



## 2020 Barley Field Crop Trials Results

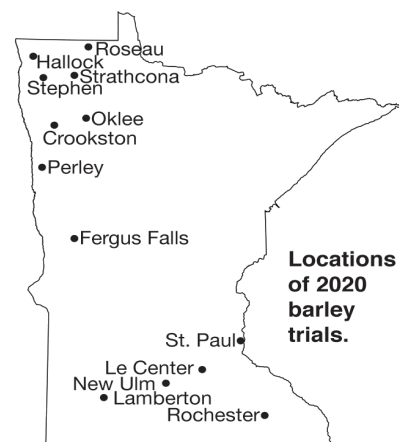
Minnesota Agricultural Experiment Station and the College of Food, Agricultural and Natural Resource Sciences

Spring barley varieties were evaluated in 2020 in replicated trials at Crookston, Hallock, Oklee, Perley, Stephen, Roseau and Strathcona in the northern part of the state and Fergus Falls, Lamberton, Le Center, New Ulm, Rochester and St. Paul in the south. Trials at Crookston and Roseau were lost due to heavy precipitation and flooding. Yield is reported for 2020 and multi-year averages as percent of the mean of the trial. Data collected from these trials should be used to make comparisons only among those varieties included in the trials. The average yield across the eleven testing locations was 91 bu/acre in 2020. The highest yields this year were recorded in Oklee (123 bu/acre) while the lowest grain yields were recorded in Strathcona (54 bu/acre). 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](http://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.

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 in harvested grain are the two most important factors limiting production of malting barley in the region. The two-rowed variety Conlon

**Table 1. Agronomic characteristics of malting barley varieties, 2018-2020.**

Variety	Origin <sup>1</sup>	Year of Release	PVP Status	Heading (DAP)	Height (inches)	Lodging (0-9) <sup>2</sup>	Plump (%)	Protein (%)
<b>2-row</b>								
AAC Synergy	AAFC	2012	Yes	54	31	5	93	12
Conlon	ND	1996	Yes	51	29	8	92	13
ND Genesis	ND	2015	Yes	55	32	5	95	11.5
Pinnacle	ND	2007	Yes	53	30	5	97	11.4
<b>6-row</b>								
Lacey	MN	2000	Yes	52	33	3	93	12.3
Quest	MN	2010	Yes	52	34	6	85	12.6
Rasmusson	MN	2008	Yes	51	31	4	90	12
Robust	MN	1984	Expired	52	35	3	93	12.7
Tradition	ABI	2003	Yes	53	34	3	91	13.1
<b>No. of Environments</b>				<b>10</b>	<b>8</b>	<b>5</b>	<b>6</b>	<b>6</b>

<sup>1</sup>Agriculture and Agri-Food Canada = AAFC, North Dakota State University = ND, University of Minnesota = MN and Anheuser-Busch InBev = ABI.

<sup>2</sup>0-9 scale where 0 = no lodging and 9 = severe lodging.

and the six-rowed variety Quest have the lowest DON score (the mycotoxin produced by the Fusarium head blight pathogen) 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. Pinnacle is very susceptible to net blotch (data not shown). All varieties have resistance to the dominant race of stem rust (MCCF) and are susceptible to the QCCJ race also known as African stem rust or Ug99. 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.

### PVP Status

All varieties shown in tables except Robust, Conlon and AC Metcalf are

covered by the Plant Variety Protection Act, PVP (94). Growers can save seed of PVP protected 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.

### Authors and Researchers

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**Table 2. Disease reactions of barley varieties in multiple-year comparisons.**

Variety	DON <sup>1</sup>	Spot Blotch <sup>1</sup>	Stem Rust <sup>1,2</sup>	Bacterial Leaf Streak <sup>1</sup>
<b>2-row</b>				
AAC Synergy	7	3	5	4
Conlon	3	9	4	5
ND Genesis	4	4	7	4
Pinnacle	5	5	8	6
<b>6-row</b>				
Lacey	6	2	6	4
Quest	3	3	4	5
Rasmusson	7	3	7	5
Robust	8	1	5	4
Tradition	4	3	5	5
<b>No. of Environments</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>4</b>

<sup>1</sup>Trait measured on a scale from 0-9 where 0 = resistant and 9 = susceptible. Deoxynivalenol (DON) is the mycotoxin produced by the Fusarium head blight pathogen.

<sup>2</sup>Data is for stem rust pathogen QCCJ. All lines were resistant to stem rust pathogen MCCF in years tested.

**Table 3. Relative grain yield (percent of the mean of the trial; in bushels/acre) of barley varieties in northern Minnesota locations in single-year (2020) and multiple-year comparisons (2018-2020).**

Variety	Crookston		Hallock		Oklee		Perley		Roseau	Stephen		Strathcona	
	2 Yr <sup>2</sup>	2020	3 Yr	2020	3 Yr	2020	3 Yr	2 Yr <sup>2</sup>	2020	3 Yr	2020	3 Yr	
<b>2-row</b>													
AAC Synergy	98	116	106	108	104	97	102	102	100	102	188	122	
Conlon	93	98	96	86	92	92	92	94	117	100	15	69	
ND Genesis	100	91	99	107	107	108	101	105	101	98	70	103	
Pinnacle	113	97	107	101	102	110	94	105	111	109	138	111	
<b>6-row</b>													
Lacey	105	84	90	95	97	87	98	104	103	100	100	104	
Quest <sup>1</sup>	—	84	—	97	—	93	—	—	92	—	119	—	
Rasmusson <sup>1</sup>	—	101	—	96	—	85	—	—	87	—	140	—	
Robust	91	99	96	96	98	102	101	96	96	94	59	93	
Tradition	101	130	105	115	100	125	112	95	92	97	71	98	
<b>Mean (Bu/Acre)</b>	<b>124</b>	<b>93</b>	<b>100</b>	<b>123</b>	<b>110</b>	<b>98</b>	<b>90</b>	<b>106</b>	<b>85</b>	<b>114</b>	<b>54</b>	<b>94</b>	
<b>LSD (0.05)</b>	<b>21.7</b>	<b>33.6</b>	<b>21.5</b>	<b>21.7</b>	<b>14.8</b>	<b>22.5</b>	<b>17.7</b>	<b>10.6</b>	<b>27.2</b>	<b>14.7</b>	<b>26.9</b>	<b>31.8</b>	

<sup>1</sup>Line was tested for yield in 2020 only. See 2018 report for prior year's data.

<sup>2</sup>Trial data is from 2019 and 2018 only.

<b>Barley</b>	
<b>Planting Rate and Date</b>	
Bushel Weight, Pounds.....	48
Seeds/Pound.....	14,300
Planting Rate, Pounds/Acre.....	85
Planting Rate, Seeds/Sq. Ft.....	28
Planting Date.....	Early Spring

**Table 4. Relative grain yield (percent of the mean of the trial; in bushels/acre) of barley varieties in southern Minnesota locations in single-year (2020) and multiple-year comparisons (2018-2020).**

Variety	Fergus Falls		Lamberton	Le Center		New Ulm		Rochester		St. Paul	
	2020	3 Yr	2020 <sup>2</sup>	2020	3 Yr	2020	2 Yr <sup>3</sup>	2020	2 Yr <sup>4</sup>	2020	3 Yr
<b>2-row</b>											
AAC Synergy	106	97	113	106	107	115	107	99	101	121	113
Conlon	89	72	78	88	96	94	97	72	73	65	56
ND Genesis	104	113	94	108	110	98	104	91	98	111	109
Pinnacle	105	111	93	105	93	95	101	102	105	112	101
<b>6-row</b>											
Lacey	94	103	109	96	99	100	98	109	114	111	113
Quest <sup>1</sup>	94	—	74	104	—	91	—	96	—	95	—
Rasmusson <sup>1</sup>	108	—	119	103	—	114	—	112	—	104	—
Robust	95	96	99	85	91	84	85	110	101	95	102
Tradition	106	109	120	106	104	110	107	109	109	87	105
<b>Mean (Bu/Acre)</b>	<b>112</b>	<b>80</b>	<b>69</b>	<b>107</b>	<b>93</b>	<b>69</b>	<b>63</b>	<b>107</b>	<b>92</b>	<b>87</b>	<b>81</b>
<b>LSD (0.05)</b>	<b>12.7</b>	<b>18.7</b>	<b>9.5</b>	<b>10.9</b>	<b>24</b>	<b>13</b>	<b>13.3</b>	<b>15.2</b>	<b>20.3</b>	<b>10.9</b>	<b>18.8</b>

<sup>1</sup>Line was tested for yield in 2020 only. See 2018 report for prior year's data.

<sup>2</sup>Trial data is from 2020 only.

<sup>3</sup>Trial data is from 2020 and 2018 only.

<sup>4</sup>Trial data is from 2020 and 2019 only.

**Table 5. Relative grain yield (percent of the mean of the trial; in bushels/acre) of barley varieties in a single-year (2020) and multiple-year comparisons (2018-2020).**

Variety	State			North			South		
	2020	2 Yr	3 Yr	2020	2 Yr	3 Yr	2020	2 Yr	3 Yr
<b>2-row</b>									
AAC Synergy	112	107	105	115	106	105	109	107	105
Conlon	84	85	86	87	88	91	81	81	76
ND Genesis	100	105	103	98	104	102	102	105	106
Pinnacle	105	104	105	108	107	106	102	100	102
<b>6-row</b>									
Lacey	98	101	102	93	98	99	103	105	106
Quest <sup>1</sup>	94	—	—	95	—	—	93	—	—
Rasmusson <sup>1</sup>	104	—	—	98	—	—	109	—	—
Robust	94	95	96	94	94	96	95	96	96
Tradition	108	104	103	111	102	101	106	106	108
<b>Mean (Bu/Acre)</b>	<b>91</b>	<b>88</b>	<b>95</b>	<b>91</b>	<b>94</b>	<b>104</b>	<b>91</b>	<b>81</b>	<b>81</b>
<b>LSD (0.05)</b>	<b>10.5</b>	<b>7</b>	<b>5.6</b>	<b>20.9</b>	<b>11.3</b>	<b>7.6</b>	<b>9.7</b>	<b>7.8</b>	<b>8.1</b>
<b>No. of Environments</b>	<b>11</b>	<b>22</b>	<b>32</b>	<b>5</b>	<b>12</b>	<b>19</b>	<b>6</b>	<b>10</b>	<b>13</b>

<sup>1</sup>Line was tested for yield in 2020 only. See 2018 report for prior years data.