	2015	PVP	58	32	5	87	13.8
ABI Growler	ABI	2015	PVP	58	33	5	90	13.0
Conlon	ND	1996	None	52	33	5	96	13.7
LCS Genie	LCS	2015	PVP(94)	61	30	3	92	13.2
LCS Odyssey	LCS	2016	PVP(94) (pending)	60	29	4	88	13.0
ND Genesis	ND	2015	PVP(94)	55	35	4	97	11.6
Pinnacle	ND	2007	PVP(94)	56	34	6	93	11.7
6-row								
Celebration	ABI	2008	PVP	55	38	6	84	14.3
Innovation	ABI	2010	PVP	53	34	4	87	14.1
Lacey	MN	2000	PVP(94)	54	34	5	92	13.8
Quest	MN	2010	PVP(94)	54	36	6	88	13.6
Rasmusson	MN	2008	PVP(94)	54	33	5	89	12.6
Robust	MN	1983	None	55	38	5	89	13.8
Tradition	ABI	2003	PVP	55	37	4	91	14.2
No. Environments				**12**	**12**	**6**	**5**	**5**

[1]Abbreviations: ABI = Busch Agricultural Resources, LCS = Limagrain Cereal Seeds, MN = Minnesota Agricultural Experiment Station; ND = North Dakota State University Research Foundation.
[2]1-9 scale in which 1 = strongest straw, 9 = weakest straw.

in harvested grain are the two most important factors limiting production of malting barley in the region. The two-rowed varieties Conlon, ABI Balster, ND Genesis, Pinnacle and the six-rowed variety Quest have a lower disease score for FHB and typically have lower DON compared to the other varieties grown in the region.

The other diseases listed in the disease reactions table are leaf diseases that can be a problem in Minnesota. The two-rowed varieties in general, with the exception of ND Genesis, tend to be more susceptible to spot blotch. Celebration and Conlon are the most resistant to net blotch. Pinnacle is very susceptible to bet blotch. Septoria speckled leaf blotch is a disease that has not been seen at any economically important level in Minnesota for more than 10 years. These leaf diseases can be controlled effectively with the use of a fungicide. FHB severity and DON can be reduced with fungicides, but they are not always effective. Bacterial leaf streak disease has become more prominent in recent years and tends to become more severe following heavy rain events. This disease cannot be controlled with fungicides. The bacterial leaf streak ratings presented are based on three years of data and at this point show only small differences among varieties for resistance.

For detailed variety descriptions and other University of Minnesota barley information please visit: http://smithlab.cfans.umn.edu.

PVP Status

All varieties shown in tables except Robust and Conlon are covered by the Plant Variety Protection Act, PVP (94). Growers can save seed of these varieties for their own planting only; it cannot be sold to anyone else, not even a relative or a neighbor without specific permission of the applicant for protection.

Project Leaders

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Test Plot Research

Guillermo Velasquez, Mark Hanson, Robert Bouvette, Curtis Reese, Joseph Wodarek and Donn Vellekson supervised and carried out test plot establishment and management.

Barley
Planting Rate and Date

Bushel Weight, Pounds.....48

Seeds/Pound.....14,300

Planting Rate, Pounds/Acre.....85

Planting Rate, Seeds/Sq. Ft.....28

Planting Date.....Early Spring

Table 2. Disease reactions of barley varieties in multiple year comparisons (2016-2018).

Entry	Fusarium Head Blight[1]	Net Blotch[1]	Spot Blotch[1]	Stem Rust[1,2]	Bacterial Leaf Streak[1]
	(1-9)				
2-row					
ABI Balster	4	nd	3	3	3
ABI Growler	7	nd	4	3	3
Conlon	4	3	3	2	5
LCS Genie	9	nd	4	3	4
LCS Odyssey	7	nd	5	3	4
ND Genesis	5	5	2	3	3
Pinnacle	5	9	3	4	4
6-row					
Celebration	6	3	3	3	4
Innovation	6	4	2	3	5
Lacey	8	6	1	4	5
Quest	5	5	2	3	4
Rasmusson	9	5	2	3	5
Robust	9	5	1	4	5
Tradition	8	4	1	3	5

[1]1-9 scale where 1 = most resistant, 9 = most susceptible, nd = not determined.
[2]Reaction to the race QCCJ of the stem rust pathogen.

Table 3. Relative grain yield of barley varieties at multiple locations in Minnesota in single-year (2018) and multiple-year comparisons (2016-2018).

	Argyle	Crookston		Hallock		Oklee		Perley	Roseau		Stephen		Strathcona	
Entry	2018[1]	2018	3 Yr	2018	3 Yr	2018	3 Yr	2018[1]	2018	3 Yr	2018	2 Yr[2]	2018	2 Yr[2]
	% of mean													
2-row														
ABI Balster	100	96	92	102	102	105	101	97	102	100	101	96	99	98
ABI Growler	101	92	94	99	96	87	95	101	98	105	82	83	96	96
Conlon	46	95	100	98	96	99	88	103	96	90	89	94	97	93
LCS Genie	101	80	89	94	88	97	102	85	91	99	100	87	101	96
LCS Odyssey	85	88	87	91	97	83	95	100	96	110	97	95	94	96
ND Genesis	91	93	100	95	102	109	102	87	107	95	95	96	100	99
Pinnacle	91	120	93	102	102	105	106	95	104	95	110	96	90	97
6-row														
Celebration	121	94	99	100	100	98	101	110	98	96	101	101	92	95
Innovation	127	112	112	105	103	107	103	102	105	105	102	107	106	106
Lacey	98	111	110	100	105	104	100	98	98	96	97	108	101	105
Quest	120	113	110	103	101	102	99	104	103	98	103	105	100	100
Rasmusson	nd	124	115	108	109	106	106	101	107	111	98	105	106	107
Robust	97	99	100	95	90	103	99	98	94	95	101	108	100	103
Tradition	113	107	106	96	102	91	99	111	96	99	99	105	104	101
Mean (Bu/Acre)	**76**	**118**	**135**	**141**	**122**	**117**	**117**	**85**	**113**	**102**	**139**	**122**	**138**	**116**
LSD (0.05)	**22.3**	**10.7**	**8.1**	**7.9**	**7.4**	**18.1**	**9.1**	**17.4**	**14.6**	**10.0**	**19.8**	**11.5**	**13.8**	**10.1**

Abbreviations: nd = not determined.
[1]Trial data is from 2018 only.
[2]Trial data is from 2017 and 2018.

Table 4. Relative grain yield of barley varieties in on-farm trials near Fergus Falls, Morris, New Ulm, and St. Paul, Minnesota in single-year (2018) and multiple-year comparisons (2016-2018).

	Fergus Falls		Morris		New Ulm	St. Paul	
Entry	2018	2 Yr[1]	2018	3 Yr	2018[2]	2018	3 Yr
	% of mean						
2-row							
ABI Balster	98	87	70	102	95	100	108
ABI Growler	80	81	48	85	98	95	105
Conlon	42	61	127	100	103	50	73
LCS Genie	105	94	28	74	78	49	83
LCS Odyssey	119	109	14	94	94	65	100
ND Genesis	108	83	154	113	111	114	121
Pinnacle	109	113	124	104	114	102	101
6-row							
Celebration	110	114	78	93	104	131	99
Innovation	89	92	153	119	100	99	99
Lacey	104	113	158	119	96	127	106
Quest	100	118	116	94	95	102	94
Rasmusson	124	125	144	111	100	129	112
Robust	79	94	136	100	84	122	96
Tradition	93	91	127	103	106	132	106
Mean (Bu/Acre)	**94**	**78**	**28**	**59**	**57**	**86**	**94**
LSD (0.05)	**22.5**	**26.4**	**14.7**	**8.6**	**16.3**	**11.0**	**7.8**

[1]Trial data is from 2016 and 2018.
[2]Trial data is from 2018 only.

Table 5. Relative grain yield of barley varieties in a single-year (2018) and multiple year comparisons (2016-2018).

	State			North			South		
Entry	2018	2 Yr	3 Yr	2018	2 Yr	3 Yr	2018	2 Yr	3 Yr
	% of mean								
2-row									
ABI Balster	99	99	99	100	99	98	95	100	101
ABI Growler	92	94	95	94	95	96	85	90	93
Conlon	86	87	89	92	91	93	66	71	80
LCS Genie	89	89	91	94	92	93	73	77	83
LCS Odyssey	90	95	97	92	95	96	85	95	100
ND Genesis	102	101	101	98	97	98	115	114	110
Pinnacle	104	102	100	103	101	98	109	107	105
6-row									
Celebration	103	101	101	100	101	101	112	104	102
Innovation	106	106	106	107	106	107	101	104	103
Lacey	104	105	105	101	103	104	115	113	110
Quest	104	102	102	105	104	103	101	97	100
Rasmusson	113	113	111	112	112	111	123	120	114
Robust	99	99	98	99	99	98	100	98	96
Tradition	103	103	103	101	102	103	112	106	102
Mean (Bu/Acre)	**99**	**101**	**101**	**115**	**114**	**114**	**66**	**72**	**75**
LSD (0.05)	**4.7**	**3.6**	**3.5**	**5.7**	**4.3**	**3.7**	**8.3**	**6.6**	**7.3**
No. of Environments	**12**	**20**	**27**	**8**	**14**	**18**	**4**	**6**	**9**