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MALTING QUALITY OF BARLEY VARIETIES AND SELECTIONS GROWN IN THE MISSISSIPPI VALLEY UNIFORM NURSERY AND AT CENTRAL AND EASTERN STATIONS IN 2002

A. D. Budde, M. Schmitt, E. D. Goplin, D. M. Peterson and Staff

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This is a joint progress report of cooperative investigations being conducted in the Agricultural Research Service of the U.S. Department of Agriculture and State Agricultural Experiment Stations. It contains preliminary data that have not been sufficiently confirmed to justify general release; interpretations may be modified with additional experimentation. Confirmed results will be published through established channels. The report is primarily a tool available to cooperators and their official staffs and for those persons who have direct and special interest in the development of improved malting barleys.

This report includes data furnished by the Agricultural Research Service as well as by the State Agricultural Experiment Stations. The report is not intended for publication and should not be referred to in literature citations nor quoted in publicity or advertising. Use of the data may be granted for certain purposes upon written request to the agency or agencies involved.

Samples malted and analyzed by the Cereal Crops Research Unit, Madison WI

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MALTING QUALITY OF BARLEY VARIETIES AND SELECTIONS GROWN AT CENTRAL AND EASTERN STATIONS IN 2002

Introduction

At the Cereal Crops Research Unit, we malt barleys received from public sector breeders and evaluate each line for its commercial malting quality. We malt and analyze each submission as consistently as possible, which allows us to compare the lines with each other. Our objective is to provide accurate data and evaluations of new selections and to facilitate the development of improved malting barleys.

Materials

The 1671 samples upon which this report is based came from several locations; either as a part of the Mississippi Valley Uniform Barley Nursery or as experimental selections from several research programs. Individual breeders' experimental lines from Maine, Minnesota, North Dakota and Virginia were processed and evaluated.

Methods

All barleys were steeped to a 45% moisture content, germinated for five days and kilned over a twenty-four hour period. Most of our analyses were performed according to the Methods of Analysis of the ASBC, 8th edition, 1992. Details of the malting and analyses are listed in Appendix A.

Rankings and Quality Scores

The best performing entries in each table can be found by consulting the Overall Rank Value column. The rank values were determined by the quality scores generated for each submission, with the rank order proceeding from low (best) to high (poorest). The quality scores were computed for each line on the basis of the sum of its individually scored parameters. Scores are assigned to each of the malt quality traits based upon how closely the trait values conform to what industry wants them to be. The closer the analytical data are to the ideal, the more points are awarded. The most important quality traits (extract, soluble protein, etc.) are weighted more than those of lesser importance. This gives a relative assessment of the overall performance of each line. Some of the criteria used to generate the quality scores changed this year. The most notable changes were a wider range for acceptable diastatic power and α–amylase levels, a new range of 42 - 47% for S/T ratios and a lowering of the upper limit for β–glucan contents from 300 to 200 ppm. All of the criteria used to generate the quality scores are listed in Appendix B.

Mississippi Valley Uniform Barley Nursery - 2002

Nursery samples were received for malting quality evaluation from three experimental stations located in Minnesota, Montana and North Dakota. The parentages of the nursery entries are listed in Table 1. Fourteen of twenty-nine entries (#16 - #29) were new in this year's nursery.

These samples were germinated for 5 days and rotated for 3 minutes every half hour, which should have yielded malts having modification levels that are similar to those produced by industry. The malting conditions and analytical methods employed are listed in Appendix A. The criteria and value assignments used to calculate quality scores have been revised this year and are listed in Appendix B. The most notable changes are a wider range for acceptable diastatic power and α-amylase levels, a new range of 42 to 47% for S/T ratios and a lowering of the β–glucan upper limit from 300 to 200 ppm.

The mean values of 14 quality factors over the three stations (Table 2) and over all varieties (Table 3) are listed. Individual station data are reported in Tables 4 through 6. Evaluations of data from the individual locations and overall performance evaluations, derived primarily from Tables 2 and 3 are presented below.

Nearly half of the barleys from Morris, MN (Table 4) were too thin and all had unacceptably high protein contents. Half of the extract values fell below the desired limits, but most of the fine – coarse differences were good. The soluble protein and free amino nitrogen levels were high, some extremely high, which contributed to the elevated wort color values. Over half of the β–glucan levels were too high, whereas the amylolitic values were generally quite good. The best performer was Lacey, but even this entry's high total and soluble protein levels would have eliminated it from commercial use.

The barleys from Sidney, MT (Table 5) were plump and had very good protein contents. The extract values were good, except for that of Barbless. These malts appear to have modified well as indicated by their low β–glucan levels and small fine – coarse differences. A third of the soluble protein and two thirds of the S/T values were unacceptably high. The amylolitic values were quite good, except for that of 2ND18365, which had an unacceptably low diastatic power value and a high α-amylase level. The best performers were Drummond, Lacey, M112, 6B95-2482, M109, ND16922 and BT389. Other lines also performed well, generating an average malt quality score of 53 from this location.

Most of the plump barleys from Bottineau, ND (Table 6) had elevated protein contents, although only six were unacceptably high. The extract, fine – coarse difference and β–glucan values were generally good. Over a third of the free amino nitrogen and wort protein levels were too high, whereas most wort colors and turbidities were good. Most amylolitic values were good, although the

diastatic power value for 2ND18365 was too low, while those of MNBrite and ND17687 were too high. The best performers were M109, M111, 6B98-7339, BT478, ND17111 and M113.

Overall, the submissions from Sidney and Bottineau performed much better than those grown at Morris (Table 2). The barleys from Morris were much thinner and had higher protein contents than those from the other locations. These elevated protein levels negatively affected the malt quality by contributing toward very high wort protein and free amino nitrogen values, high turbidity and low extract values. The barleys from Sidney averaged 12.7% protein, which would be considered 'ideal', while the 13.5% average protein level in barleys from Bottineau was high, although still within the acceptable range. At Sidney, the average extract value of 80.2% was significantly higher than those from Bottineau and Morris. The higher extract values and good protein contents of the Sidney entries were most responsible for the excellent average quality score. Submissions from Bottineau had slightly higher total and soluble protein levels than entries from Sidney, which resulted in the slightly lower, but still respectable average quality score.

In general, the entries in this nursery were plump and had good extract and fine – coarse difference values when grown in favorable environments. Some of the average barley protein levels were unacceptably high, however this was mostly due to the extremely high levels found in the submissions from Morris. The soluble protein levels were also elevated, with over half being unacceptably high, again affected by the very high levels found in those entries grown at Morris. The average amylolitic values were generally within the recently expanded desired range (Appendix B), the only exception being the average diastatic power value of 2ND18365, which was too low. The β–glucan levels indicated that most of these lines modified well with our malting protocol, and only four lines had an average value higher than that of the Mid-West standard, Robust. Many of these lines performed well, with half of the nursery scoring higher than Robust. The best overall performers were M109, Lacey, 6B95-2482, M113, Drummond and ND17643. M109 was new in this year's nursery. It performed much better at Bottineau and Sidney than at Morris. This line had a perfect score at Bottineau and also would have at Sidney, except for an elevated S/T ratio due mostly to its low total protein content. Lacey has performed quite well in this nursery since it introduction in 1998. This year's submission performed well, especially at Sidney, with a perfect score and had the best score at Morris where high protein levels negatively impacted the malting quality. The Lacey from Bottineau had an unacceptably high protein level, which also contributed to a low S/T ratio and a lower quality score. This is the fourth year that 6B95-2482 has been in this nursery. This line has performed well, but seldom has been a top performer. That is the case again this year, where this line performed better than most at Morris, extremely well at Sidney, but ranked in the middle of the experiment at Bottineau. Most quality parameters were good in general, however the diastatic power levels were quite high and this could be a concern. This is the first year for M113 and its performance was very similar to that of

Robust. M113 may have modified a bit better than Robust, with slightly lower β–glucan and F-C difference values, and slightly higher soluble protein and free amino nitrogen levels than those of Robust, though none of these measures were significantly different. Drummond has been part of the nursery since the 1997 crop year. It has performed reasonably well throughout the years and did very well at Sidney this year with a top score of 65, good at Bottineau with a score of 49 and poorly at Morris where high protein levels negatively affected nearly all of the submissions. ND17643 is new in this year's nursery where it performed quite well scoring a bit better than Robust.

2002 Crop Year Evaluations

Submissions from Maine

2002 Malting Barley X Nitrogen Study – Presque Isle
Table 7 – 28 Entries

A quarter of these barleys were thin and many had elevated, but still acceptable protein contents. The extract and α–amylase values were generally good, but most of the soluble protein levels were too high. The elevated soluble protein values resulted in three quarters of the S/T ratios exceeding the desired limit. A third of the diastatic power levels were too low and all but one β–glucan value was too high. The best performers were 302(9) and 506(9), however their elevated β–glucan levels would be a concern for industry.

Submissions from Minnesota

2002 Advanced Lines (Group 1) – St. Paul
Table 8 – 22 Entries

Nearly all of these thin barleys had unacceptably high protein contents. Three quarters of the extract values were too low, while all soluble protein levels were extremely high. The amylolitic and β–glucan values were generally good. None of these lines, including the experimental controls performed well.

2002 Advanced Lines (Group 2) – St. Paul
Table 9 – 26 Entries

Three quarters of these thin barleys had unacceptably high protein contents. Most of the extract values were too low, while nearly all soluble protein and wort

colors were too high. The diastatic power levels ranged from five that were too low, to one that exceeded the desired limit. Most of the α–amylase and β–glucan levels were good. None of these lines performed well.

2002 Advanced Lines (Group 3) – Crookston
Table 10 – 22 Entries

Half of these plump barleys had unacceptably high protein contents. Most extract and amylolitic values were good. The soluble protein levels were extremely high and the wort color and S/T values were also high because of the elevated soluble protein contents. A third of the β–glucan levels exceeded the upper limit. The best performers were M97-67, M109, M96-203, M111 and M97-53, however the extremely high wort protein levels found in these submissions would preclude them from commercial use.

2002 Advanced Lines (Group 4) – Crookston
Table 11 – 26 Entries

Only a quarter of these plump barleys had unacceptably high protein contents. The extract values were generally good, but the soluble protein levels were very high. The high soluble protein levels resulted in all but one line having unacceptably high S/T ratios and contributed to the high wort color values. Half of the diastatic power values were too low, while most of the α–amylase and β–glucan levels were good. The best performers were M112, M111, M114, FEG26-50, FEG38-12, FEG4-66, M96-177 and M98-69, however the elevated soluble protein contents would detract from their commercial use.

2002 Advanced Lines (Group 5) – Morris
Table 12 – 22 Entries

All of these barleys had elevated total protein contents. Half of the extract values fell below the desired limit, whereas nearly all of the soluble protein contents exceeded the upper limit. The amylolitic values were generally good, while most of the β–glucan levels exceeded the upper limit. None of these lines, including the experimental controls, performed well.

2002 Advanced Lines (Group 6) – Morris
Table 13 – 26 Entries

A quarter of these entries were too thin and over half had unacceptably high protein contents. Only six extract values were too low, but the soluble protein, S/T, β–glucan and wort color values were generally too high. A third of the

diastatic power levels were too low, while three of the α–amylase values exceeded the upper limit. The best performers were FEG4-66 and M112, however both of these lines had elevated soluble protein and β–glucan contents.

2002 Advanced Lines (Group 7) – St. Paul
Table 14 – 28 Entries

These barleys had very high protein contents. Most of the extract values were too low, while all soluble protein levels were too high. The amylolitic values were generally good, while the β–glucan contents ranged from very low, indicating over-modified malts to very high indicating under-modified malts. None of these lines, including the experimental controls, performed well.

2002 Advanced Lines (Group 8) – Crookston
Table 15 – 28 Entries

A third of these plump barleys had unacceptably high protein contents. The extract values were generally good, but most soluble protein levels were too high. The elevated soluble protein contents resulted in most S/T ratios and wort color values being higher than desired. The diastatic power levels were generally low, with six falling below the desired limit, however α–amylase contents were good. Two thirds of the β–glucan levels were too high. The best performers were FEG43-82 and FEG52-16. The β–glucan content of FEG43-82 was high, while the soluble protein level of FEG52-16 was slightly high and both values would be a concern to industry.

2002 Advanced Lines (Group 9) – St. Paul
Table 16 – 31 Entries

A third of these barleys were too thin and all had unacceptably high protein contents. Most of the extract values were below the desired limit, whereas all soluble protein levels were extremely high. The elevated soluble protein contents resulted in most S/T ratios and wort color values being too high. Most β–glucan contents were too high, while the amylolitic values were good. None of these lines, including the experimental controls performed well, because of the high total and soluble protein levels.

2002 Advanced Lines (Group 10) – St. Paul, Crookston and Morris
Table 17 – 42 Entries

Half of these barleys were too thin and most had unacceptably high protein contents. Sixteen extract values fell below the minimum limit and all soluble

protein levels were too high. The elevated soluble protein levels caused three quarters of the S/T ratios to exceed the upper limit and also increased the wort color values. Eight diastatic power levels were too low, which was surprising considering the elevated total protein contents. The α–amylase values were generally good, whereas two thirds of the β–glucan levels exceeded the upper limit. The best performers were M98-68 and one of the Robust experimental controls, however the elevated soluble protein levels would adversely affect their commercial usefulness.

2002 Early Generation Lines (Group 11) – Crookston
Table 18 – 32 Entries

Half of these plump barleys had unacceptably high protein contents. Only four extract values were too low, but nearly all of the soluble protein levels exceeded the upper limit. The amylolitic values were generally good, while a third of the β–glucan levels were too high. The best performers were M96-106/M109 3148, M96-106/M109 3142, M96-106/M109 3143 and Lacey. M96-106/M109 3148 had solid malt quality characteristics, except for its high soluble protein level. M96-106/M109 3142 had high total and soluble protein levels. M96-106/M109 3143 had good protein levels, but had a low diastatic power value, an elevated β–glucan level and slightly hazy wort. Lacey had a solid malt quality profile except for its elevated total protein content and high soluble protein value.

2002 Early Generation Lines (Group 12) – Crookston
Table 19 – 32 Entries

Half of these plump barleys had unacceptably high protein levels, but only six extract values fell below the minimum limit. Three quarters of the S/T ratios were too high, because of the very high soluble protein levels. The amylolitic values were generally good, while nine of the β–glucan levels were too high. The best performers were M110/M96-64 3292, M110M96-64 3299 and M110/M96-64 3323, however all of these lines had unacceptably high soluble protein and S/T values. These lines did perform better than the experimental controls.

2002 Early Generation Lines (Group 13) – Crookston
Table 20 – 32 Entries

Half of these plump barleys had unacceptably high protein contents, but only four extract values were below the minimum limit. All soluble protein and S/T values were unacceptably high. Most of the amylolitic and β–glucan values were good. The best performers were M96-149/M110 3587 and Lacey, however both of these lines had unacceptably high soluble protein and S/T values. Most of the

experimental lines performed better than Stander and Robust, and similarly to Lacey.

2002 Early Generation Lines (Group 14) – Crookston
Table 21 – 32 Entries

A third of these plump barleys had unacceptably high protein contents. Their extract values were good, except for that of MNBrite. Nearly all of the soluble protein and S/T values were unacceptably high. A quarter of the diastatic power values were too low, while α–amylase levels were excellent. The β–glucan levels ranged from good to a bit too low, indicating that some of these lines were over-modified by our standard malting protocol. The best performers were M97-68/Lacey 3661, M96-186/M109 3827, and Lacey 3830. M97-68/Lacey 3661 had a solid malt profile except for its elevated soluble protein value. M96-186/M109 3827 had high soluble protein, S/T and color values. Lacey 3830 had high soluble protein and S/T values.

2002 Early Generation Lines (Group 15) – Crookston
Table 22 – 30 Entries

The five barleys associated with STP MAT were thin, had high total and soluble protein and S/T values and low extract levels. The rest of the experiment was plump, but two thirds of the protein contents were unacceptably high. Most of the extract values were good, but all of the soluble protein contents were too high. The amylolitic and β–glucan levels were generally good. The best performers were M96-186/M109 3844 and M96-186/M109 3853, however both of these lines had high soluble protein, S/T and color values. These lines outperformed the experimental controls.

2002 Early Generation Lines (Group 16) – Crookston
Table 23 – 45 Entries

A third of these barleys were too thin and two thirds of the protein contents were unacceptably high. Over half of the extract values were good, whereas most of the soluble protein levels were too high, with an experimental average of over 7.0%. A fifth of the diastatic power levels were above the upper limit, while the α–amylase levels were good. Only ten β–glucan levels exceeded the upper limit. The best performers were FEG65-61 and Lacey, but their very high soluble protein levels would exclude these lines from commercial use.

2002 Mixed Lines, Old and New (Group 17) – St. Paul
Table 24 – 36 Entries

All of these thin barleys had unacceptably high protein contents and all but one of the extract values were unacceptably low. All but two soluble protein values were too high, with this experiment averaging 8.13%. The amylolitic and β–glucan values were generally good. None of these lines including the experimental controls performed well.

2002 Mixed Lines, Old and New (Group 18) – St. Paul
Table 25 – 36 Entries

All of these thin barleys had unacceptably high protein contents. All of the extract values were unacceptably low, with an experimental average of 74%. Nearly all of the soluble protein values were too high. A couple of the diastatic power values were low and eleven exceeded the upper limit, while α–amylase values were good. Half of the β–glucan contents were too high. None of these lines performed well, including the experimental controls.

2002 Mixed Lines, Old and New (Group 19) – St. Paul
Table 26 – 36 Entries

All of these thin barleys had unacceptably high protein contents. Most of the extract values were unacceptably low and all of the soluble protein contents were too high. The diastatic power values ranged from two that were too low, to five that exceeded the desired limit. The α–amylase levels were good, while two thirds of the β–glucan levels were too high. None of these lines performed well.

2002 Mixed Lines, Old and New (Group 20) – Crookston
Table 27 – 36 Entries

A quarter of these barleys were too thin and nearly two thirds had unacceptably high protein contents. A third of the extract and diastatic power values were too low. Nearly all of the soluble protein values were too high, with this experiment averaging over 7.0%. The α–amylase levels were good, but three quarters of the β–glucan contents exceeded the desired maximum. The best performers were M73, M71, M37 and Lacey, however their high soluble protein levels would exclude all of these lines from commercial use.

2002 Mixed Lines, Old and New (Group 21) – Crookston
Table 28 – 36 Entries

A quarter of these barleys were too thin, and though the protein contents were generally high, well over half were below the upper limit. Half of the extract and diastatic power values were too low, while most of the soluble protein levels were too high. The α–amylase levels were good, but over half of the β–glucan levels exceeded the upper limit. The best performers were M6, M55, M57 and Lacey. M6 had a pretty solid malt profile, while M55, M57 and Lacey had good malt quality characteristics, except for their very high soluble protein contents.

2002 Mixed Lines, Old and New (Group 22) – Crookston
Table 29 – 36 Entries

A quarter of these barleys were thin and half had unacceptably high protein contents. A third of the extract values were too low, while most of the soluble protein levels were too high. Fourteen diastatic power values were too low, whereas all α–amylase values were good. Over half of the β–glucan levels were above the desired limit indicating that many of these lines did not modify well with our standard malting protocol. The best performers were M100 and Lacey, however their high soluble protein levels would exclude these samples from commercial use.

Submissions from North Dakota

2002 Experiment 21, Preliminary Malting Barley Yield Trial – Osnabrock
Table 30 – 48 Entries

All of these plump barleys had unacceptably high protein contents. Most of the extract values were too low, including three of the four experimental controls. The soluble protein levels ranged from excellent at 5.0% to extremely high at over 8.0%. The amylolitic values were generally good, whereas most β–glucan contents were too high. The best performer was ND20302, which had a high total protein level of 14.3%, which was better than any of the experimental controls. Many lines would have performed much better under conditions promoting lower protein contents.

2002 Experiment 22, Preliminary Malting Barley Yield Trial - Osnabrock
Table 31 – 54 Entries

All of these plump barleys had unacceptably high protein contents. Most of the extract values fell below the desired limit. The soluble protein levels ranged from

one that was too low to twenty-three that exceeded the upper limit. The amylolitic values were generally good, while all but one β–glucan value exceeded the upper limit. None of these lines performed well, including the experimental controls.

2002 Experiment 24, Preliminary Malting Barley Yield Trial – Osnabrock
Table 32 – 26 Entries

All of these plump barleys had unacceptably high protein contents. Most of their extract values were too low. These samples appeared to have modified poorly based on all of the unacceptably high β–glucan levels. Most of the soluble protein and amylolitic values were good. None of these lines performed well.

2002 Experiment 22B, Preliminary Malting Barley Yield Trial – Osnabrock
Table 33 – 55 Entries

All except one of these plump barleys had unacceptably high protein contents. Three quarters of the extract values were too low. These samples appeared to have modified poorly based on all of the unacceptably high β–glucan values. A quarter of the soluble protein and diastatic power values were too high, while α–amylase values were very good. None of these lines performed well.

2002 Experiment 23, Preliminary Malting Barley Yield Trial – Osnabrock
Table 34 – 56 Entries

All of these plump barleys had unacceptably high protein contents. Nearly all of the extract and S/T values were too low. The β–glucan levels were generally too high indicating that these malts had modified poorly. Even with poor modification, twelve soluble protein and eight diastatic power levels were unacceptably high. None of these lines performed well.

2002 Experiment 3, Intermediate Malting Barley Yield Trial – Osnabrock
Table 35 – 42 Entries

A quarter of these barleys were too thin, while over three quarters of their protein contents were too high. Over half of the extract values fell below the desired limit, while nearly all of the β–glucan levels were too high. Most of the soluble protein and amylolitic values were good. The best performers were ND19655 and ND19651. Both of these lines had high β–glucan contents indicating they did not modify well with our standardized malting protocol. The high soluble protein levels might become unacceptably high with better modification and this would be a concern for commercial use.

2002 Experiment 3, Intermediate Malting Barley Yield Trial – Williston
Table 36 – 42 Entries

Over three quarters of these plump barleys had unacceptably high protein contents. Most of the extract values were good, but three quarters of the soluble protein levels were too high. Most of these samples modified well as shown by the generally good β–glucan levels. A third of the diastatic power values exceeded the upper limit, while the α–amylase values were generally good. The best performers were ND19728, ND19609, Lacey, ND19647, ND19669, ND19651, ND19620 and ND19203. All of these lines had unacceptably high soluble protein contents, which would be a concern for commercial use.

2002 Experiment LA41, Langdon Preliminary Yield Trial – Langdon
Table 37 – 25 Entries

Over half of these plump barleys had good protein contents. The extract values were very good, with this experiment averaging over 80%. Nine soluble protein levels were too high, with a couple values topping out at over 7.0%. The diastatic power levels ranged from three that were too low to one that exceeded the upper limit. Most of the β–glucan levels were too high, while the α–amylase contents were good. The best performers were ND20789, ND20818, ND 20793, ND 20817, ND20788 and ND20801. All of these top performers were under-modified by our standard malting protocol and the elevated β–glucan levels found in these lines detract from their commercial worth.

2002 Experiment LA42, Langdon Preliminary Yield Trial – Langdon
Table 38 – 23 Entries

Nearly three quarters of these plump barleys had unacceptably high protein contents. Only five extract values fell below the desired limits, and only six soluble protein levels were too high. The diastatic power levels were generally low, with eight being too low, while α–amylase values were good. All of the β–glucan values, except that of Lacey exceeded the upper limit. The best performers were ND16461-1, Lacey and ND20833. ND161641-1 had a very high β–glucan level, while the protein levels found in Lacey were too high. ND20833's extract value was very good, but the soluble protein and β–glucan levels were elevated.

2002 Experiment LA43, Langdon Preliminary Yield Trial – Langdon
Table 39 – 29 Entries

Over half of these plump barleys had good protein contents. The extract, soluble protein and amylolitic values were generally good, but most β–glucan levels were

too high. The best performers were ND20890, ND20908 and ND20894. ND20890 had a solid malt quality profile. ND20908 had a good malt quality profile, except for its elevated β–glucan content. ND20894 had an excellent extract value, but had an elevated soluble protein level.

2002 Experiment LA44, Langdon Preliminary Yield Trial – Langdon
Table 40 – 23 Entries

Most of these plump barleys had unacceptably high protein contents. Most of the extract and amylolitic values were very good. The soluble protein levels ranged from two that were too low, to nine that exceeded the upper limit. Most of the β–glucan levels were too high suggesting that these malts were under-modified. The best performers were ND20960 and ND20927, which had solid malt quality characteristics, except for their elevated β–glucan levels.

2002 Experiment LA45, Langdon Preliminary Yield Trial – Langdon
Table 41 – 28 Entries

Three quarters of these plump barleys had unacceptably high protein contents. The extract values ranged from good to exceptional. Over half of the soluble protein and most of the β–glucan values were too high, whereas most of the amylolitic values were good. The best performers were Drummond, ND20968, Conlon, ND20990 and ND21000, which had very good malt profiles, except for their elevated β–glucan contents.

2002 Experiment LA46, Langdon Preliminary Yield Trial – Langdon
Table 42 – 27 Entries

Most of these plump barleys had unacceptably high protein contents. The extract values were good, with only a couple exceptions. The soluble protein levels ranged from very good to thirteen that exceeded the upper limit. A quarter of the diastatic power and three quarters of the β–glucan values were too high, while the α–amylase levels were very good. The best performers were ND16461-1 and Conlon, which had very good malt profiles, except for their elevated β–glucan levels.

2002 Experiment LA47, Langdon Preliminary Yield Trial – Langdon
Table 43 – 26 Entries

Most of these plump barleys had unacceptably high protein contents. The extract values were generally good, but most of the soluble protein levels were too high. The amylolitic values were generally good, but over half of the

β–glucan levels exceeded the upper limit. The best performers were ND21099, Lacey and ND21073. ND21099 had a solid malt profile, except for its high soluble protein value. Lacey and ND21073 had high soluble protein and total protein levels that would have rendered these submissions unacceptable for commercial use.

2002 Experiment LA48, Langdon Preliminary Yield Trial – Langdon
Table 44 – 25 Entries

Three quarters of these plump barleys had unacceptably high protein contents. The extract values were good, with two exceptions. Over a quarter of the soluble protein levels exceeded the upper limit and the excessive protein contents contributed to the elevated wort colors. The amylolitic values were generally good, whereas most of the β–glucan levels exceeded the upper limit. The best performers were ND21109, ND16461-1, ND21112 and ND21110, however all of these lines had rather high β–glucan levels.

2002 Experiment LA49, Langdon Preliminary Yield Trial – Langdon
Table 45 – 25 Entries

Nearly all of these plump barleys had unacceptably high protein contents. Most of the extract and amylolitic values were good. Over half of the soluble protein and two thirds of the β–glucan levels exceeded the upper limits. The best performers were Lacey, Conlon and Metcalfe. Lacey and Conlon had elevated β–glucan contents, while Metcalfe had elevated protein levels.

2002 Sidney Flood Experiment 212 – Sidney, MT
Table 46 – 36 Entries

A quarter of these barleys were too thin, but all protein contents were good. All extract values were within the desired limits and soluble protein levels were generally good. A third of the diastatic power values were too low and a third of the β–glucan levels, all from two rowed submissions, were too high. The best performers were ND18460, ND18578, ND18825, and ND18556. ND18460 had a very good malting quality profile, with only a high S/T ratio keeping this submission from a perfect score. ND18578 also had good malt quality characteristics, but it had a high S/T ratio and was a bit thin. ND18825 was thin, whereas ND18744 had a hazy wort that would detract from this line's commercial use. The experimental controls, Robust and Lacey also performed well in this experiment as did most of the 6 rowed lines.

2002 Sidney Overhead Experiment 212 – Sidney, MT
Table 47 – 36 Entries

Only three of these plump barleys had unacceptably high protein contents. All of the extract values were good and while the soluble protein levels were a bit high, only six exceeded the upper limit. Over half of the two rowed submissions had deficient diastatic power levels, whereas all α–amylase values fell within the desired limits. Fifteen β–glucan levels were too high and most of these were two rowed lines. This indicated that, in general, these two rowed selections were not as well modified by our protocol as were the six rowed lines. The best performers, all six rowed lines, were ND18554, ND18566, ND18567, Lacey, ND18650, Robust, ND18549, ND18825, ND18546 and ND18556. ND18554, ND18566, ND18567 and Lacey all scored a perfect 65. ND18650 and Robust had similar solid malt profiles, with only their elevated β–glucan levels detracting from a higher score. The soluble protein level of ND18549 was a bit high, although still within limits. ND18825 had elevated β–glucan and soluble protein values, which could be a concern since better modification would lead to lower β–glucan levels, but would further elevate the soluble protein contents. ND18546 and ND18556 had elevated soluble protein levels and in the latter this pushed the S/T ratio above the desired limit.

2002 Mott Experiment 5 – Mott
Table 48 – 25 Entries

Most of these barleys had good protein contents. The extract values were good, with the experiment averaging over 80%. The soluble protein levels tended to be a bit high, but only five exceeded the upper limit. The S/T ratios reflected the high soluble protein levels, with seventeen exceeding the desired limit. Half of the diastatic power values were too low, whereas the α–amylase levels were very good. Over half of the β–glucan levels were too high. The best performers were ND19742, Lacey, ND19703, ND19711 and ND19743. ND19742 and ND19711 had low diastatic power values and high S/T ratios. Lacey had a solid malt quality profile, except for an elevated soluble protein level. ND19703 was thin and had a slightly elevated soluble protein value. ND19743 had an excellent extract value, but a low diastatic power level and unacceptably high β–glucan and S/T values, which would detract from commercial use.

2002 Williston Re-Crop Experiment 5 – Williston
Table 49 – 25 Entries

Over half of these plump barleys had unacceptably high protein contents. The extract values were generally good, but nearly all of the soluble protein values were too high. The diastatic power levels ranged from five that were too low to two that exceeded the upper limit. The α–amylase levels were generally high,

however only that of Stander was too high. Over half of the β–glucan levels were unacceptably high, indicating many of these submissions did not modify well with our standard malting protocol. None of these lines performed well including the experimental controls.

2002 Osnabrock Experiment 1 – Osnabrock
Table 50 – 18 Entries

All of these plump barleys had unacceptably high protein contents and most of the extract levels were too low. Half of the soluble protein and nearly all of the β–glucan levels exceeded the maximum limits. The amylolitic values were generally good. The best performer was ND17655, which performed better than all of the experimental controls. This line had high total protein contents and elevated soluble protein, amylolitic and β–glucan values.

2002 Carrington, Experiment 1 – Carrington
Table 51 – 18 Entries

All of these thin barleys had unacceptably high protein contents. A third of the extract values were too low. All soluble protein and diastatic power values were too high, except for those of Conlon. The α–amylase values were good, but a third of the β–glucan levels were too high. None of these lines performed well.

2002 Experiment LA12, Langdon Advanced Yield Trial – Langdon
Table 52 - 15 Entries

These plump barleys generally had good protein contents and excellent extract values. Only four soluble protein levels were too high. Four diastatic power levels were too low, while all α–amylase values were good. All except one of the β–glucan levels were high indicating under-modification of these submissions by our standard malting protocol. The best performers were ND19854, ND16461-1 and ND19088. ND19854 had a very solid malt quality profile except for its high β–glucan content. ND16461-1 had an extremely high β–glucan level and its diastatic power level was a bit low. ND19088 had a low diastatic power value and high β–glucan content.

2002 Experiment CR12, Carrington Advanced Yield Trial – Carrington
Table 53 – 15 Entries

Most of these barleys were thin and had unacceptably high protein contents. Six extract values were too low, while five soluble protein levels were too high. Most

of the β–glucan levels exceeded the upper limit, while the amylolitic values were generally good. None of these lines performed well.

2002 Experiment LA13, Langdon Intermediate Yield Trial – Langdon
Table 54 – 26 Entries

Over half of these plump barleys had unacceptably high protein contents. The extract values were excellent, with the experiment averaging 80.8%. Most of the soluble protein levels were very good, with only four exceeding the upper limit. Six diastatic power levels were too low, while the α–amylase values were excellent. Nearly all β–glucan levels were unacceptably high. The best performers were ND19879, ND19855, ND19852, ND20049 and Conlon. All of these lines had solid malt quality characteristics, except for their extremely high β–glucan contents.

2002 Experiment CR13, Carrington Intermediate Yield Trial – Carrington
Table 55 – 26 Entries

Three quarters of these thin barleys had unacceptably high protein contents. Nearly all of the extract values were good, but a third of the soluble protein levels exceeded the upper limit. The amylolitic values were generally good, but three quarters of the β–glucan contents were too high. The best performers were ND19873, ND19852 and ND19879. These lines had good malt quality characteristics, but were thin and had elevated β–glucan levels.

2002 WI Fallow 13, Intermediate Yield Trial – Williston
Table 56 – 26 Entries

All of these thin barleys had unacceptably high protein contents. Most of the extract values were low and a third of the soluble protein levels exceeded the upper limit. The diastatic power levels ranged from one that was too low to five that were too high. Two α–amylase and most of the β–glucan values were too high. None of these lines performed well.

2002 Experiment LA11, Langdon Variety Yield Trial – Langdon
Table 57 – 10 Entries

Most of these plump barleys had unacceptably high protein contents. The extract and α–amylase values were very good. Seven soluble protein and β–glucan levels were too high, while three diastatic power values were too low. The best performers were Lacey and ND16461-1. Lacey had unacceptably high

total and soluble protein levels. ND16461-1 had a low diastatic power level and an extremely high β–glucan content.

2002 Experiment CR11, Carrington Variety Yield Trial – Carrington
Table 58 – 10 Entries

Nearly all of these thin barleys had unacceptably high protein contents. Four extract values were too low, while the soluble protein levels were high, with eight exceeding the upper limit. Three diastatic power levels were too high, while two α–amylase values exceeded the maximum limit. Most of the β–glucan levels were too high. None of these lines performed well.

Submissions from Virginia

2002 Barley Submissions – Blacksburg
Table 59 – 24 Entries

These barleys were generally plump and had protein contents that ranged from good to a bit too low. The extract values were excellent averaging over 80%. Half of the soluble protein values were too low, as were all but three of the diastatic power levels. Only three α–amylase values fell outside the expanded desired range, these being too low. Half of the β–glucan levels were too high. The best performers were 92AB1841, 94AB1274 and 95AB2299. 92AB1841 exhibited a solid malt quality profile, but was thinner than most of the other submissions. The other best performers also had good malt quality profiles, except for their low diastatic power levels.

Table 1 **Entries in the Mississippi Valley Uniform Barley Nursery - 2002 Crop**

Entry No.	New Entry	CI# or Contributor	Name	Rowed	Parentage
1		5105	Barbless	6	Oderbrucker/Lion
2		10648	Larker	6	Titan/Kindred/3/Newal/Peatland//Montcalm
3		15773	Morex	6	Cree/Bonanza
4		476976	Robust	6	Morex/Manker
5		Minnesota	Stander (M64)	6	Robust 2*/3/Cree/Bonanza//Manker/4/Robust/Bumper
6		Busch Ag. Res.	Legacy (6B93-2978)	6	Bumper/Karl//Bumper/Manker/3/Bumper/Karl/4/Excel
7		PI 603050	MNBrite (MNS85)	6	M90-89/M69
8		North Dakota	Drummond (ND15477)	6	ND9712//Stander/ND12200
9		Minnesota	Lacey (M98)	6	M78/M79
10		North Dakota	ND16301	6	Foster//ND12200/6B88-3213
11		Busch Ag.	6B95-2482	6	6B89-2126/ND10981
12		Busch Ag.	6B95-2089	6	6B84-2912/B1601//6B88-3213
13		Minnesota	M109	6	Lacey/M95
14		Minnesota	M110	6	M93-117/M95
15		North Dakota	ND16922	6	ND14161/ND14296
16	X	Minnesota	M111	6	M93-9/M92-392
17	X	Minnesota	M112	6	M93-121/M81
18	X	Minnesota	M113	6	M93-109/Lacey
19	X	North Dakota	ND17643	6	ND15245/ND15377
20	X	North Dakota	ND17655	6	ND15245/ND15377
21	X	North Dakota	ND17687	6	ND15246/ND15377
22	X	North Dakota	ND17711	6	ND15246/ND15377
23	X	North Dakota	2ND18365	2	2B91-4947/ND15403
24	X	Busch Ag.	6B98-9105	6	6B93-3192/M82
25	X	Busch Ag.	6B98-9170	6	6B92-7098//6B92-7098/M75
26	X	Busch Ag.	6B98-9339	6	B1614//B1614/M75

MISSISSIPPI VALLEY UNIFORM BARLEY NURSERY - 2002 Crop

Table 2 - Station Means* of Barley and Malt Quality Factors for 29 Varieties or Selections**.

Location	Barley Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	F-C (%)	Wort Color	Turbidity (NTU)	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°)	Alpha-amylase (20° DU)	Beta-glucan (ppm)	FAN (ppm)	Ave. Quality Score
Morris, MN	30.2 C	73.7 B	43.1 B	77.6 C	1.0 B	2.9 C	10.1 B	15.2 C	6.90 B	46.5 AB	156 A	71.1 B	212 B	331 B	27
Sidney, MT	33.7 B	86.6 A	51.9 A	80.2 A	0.7 A	2.0 B	8.7 B	12.7 A	5.83 A	48.1 B	158 A	69.6 B	119 A	266 A	53
Bottineau, ND	35.8 A	89.0 A	52.2 A	78.9 B	1.1 B	1.8 A	6.0 A	13.5 B	5.88 A	45.0 A	171 B	62.6 A	144 A	258 A	49

* Within each column, means followed by the same letter are not significantly different (alpha=0.05), according to Duncan's Multiple Range test

** Barbless, Larker, Morex, Robust, Stander, Legacy, MNBrite, Drummond, Lacey, ND16301, 6B95-2482, 6B95-2089, M109, M110, ND16922, M111, M112, M113, ND17643, ND17655, ND17687, ND17711, 2ND18365, 6B98-0105, 6B98-9170, 6B-9339, BT389, BT478, BT483

MISSISSIPPI VALLEY UNIFORM BARLEY NURSERY - 2002 Crop

Table 3 - Varietal Means* of Barley and Malt Quality Factors for 3 Stations**

Variety	Rowed	Barley Kernel Weight (mg)		on 6/64" (%)		Barley Color (Agtron)		Malt Extract (%)		F-C (%)		Wort Color	Turbidity (NTU)		Barley Protein (%)	Wort Protein (%)		S/T (%)		DP (°)		Alpha-amylase (20° DU)		Beta-glucan (ppm)		FAN (ppm)		Ave. Quality Score
Barbless	6	32.8	B	73.0	AB	46.0	76.2	C	1.2	ABCD	2.2	18.1	C	14.7	5.38	A	37.9	J	155	BCD	51.8	J	225	AB	216	E	29.0
Larker	6	32.0	B	78.3	AB	48.0	78.7	ABC	1.1	ABCD	2.2	8.6	AB	13.8	5.97	ABCD	45.1	FGHI	157	BCD	65.2	DEFGH	149	ABC	279	ABCDE	43.0
Morex	6	30.2	B	64.8	B	49.3	78.2	BC	1.0	ABCD	2.0	5.7	A	14.4	6.05	ABCD	43.6	GHI	165	ABCD	68.8	BCDEFGH	152	ABC	242	CDE	40.3
Robust	6	33.0	B	81.9	AB	47.0	78.7	ABC	1.5	D	1.8	6.7	A	13.7	5.88	ABCD	44.1	GHI	162	ABCD	53.0	IJ	216	AB	261	ABCDE	45.0
Stander (M64)	6	33.8	AB	87.1	A	48.0	79.9	AB	0.7	ABCD	2.7	6.1	A	13.6	6.81	BCD	51.3	ABC	148	D	77.5	ABC	183	ABC	359	AB	44.3
Legacy (6B93-2978)	6	32.1	B	82.7	AB	47.0	78.9	ABC	0.9	ABCD	2.4	6.5	A	14.2	6.71	ABCD	48.5	BCDEFG	155	BCD	76.0	ABCD	224	AB	332	ABCD	33.7
MNBrite (MNS85)	6	32.3	B	79.1	AB	52.7	78.2	BC	0.9	ABCD	2.9	6.6	A	15.5	7.20	D	48.4	BCDEFGH	192	A	66.7	CDEFGH	80	C	333	ABCD	31.0
Drummond (ND15477)	6	32.6	B	80.8	AB	54.3	78.9	ABC	1.1	ABCD	1.9	6.5	A	13.8	5.85	ABCD	43.4	HI	181	ABC	68.0	BCDFGH	134	ABC	258	ABCDE	48.0
Lacey (M98)	6	33.9	AB	85.9	AB	47.7	79.0	ABC	1.1	ABCD	1.9	8.3	AB	13.9	5.89	ABCD	43.5	HI	163	ABCD	64.3	EFGH	118	ABC	259	ABCDE	48.7
ND16301	6	33.5	B	87.5	AB	54.3	78.9	ABC	1.1	ABCD	2.0	8.3	AB	13.3	5.74	ABC	45.5	EFGHI	171	ABCD	66.0	DEFGH	135	ABC	254	ABCDE	46.0
6B95-2482	6	33.6	B	85.6	A	48.7	78.7	ABC	1.1	ABCD	1.9	8.6	AB	13.9	5.73	ABC	42.8	I	184	AB	63.9	EFGH	156	ABC	233	DE	48.3
6B95-2089	6	33.3	B	83.2	AB	44.3	79.0	ABC	1.3	ABCD	2.0	9.4	AB	14.0	5.90	ABCD	43.8	GHI	173	ABCD	62.9	FGHI	162	ABC	224	DE	44.0
M109	6	34.0	AB	81.9	AB	49.3	79.8	AB	0.9	ABCD	2.0	8.0	AB	12.9	5.81	ABC	47.7	BCDEFGHI	165	ABCD	63.6	EFGH	142	ABC	264	ABCDE	51.0
M110	6	33.3	B	83.7	AB	44.3	79.4	AB	1.4	CD	2.1	13.0	BC	13.1	5.71	ABC	46.0	DEFGHI	164	ABCD	58.2	HIJ	211	AB	257	ABCDE	47.3
ND16922	6	32.1	B	88.0	A	48.3	78.4	BC	1.4	CD	2.1	8.5	AB	13.7	5.95	ABCD	44.7	FGHI	160	BCD	70.0	BCDEFG	226	AB	248	BCDE	46.0
M111	6	32.8	B	82.8	AB	51.3	79.0	AB	1.3	BCD	2.0	8.1	AB	13.2	5.90	ABCD	45.8	EFGHI	162	ABCD	62.3	FGHI	108	ABC	245	CDE	47.7
M112	6	33.9	AB	85.8	A	48.0	78.7	ABC	1.1	ABCD	2.1	11.1	AB	13.3	5.61	AB	43.3	I	161	BCD	59.2	GHIJ	192	ABC	237	CDE	48.0
M113	6	33.6	B	84.4	A	47.3	79.2	AB	1.3	CD	2.1	6.7	AB	13.5	6.18	ABCD	47.6	BCDEFGHI	163	ABCD	67.4	CDEFGH	158	ABC	271	ABCDE	48.3
ND17643	6	33.4	B	87.8	A	52.7	78.8	ABC	0.7	ABCD	2.1	7.0	AB	13.7	6.04	ABCD	45.0	FGHI	173	ABCD	67.3	CDEFGH	104	ABC	292	ABCDE	48.0
ND17655	6	35.3	AB	90.0	A	50.3	79.1	AB	0.6	ABC	2.5	8.0	AB	13.6	6.58	ABCD	50.1	ABCDE	167	ABCD	73.1	BCDEF	102	ABC	320	ABCDE	43.3
ND17687	6	32.1	B	84.2	A	51.3	77.9	BC	0.4	A	2.2	7.9	AB	14.4	6.46	ABCD	46.4	DEFGHI	179	ABCD	68.1	BCDEFGH	99	BC	279	ABCDE	40.0
ND17711	6	31.4	B	85.8	A	50.0	78.7	ABC	0.4	AB	2.2	7.6	AB	13.5	6.08	ABCD	47.0	CDEFGHI	161	BCD	66.1	DEFGH	120	ABC	286	ABCDE	46.3
2ND18365	2	39.4	A	86.4	A	50.0	81.3	A	0.8	ABCD	2.8	5.7	A	13.1	6.80	BCD	53.9	A	95	E	83.9	A	190	ABC	336	ABCD	32.3
6B98-9105	6	34.3	AB	86.0	A	48.3	79.3	AB	0.8	ABCD	2.4	6.7	A	13.7	6.73	ABCD	50.8	ABCD	152	CD	74.7	ABCDE	157	ABC	327	ABCDE	38.7
6B98-9170	6	33.8	AB	86.8	A	49.7	78.9	ABC	0.7	ABCD	2.3	6.1	A	14.1	6.65	ABCD	49.4	ABCDEF	156	BCD	74.4	ABCDE	230	A	332	ABCD	38.7
6B98-9339	6	32.7	B	82.8	AB	48.0	79.1	AB	0.9	ABCD	2.4	7.7	AB	13.7	6.47	ABCD	48.4	BCDEFGH	152	CD	71.3	BCDEF	112	ABC	348	ABC	46.3
BT389	6	34.1	AB	83.2	AB	49.3	78.2	BC	0.6	ABC	2.6	9.5	AB	14.3	6.58	ABCD	46.6	CDEFGHI	170	ABCD	71.7	BCDEF	192	ABC	332	ABCD	46.0
BT478	6	32.7	B	79.6	AB	51.0	79.4	AB	0.8	ABCD	2.3	8.5	AB	13.4	6.19	ABCD	47.2	BCDEFGHI	154	BCD	71.2	BCDEF	148	ABC	278	ABCDE	45.7
BT483	6	31.9	B	81.0	AB	45.7	79.6	AB	0.7	ABCD	2.9	10.2	AB	14.2	7.07	CD	51.9	AB	154	BCD	78.9	AB	169.0	ABC	362	A	34.3

* Within each column, means followed by the same letter are not significantly different (alpha=0.05), according to Duncan's Multiple Range test

** Morris, MN, Sydney, MT and Bottineau, ND

2002 MISSISSIPPI VALLEY BARLEY NURSERY - MORRIS, MN
Table 4

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	F-C (%)	Wort Color	Turbidity (Hach)	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Free Amino Nitrogen	Quality Score	Overall Rank
4458	BARBLESS	6	30.0	57.9	41	*74.2	2.0	2.4	11.2	1	16.1	5.79	36.6	127	56.5	352	272	18	25
4459	LARKER	6	29.5	65.3	40	75.7	1.1	2.5	15.8	2	15.7	5.98	38.5	158	58.1	219	278	20	24
4460	MOREX	6	*25.3	41.0	45	76.6	1.1	2.6	7.7	2	15.7	6.86	43.9	171	74.7	155	287	23	23
4461	ROBUST	6	30.9	74.0	43	78.1	2.0	2.2	7.6	2	14.9	6.53	44.6	155	56.7	225	341	31	6
4462	STANDER (M64)	6	32.6	85.6	42	78.5	0.8	3.6	9	1	14.6	7.25	51.0	133	78.7	328	437	30	8
4463	LEGACY (6B93-2978)	6	29.4	74.6	45	78.0	0.7	3.0	8.6	1	15.2	7.29	48.8	146	78.6	225	419	25	20
4464	MNBRITE (MNS85)	6	29.1	67.3	47	77.7	0.6	*4.9	10	1	17.5	8.87	51.9	187	70.7	79	530	18	25
4465	DRUMMOND (ND15477)	6	29.4	68.2	49	78.2	1.0	2.4	8.9	1	15.1	6.59	46.0	177	72.3	176	326	30	8
4466	LACEY (M98)	6	31.4	80.1	44	78.3	1.4	2.2	8.2	1	14.7	6.58	46.1	147	66.7	140	335	40	1
4467	ND16301	6	30.4	78.0	48	77.6	1.2	2.4	7.6	1	14.6	6.41	45.8	170	70.6	230	324	28	12
4468	6B95-2482	6	31.4	80.9	42	78.1	1.3	2.5	9.3	2	15.2	6.43	44.1	172	65.8	280	267	33	3
4469	6B95-2089	6	29.9	70.2	39	77.9	1.4	2.6	11.3	2	14.8	6.52	45.1	158	65.3	276	252	26	18
4471	M109	6	30.8	69.8	42	78.2	1.5	2.3	8.7	2	14.7	6.43	46.7	169	64.0	240	295	28	12
4472	M110	6	31.2	75.9	40	78.6	1.4	2.7	16.3	2	14.2	6.26	46.6	165	61.8	263	345	34	2
4473	ND16922	6	29.7	83.4	42	77.4	1.3	2.6	8.5	2	14.9	6.60	45.6	162	73.9	245	330	27	15
4474	M111	6	30.0	72.0	43	77.9	1.6	2.4	11.9	2	14.6	6.37	44.7	147	62.0	151	268	29	10
4475	M112	6	30.0	70.6	43	77.5	1.9	2.6	13.2	2	14.4	6.18	44.8	147	61.9	270	234	24	22
4476	M113	6	30.9	77.6	41	77.8	1.5	2.6	7.7	2	14.7	6.66	46.4	154	68.3	217	229	31	6
4477	ND17643	6	29.2	75.5	48	77.3	0.3	2.6	10.2	1	14.6	6.43	44.4	152	71.6	105	219	33	3
4478	ND17655	6	31.8	82.8	45	77.5	0.1	3.4	12.1	1	15.2	7.49	50.4	160	75.7	162	328	28	12
4479	ND17687	6	28.7	76.3	45	76.8	0.5	2.8	10.7	1	15.6	7.14	46.1	174	71.8	102	389	33	3
4480	ND17711	6	28.6	78.4	43	77.4	0.2	2.5	9.6	1	14.8	6.45	45.8	154	68.0	173	333	29	10
4481	2ND18365	2	33.6	76.4	45	80.0	0.6	3.6	8.3	1	14.2	7.43	55.1	101	85.8	225	306	17	28
4482	6B98-9105	6	30.6	72.9	42	77.5	0.6	3.0	9	1	15.0	7.12	49.1	127	82.5	193	362	17	28
4483	6B98-9170	6	31.5	82.0	42	78.2	0.6	2.9	7.2	1	15.6	7.56	50.1	147	81.5	282	361	26	18
4484	6B98-9339	6	29.0	70.6	40	78.3	1.0	3.1	9.1	1	15.3	7.18	48.4	140	79.8	161	378	25	20
4485	BT389	6	31.3	81.6	39	76.2	0.8	3.5	11.4	1	17.6	8.05	46.0	200	75.3	288	394	27	15
4486	BT478	6	31.7	81.2	43	77.6	0.5	3.2	11.2	1	16.1	7.30	46.2	165	81.5	203	404	27	15
4487	BT483	6	28.3	68.0	41	77.4	0.8	4.2	13.5	1	16.3	8.31	51.1	160	83.1	184	350	18	25
4470	HARRINGTON MALT CHECK	2	39.5	94.7	73	82.1	0.9	1.9	5.1	2	11.4	6.05	53.3	108	66.9	59	438	37	
Minima			28.3	41.0	39	75.7	0.1	2.2	7.2		14.2	5.79	36.6	101	56.5	79	219	17	
Maxima			33.6	85.6	49	80.0	2.0	4.2	16.3		17.6	8.87	55.1	200	85.8	352	530	40	
Means			30.4	73.7	43	77.7	1.0	2.8	10.1		15.2	6.90	46.5	156	71.1	212	331	27	
Standard Deviations			1.3	8.9	3	0.8	0.5	0.5	2.4		0.8	0.70	3.7	19	8.4	66	69	6	
Coefficients of Variation			4.2	12.1	6	1.0	50.9	17.8	23.4		5.6	10.20	7.9	12	11.7	31	21	21	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 MISSISSIPPI VALLEY BARLEY NURSERY - SIDNEY, MT

Table 5

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	F-C (%)	Wort Color	Turbidity (Hach)	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Free Amino Nitrogen	Quality Score	Overall Rank
4488	BARBLESS	6	32.7	78.2	49	*77.6	0.4	2.5	*28.0	2	13.7	5.19	39.9	169	49.9	184	199	34	29
4489	LARKER	6	34.1	87.3	51	80.9	1.2	2.3	6.5	1	12.5	6.06	49.6	151	71.1	97	295	53	16
4490	MOREX	6	31.7	71.9	50	79.4	0.6	1.8	5.0	1	13.3	5.75	45.4	157	73.9	122	254	55	14
4491	ROBUST	6	33.3	84.2	47	79.9	1.1	1.8	7.1	1	13.1	5.81	46.3	166	55.6	179	242	57	9
4492	STANDER (M64)	6	33.3	88.0	52	81.2	1.0	2.3	5.2	1	12.6	6.46	51.3	144	81.9	86	328	50	22
4493	LEGACY (6B93-2978)	6	31.1	79.6	44	80.0	0.9	2.3	7.0	1	13.8	6.35	47.4	148	77.9	222	300	38	27
4494	MNBRITE (MNS85)	6	33.7	88.1	53	79.6	1.1	2.1	6.3	1	13.9	6.41	49.0	179	66.1	63	291	44	26
4495	DRUMMOND (ND15477)	6	34.0	90.2	58	80.1	1.0	1.7	6.5	1	12.8	5.66	44.6	168	69.9	99	240	65	1
4496	LACEY (M98)	6	34.7	90.0	51	80.6	0.8	2.0	11.1	1	12.6	5.67	45.9	152	67.7	87	245	65	1
4497	ND16301	6	34.1	89.6	57	80.5	0.7	2.0	11.2	1	12.1	5.48	48.8	154	70.6	67	239	56	11
4498	6B95-2482	6	33.5	86.2	52	79.4	0.9	1.8	11.5	1	13.1	5.31	42.5	190	65.9	118	218	62	4
4499	6B95-2089	6	33.5	84.6	45	80.1	1.2	1.9	10.2	1	13.3	5.74	45.6	165	65.8	74	226	57	9
4501	M109	6	34.7	88.0	52	81.1	0.0	2.1	8.5	1	11.5	5.56	51.0	156	69.7	92	252	60	5
4502	M110	6	33.2	81.4	45	80.0	0.7	2.1	15.3	1	11.9	5.14	46.6	145	56.5	227	229	54	15
4503	ND16922	6	31.7	86.7	48	79.3	0.7	1.9	9.0	1	12.9	5.49	43.9	157	71.7	180	212	60	5
4504	M111	6	34.3	88.8	53	80.4	0.8	1.9	6.5	1	12.4	5.76	47.4	171	66.1	64	241	52	18
4505	M112	6	35.5	92.6	50	80.0	0.5	1.9	10.3	1	12.5	5.21	42.9	165	60.7	90	295	65	1
4506	M113	6	34.2	87.8	48	80.5	1.0	1.9	7.1	1	12.4	5.87	49.5	161	70.5	125	247	56	11
4507	ND17643	6	34.5	94.2	57	80.2	0.7	1.9	5.9	1	13.0	5.92	46.3	190	68.3	99	311	58	8
4508	ND17655	6	35.8	93.0	54	80.4	0.3	2.1	7.0	1	12.3	6.06	52.4	175	76.2	63	304	49	23
4509	ND17687	6	32.8	90.8	56	79.6	0.1	1.9	7.4	1	12.8	5.88	49.2	159	68.4	91	295	56	11
4510	ND17711	6	32.1	87.9	56	80.0	0.1	2.1	6.8	1	12.2	5.83	49.4	154	69.1	79	257	52	18
4511	2ND18365	2	*40.9	92.2	53	81.9	0.5	2.4	5.6	1	12.2	6.27	52.8	*86.4	87.1	195	274	38	27
4512	6B98-9105	6	35.3	92.0	56	81.5	0.8	2.1	6.2	1	13.0	6.66	53.6	173	74.8	168	258	49	23
4513	6B98-9170	6	33.2	86.0	54	80.3	0.7	1.9	5.3	1	12.7	5.98	49.6	157	73.4	164	384	52	18
4514	6B98-9339	6	33.4	88.9	50	79.7	0.7	2.3	8.8	1	12.8	6.34	50.9	156	70.8	85	271	53	16
4515	BT389	6	33.2	81.3	59	79.9	0.4	2.1	10.2	1	12.1	5.59	47.7	163	73.9	119	328	60	5
4516	BT478	6	31.9	80.1	54	80.5	1.2	2.0	8.1	1	11.4	5.51	49.4	137	65.5	109	255	51	21
4517	BT483	6	31.9	81.9	50	81.5	1.0	2.3	9.5	1	12.1	6.19	55.7	137	79.1	112	238	49	23
4500	HARRINGTON MALT CHECK	2	39.4	94.6	77	81.8	1.1	1.9	5.4	1	11.5	5.83	53.0	106	72.6	76	339	46	
Minima			31.1	71.9	44	79.3	0.0	1.7	5.0		11.4	5.14	39.9	137	49.9	63	199	34	
Maxima			35.8	94.2	59	81.9	1.2	2.5	15.3		13.9	6.66	55.7	190	87.1	227	384	65	
Means			33.5	86.6	52	80.3	0.7	2.0	8.0		12.7	5.83	48.1	161	69.6	119	266	53	
Standard Deviations			1.2	5.1	4	0.7	0.3	0.2	2.4		0.6	0.40	3.5	13	7.7	49	41	8	
Coefficients of Variation			3.6	5.9	8	0.8	45.8	9.7	30.0		4.9	6.88	7.4	8	11.1	41	15	15	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by D. B. Cooper, BARI - Ft. Collins, CO

2002 MISSISSIPPI VALLEY BARLEY NURSERY - BOTTINEAU, ND
Table 6

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	F-C (%)	Wort Color	Turbidity (Hach)	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Free Amino Nitrogen	Quality Score	Overall Rank
4556	BARBLESS	6	35.7	83.0	48	76.7	1.1	1.8	*15.2	2	14.4	5.15	37.2	169	48.9	138	176	35	27
4557	LARKER	6	32.5	82.2	53	79.5	0.9	1.7	3.6	1	13.1	5.87	47.1	163	66.5	132	263	56	7
4558	MOREX	6	33.5	81.5	53	78.6	1.2	1.6	4.3	1	14.2	5.55	41.6	167	57.7	178	224	43	21
4559	ROBUST	6	34.9	87.5	51	78.2	1.5	1.4	5.3	1	13.2	5.30	41.5	165	46.8	243	200	47	20
4560	STANDER (M64)	6	35.6	87.8	50	80.0	0.4	2.1	4.2	1	13.5	6.71	51.5	168	71.8	136	325	53	11
4561	LEGACY (6B93-2978)	6	35.9	93.9	52	78.7	1.1	1.9	4	1	13.6	6.49	49.2	171	71.4	224	276	38	24
4562	MNBRITE (MNS85)	6	34.1	81.9	58	77.3	1.0	1.7	3.4	1	15.0	6.31	44.2	209	63.3	97	258	31	28
4563	DRUMMOND (ND15477)	6	34.3	84.0	56	78.4	1.3	1.5	4.2	1	13.6	5.29	39.7	199	61.9	128	208	49	18
4564	LACEY (M98)	6	35.7	87.5	48	78.1	1.0	1.5	5.6	1	14.4	5.43	38.4	189	58.5	126	196	41	23
4566	ND16301	6	36.0	94.8	58	78.6	1.5	1.5	6	1	13.1	5.34	42.0	189	56.9	108	252	54	9
4567	6B95-2482	6	35.9	89.8	52	78.7	1.2	1.5	5.1	1	13.3	5.44	41.8	190	59.9	71	198	50	16
4568	6B95-2089	6	36.4	94.9	49	78.9	1.2	1.5	6.6	1	13.8	5.44	40.6	195	57.5	135	214	49	18
4569	M109	6	36.5	87.8	54	80.1	1.1	1.5	6.8	1	12.4	5.44	45.3	170	57.1	94	194	65	1
4570	M110	6	35.4	93.7	48	79.5	2.2	1.6	7.5	1	13.1	5.72	44.8	182	56.4	142	221	54	9
4571	ND16922	6	34.9	93.9	55	78.4	2.1	1.7	8	1	13.3	5.77	44.5	161	64.4	254	231	51	14
4572	M111	6	34.2	87.5	58	78.8	1.5	1.6	6	1	12.7	5.57	45.2	167	58.9	109	235	62	2
4573	M112	6	36.1	94.3	51	78.6	0.9	1.7	9.8	1	12.9	5.44	42.3	170	55.0	217	209	55	8
4574	M113	6	35.7	87.9	53	79.3	1.5	1.9	5.4	1	13.5	6.00	46.8	174	63.4	132	249	58	5
4575	ND17643	6	36.5	93.7	53	78.8	1.0	1.9	5	1	13.5	5.77	44.3	176	61.9	107	298	53	11
4576	ND17655	6	38.3	94.3	52	79.5	1.5	2.0	4.9	1	13.2	6.19	47.6	167	67.3	82	288	53	11
4577	ND17687	6	34.7	85.6	53	77.4	0.6	2.0	5.6	1	14.7	6.35	43.8	205	64.1	105	326	31	28
4578	ND17711	6	33.5	91.0	51	78.7	1.0	2.0	6.4	1	13.4	5.96	45.7	174	61.2	109	259	58	5
4579	2ND18365	2	*43.8	90.7	52	*82.1	1.4	2.4	3.1	1	13.0	6.70	53.9	*99	78.8	149	264	42	22
4580	6B98-9105	6	37.1	93.2	47	78.8	1.0	2.2	4.8	1	13.0	6.40	49.7	155	66.7	110	366	50	16
4581	6B98-9170	6	36.8	92.4	53	78.2	0.7	2.1	5.8	1	13.9	6.41	48.5	163	68.3	245	250	38	24
4582	6B98-9339	6	35.7	88.8	54	79.3	1.0	1.9	5.3	1	13.1	5.89	45.8	159	63.2	90	361	61	3
4583	BT389	6	37.7	86.8	50	78.5	0.7	2.1	6.8	1	13.3	6.10	46.2	146	65.9	168	339	51	14
4584	BT478	6	34.6	77.5	56	80.2	0.7	1.8	6.2	1	12.6	5.75	45.9	160	66.7	133	352	59	4
4585	BT483	6	35.6	93.2	46	79.8	0.3	2.3	7.7	1	14.3	6.71	48.9	164	74.4	212	261	36	26
4565	HARRINGTON MALT CHECK	2	39.8	94.4	78	82.2	1.3	1.6	3	1	11.8	5.79	53.0	108	66.9	51	324	46	
Minima			32.5	77.5	46	76.7	0.3	1.4	3.1		12.4	5.15	37.2	146	46.8	71	176	31	
Maxima			38.3	94.9	58	80.2	2.2	2.4	9.8		15.0	6.71	53.9	209	78.8	254	366	65	
Means			35.5	89.0	52	78.8	1.1	1.8	5.6		13.5	5.88	45.0	174	62.6	144	258	49	
Standard Deviations			1.3	4.8	3	0.8	0.4	0.3	1.5		0.6	0.48	3.8	15	7.0	52	54	9	
Coefficients of Variation			3.6	5.4	6	1.1	38.4	14.8	26.9		4.7	8.08	8.5	9	11.2	36	21	19	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by D. B. Cooper, BARI - Ft. Collins, CO

2002 MALTING BARLEY X NITROGEN STUDY - PRESQUE ISLE, ME
Table 7

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2863	301 (3)	2	36.9	84.5	44	81.2	2.9	1	13.0	7.12	57.5	113	76.9	129	31	21
2864	302 (1)	2	33.6	73.1	46	78.8	1.8	1	13.4	6.06	46.3	151	59.2	477	30	22
2865	303 (5)	2	36.6	78.0	47	80.3	2.6	1	12.6	6.57	53.6	83	75.9	469	26	25
2866	304 (4)	2	41.3	88.0	38	80.8	2.6	1	13.3	6.07	47.9	89	65.9	642	28	23
2868	305 (2)	2	37.4	77.4	43	81.2	2.9	1	12.7	6.41	52.2	151	58.3	427	36	16
2869	501 (1)	2	32.6	73.3	45	79.0	1.7	1	13.8	5.85	44.5	149	57.2	674	28	23
2870	502 (4)	2	39.2	88.8	35	80.8	2.6	1	13.3	5.95	46.1	93	63.4	679	34	20
2871	503 (5)	2	35.0	65.4	48	78.3	2.5	1	14.1	6.59	48.5	102	76.8	407	17	28
2872	504 (3)	2	36.3	80.7	48	80.6	2.9	1	14.1	6.66	50.7	110	77.8	237	20	27
2873	505 (2)	2	34.1	68.9	43	79.6	3.5	1	13.4	6.63	50.9	111	80.8	404	22	26
2874	301 (7)	6	36.7	83.5	42	78.5	2.5	1	12.7	6.14	50.2	118	50.9	642	36	16
2875	302 (9)	6	35.8	87.8	42	79.3	2.0	1	13.1	5.80	45.7	150	53.0	374	54	1
2876	303 (6)	6	32.5	78.0	49	79.4	2.1	1	13.0	6.16	50.4	163	65.4	616	44	5
2877	304 (5)	6	34.7	85.1	49	79.8	2.7	1	12.7	6.85	55.5	96	41.2	461	36	16
2878	305 (2)	6	34.2	92.7	43	80.2	2.4	1	13.3	6.70	53.8	117	72.0	517	39	12
2879	306 (4)	6	35.7	87.2	44	80.4	2.6	1	12.5	6.79	55.9	95	58.5	534	39	12
2880	307 (8)	6	36.0	87.8	43	80.0	2.1	1	12.8	5.84	47.8	79	59.5	382	42	8
2881	308 (3)	6	34.8	84.4	41	80.6	2.9	1	13.4	7.28	56.6	146	68.1	418	46	3
2882	309 (1)	6	33.4	76.8	46	77.8	1.9	1	13.9	5.62	42.4	150	55.6	697	45	4
2883	501 (1)	6	33.8	80.8	48	77.3	2.0	1	13.8	5.28	38.6	140	45.7	793	35	19
2884	502 (3)	6	35.6	83.9	49	79.8	2.8	1	13.6	6.97	53.9	136	67.1	513	38	14
2885	503 (6)	6	32.6	78.8	49	79.5	2.2	1	12.9	6.36	51.8	104	46.5	653	37	15
2886	504 (5)	6	36.1	84.1	49	79.5	2.5	1	13.2	6.86	53.2	135	67.2	607	43	6
2887	505 (4)	6	36.4	82.7	43	81.8	2.5	1	13.5	6.90	53.0	123	63.7	657	43	6
2889	506 (9)	6	33.1	83.1	43	79.0	1.9	1	13.1	5.71	43.7	161	53.2	580	51	2
2890	507 (7)	6	36.1	81.5	40	77.7	2.3	1	12.6	5.84	48.0	126	47.4	815	40	11
2891	508 (2)	6	35.2	84.6	47	80.0	2.2	1	13.8	6.82	50.2	159	64.2	633	41	9
2892	509 (8)	6	36.1	85.7	45	80.1	2.0	1	13.6	6.17	47.9	148	48.6	556	41	9
2867	HARRINGTON MALT CHECK	2	39.9	94.3	75	81.6	1.6	1	11.7	6.02	52.9	109	66.8	96	47	
2888	HARRINGTON MALT CHECK	2	40.0	94.5	75	82.1	1.7	1	12.0	5.95	52.7	113	67.8	193	46	
Minima			32.5	65.4	35	77.3	1.7		12.5	5.28	38.6	79	41.2	129	17	
Maxima			41.3	92.7	49	81.8	3.5		14.1	7.28	57.5	163	80.8	815	54	
Means			35.4	81.7	45	79.7	2.4		13.3	6.36	49.9	125	61.4	535	37	
Standard Deviations			2.0	6.2	4	1.1	0.4		0.5	0.51	4.6	26	10.8	157	9	
Coefficients of Variation			5.6	7.6	8	1.4	17.5		3.5	8.05	9.1	21	17.6	29	24	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by G. Porter, University of Maine - Presque Isle

2002 ADVANCED LINES (GROUP 1) - ST. PAUL, MN
Table 8

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
59	ROBUST	6	26.9	51.3	61	76.3	2.6	1	15.9	7.43	47.7	217	60.9	176	12	21
60	STANDER	6	28.9	69.3	56	76.5	4.9	1	15.4	8.38	54.3	152	72.2	141	21	13
61	MNBRITE	6	28.5	55.2	64	77.1	4.8	1	16.1	8.39	54.6	215	66.8	27	11	22
62	LACEY	6	30.1	66.5	56	77.4	2.7	1	14.6	7.08	49.4	173	65.6	139	27	3
63	M109	6	27.8	52.1	50	78.6	3.1	1	13.3	7.19	54.7	197	72.0	142	33	2
64	M111 (M96-48)	6	29.0	63.0	54	77.5	3.1	1	14.3	7.40	53.6	165	68.1	117	25	6
65	M112 (M96-100)	6	28.6	65.6	56	77.1	2.8	1	13.5	6.98	52.5	174	65.3	200	26	5
66	M113 (M97-51)	6	28.7	63.8	54	76.0	3.3	1	15.5	7.49	48.8	179	69.4	130	25	6
67	M114 (FEG26-26-93)	6	28.3	61.9	54	77.4	3.8	1	14.2	7.43	53.4	159	70.8	186	21	13
69	FEG33-89	6	28.0	68.2	57	76.6	3.0	1	14.8	7.32	50.4	196	78.4	111	20	16
70	FEG39-66	6	29.8	60.8	56	76.2	3.0	1	15.7	7.20	47.1	188	68.7	116	22	9
71	M96-203	6	27.7	54.4	54	78.1	3.0	1	14.1	7.27	53.1	195	75.1	276	17	20
72	M97-103	6	27.8	59.9	51	77.8	4.2	1	14.1	7.66	54.3	149	75.6	81	27	3
73	M97-17	6	27.8	52.6	57	77.1	2.5	1	13.9	6.99	50.6	219	73.1	117	21	13
74	M97-30	6	29.1	65.2	53	76.8	2.7	1	15.6	7.28	49.0	177	70.5	243	18	18
75	M97-31	6	30.3	70.5	52	76.1	3.0	1	15.0	7.29	50.6	187	72.4	177	20	16
76	M97-53	6	29.4	61.3	53	76.6	2.8	1	15.1	7.56	51.4	188	73.4	127	22	9
77	M97-57	6	28.9	66.8	49	77.2	3.6	1	15.3	7.74	51.9	128	76.8	197	18	18
78	M97-67	6	29.5	67.7	49	77.8	4.7	1	14.9	7.89	54.9	147	81.2	79	22	9
79	M98-102	6	27.7	46.0	49	76.8	4.7	1	14.0	7.53	56.9	123	80.3	124	22	9
80	M96-61	6	28.5	60.2	53	77.9	4.5	1	13.7	7.65	58.9	143	78.7	81	34	1
81	M99-02	6	29.4	78.5	49	76.8	5.1	1	14.8	7.67	53.0	148	82.8	111	25	6
68	MOREX MALT CHECK	6	30.4	67.7	72	79.6	2.1	1	12.4	6.25	51.8	145	81.4	49	40	
Minima			26.9	46.0	49	76.0	2.5		13.3	6.98	47.1	123	60.9	27	11	
Maxima			30.3	78.5	64	78.6	5.1		16.1	8.39	58.9	219	82.8	276	34	
Means			28.7	61.9	54	77.1	3.5		14.7	7.49	52.3	174	72.6	141	22	
Standard Deviations			0.9	7.6	4	0.7	0.9		0.8	0.37	3.0	28	5.6	57	6	
Coefficients of Variation			3.1	12.3	7	0.9	24.8		5.4	4.99	5.7	16	7.8	40	25	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 ADVANCED LINES (GROUP 2) - ST. PAUL, MN
Table 9

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
82	ROBUST	6	27.3	54.6	54	76.3	2.5	1	16.1	7.33	47.2	230	66.5	153	12	26
83	STANDER	6	28.4	71.1	45	76.4	5.0	1	15.3	8.24	54.5	160	85.2	176	18	18
84	LACEY	6	30.2	66.4	56	77.1	2.7	1	14.7	6.80	47.5	173	71.7	113	27	5
85	M111 (M96-48)	6	29.4	64.4	52	77.2	3.4	1	15.0	7.55	52.3	164	76.2	101	25	7
86	M112 (M96-100)	6	29.3	69.0	52	76.7	3.0	1	14.7	6.91	49.3	177	71.1	215	18	18
87	M114 (FEG26-93)	6	27.9	61.3	51	76.8	3.8	1	15.1	7.37	49.6	153	70.7	213	16	23
88	FEG26-50	6	29.7	73.7	51	77.1	5.6	1	14.3	7.94	55.7	135	64.5	185	21	11
90	FEG38-12	6	26.9	57.5	53	76.8	2.4	1	15.0	5.83	41.0	114	61.4	136	19	15
91	M96-67	6	29.4	66.7	56	77.8	2.9	2	14.0	6.75	48.6	146	67.0	86	33	2
92	FEG4-66	6	27.8	61.9	54	76.8	2.8	2	14.5	6.81	47.6	169	66.3	173	18	18
93	M96-177	6	29.4	62.1	52	78.1	2.7	2	13.7	6.60	48.3	171	64.2	157	29	4
94	M97-125	6	26.7	49.0	43	79.2	3.4	2	11.2	5.52	51.8	105	69.8	120	37	1
95	M98-34	6	27.9	53.8	39	79.4	4.3	2	11.4	6.72	59.5	86	74.5	171	26	6
96	M98-53	6	28.6	60.3	56	76.7	2.7	1	14.9	7.15	49.7	187	69.8	160	18	18
97	M98-60	6	27.7	60.7	49	76.9	4.6	2	14.6	8.00	56.4	152	77.4	106	22	9
98	M98-69	6	28.0	57.5	49	77.7	4.6	2	14.5	7.78	54.5	151	72.3	119	22	9
99	M98-87	6	27.5	51.1	46	77.5	5.0	2	14.4	8.06	57.9	151	90.5	83	15	24
100	M98-93	6	29.2	69.6	45	77.6	4.4	2	15.6	7.97	51.7	155	90.0	123	21	11
101	M98-94	6	24.3	27.8	52	78.6	5.2	2	13.9	8.10	58.9	151	90.8	46	23	8
102	M98-95	6	27.1	55.9	54	78.5	4.5	1	13.8	7.65	56.5	131	78.1	81	32	3
103	M98-97	6	28.1	41.5	46	77.2	4.6	2	14.4	7.73	54.1	102	73.8	145	13	25
104	M98-98	6	28.1	42.9	51	77.3	4.3	2	14.4	7.35	52.1	131	71.7	164	17	22
105	M98-100	6	26.9	37.1	46	78.1	5.1	2	14.6	7.99	56.7	115	76.5	109	19	15
106	M99-03	6	28.2	75.7	47	77.1	4.6	2	15.6	8.06	52.3	125	86.0	117	21	11
107	M99-04	6	29.3	79.2	46	76.9	4.3	2	14.8	7.48	51.9	124	72.3	189	20	14
108	M99-06	6	26.2	64.7	47	76.8	4.7	2	15.9	8.39	53.0	133	76.7	119	19	15
89	MOREX MALT CHECK	6	30.4	67.7	72	79.0	2.2	1	12.4	5.80	50.1	131	77.0	56	40	
Minima			24.3	27.8	39	76.3	2.4		11.2	5.52	41.0	86	61.4	46	12	
Maxima			30.2	79.2	56	79.4	5.6		16.1	8.39	59.5	230	90.8	215	37	
Means			28.1	59.1	50	77.4	4.0		14.5	7.39	52.3	146	74.4	137	22	
Standard Deviations			1.3	12.2	4	0.8	1.0		1.1	0.73	4.3	31	8.3	42	6	
Coefficients of Variation			4.6	20.6	9	1.0	24.6		7.8	9.86	8.2	21	11.1	31	28	

Malt Check Data are Excluded from Rank Sorting and Statistics
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For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 ADVANCED LINES (GROUP 3) - CROOKSTON, MN
Table 10

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
109	ROBUST	6	34.4	88.8	32	78.3	4.8	2	14.7	7.99	56.2	121	74.4	254	29	18
111	STANDER	6	33.0	84.9	33	78.6	4.3	2	13.8	7.45	56.1	118	80.9	279	27	20
112	MNBRITE	6	33.0	90.7	*50	78.2	4.8	2	14.9	8.27	57.2	188	80.8	117	30	17
113	LACEY	6	34.1	90.4	38	77.9	4.0	2	14.0	6.99	51.4	151	66.7	140	37	12
114	M109	6	34.3	87.9	33	79.6	3.2	1	13.3	6.69	51.2	156	67.2	238	46	2
115	M111 (M96-48)	6	33.6	91.6	38	78.9	3.8	1	13.6	7.29	54.4	155	68.8	120	45	4
116	M112 (M96-100)	6	33.9	93.1	34	78.5	3.1	1	13.2	6.35	49.5	139	58.6	317	40	8
117	M113 (M97-51)	6	34.8	91.9	31	77.3	3.5	1	14.8	6.82	47.7	141	60.4	309	26	21
118	M114 (FEG26-93)	6	34.4	88.1	31	78.6	4.0	1	14.0	7.06	51.7	143	62.8	352	33	15
119	FEG33-89	6	33.7	94.2	35	77.6	3.6	1	14.5	7.03	49.5	191	64.9	151	26	21
120	FEG39-66	6	34.8	88.2	40	77.8	3.2	1	14.0	6.47	47.2	146	58.3	192	33	15
121	M96-203	6	33.9	91.6	33	79.8	4.4	1	13.5	7.20	54.1	155	61.8	207	46	2
122	M97-103	6	34.1	87.2	35	80.0	4.6	1	14.2	7.58	56.5	125	67.2	164	36	13
123	M97-17	6	32.9	89.5	32	78.3	3.3	1	15.1	6.91	46.4	190	59.3	151	38	11
124	M97-30	6	35.6	92.9	36	79.2	3.3	1	13.9	6.84	52.1	144	54.8	190	44	6
125	M97-31	6	34.8	90.2	34	78.7	3.5	1	14.0	6.80	48.8	150	56.9	191	41	7
126	M97-53	6	34.7	91.9	36	78.8	4.1	1	14.0	7.25	53.3	152	58.2	134	45	4
127	M97-57	6	35.3	90.9	30	79.9	4.9	1	14.7	7.91	54.4	118	68.0	248	29	18
128	M97-67	6	34.7	89.9	36	80.4	5.2	1	13.4	7.76	61.0	125	70.9	123	50	1
129	M98-102	6	31.8	*77.7	33	79.3	4.4	1	12.8	7.04	55.3	93	67.2	195	39	10
130	M98-61	6	33.0	88.2	34	79.3	5.9	1	14.4	7.86	55.9	120	68.1	107	40	8
131	M99-02	6	32.6	89.9	34	79.1	4.8	1	14.3	7.52	53.4	131	70.0	151	36	13
110	MOREX MALT CHECK	6	30.4	67.7	72	79.3	2.1	1	12.4	6.09	51.6	134	79.8	61	40	
Minima			31.8	84.9	30	77.3	3.1		12.8	6.35	46.4	93	54.8	107	26	
Maxima			35.6	94.2	40	80.4	5.9		15.1	8.27	61.0	191	80.9	352	50	
Means			34.0	90.1	34	78.8	4.1		14.0	7.23	52.9	143	65.7	197	37	
Standard Deviations			0.9	2.2	3	0.8	0.7		0.6	0.51	3.7	25	7.1	71	7	
Coefficients of Variation			2.8	2.5	7	1.0	18.0		4.3	7.05	7.0	17	10.8	36	20	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 ADVANCED LINES (GROUP 4) - CROOKSTON, MN
Table 11

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
132	ROBUST	6	33.3	91.1	33	79.0	3.0	1	14.4	6.82	48.3	168	55.0	169	39	16
133	STANDER	6	33.0	90.8	35	79.5	5.1	1	13.9	7.56	55.2	122	72.3	143	41	14
134	LACEY	6	34.5	93.7	32	79.1	4.0	1	14.6	7.08	52.0	152	62.7	135	43	9
135	M111 (M96-48)	6	33.1	91.7	35	79.3	4.0	1	13.8	7.19	54.4	146	63.7	83	48	2
136	M112 (M96-100)	6	35.0	94.8	36	79.2	3.2	1	13.4	6.12	48.3	142	59.9	193	49	1
137	M114 (FEG26-93)	6	34.4	93.2	37	79.8	4.4	1	13.5	7.02	54.7	135	63.0	168	46	3
139	FEG26-50	6	36.2	94.7	38	80.0	5.0	1	13.1	7.42	57.3	116	70.3	105	46	3
140	FEG38-12	6	29.8	79.3	36	78.4	2.8	1	13.2	5.78	44.4	102	55.9	132	46	3
141	M96-67	6	33.8	91.9	35	79.0	3.6	1	14.1	6.76	48.7	158	63.7	86	43	9
142	FEG4-66	6	34.4	95.0	37	79.7	3.1	1	13.1	6.30	49.6	136	62.2	179	46	3
143	M96-177	6	34.8	93.3	30	80.4	3.1	1	13.5	6.60	50.7	149	62.5	218	46	3
144	M97-125	6	27.1	60.6	25	78.8	3.7	1	11.4	5.41	49.3	95	61.3	185	31	24
145	M98-34	6	30.4	74.8	26	80.4	3.7	1	10.9	5.85	55.8	75	65.5	*315	34	21
146	M98-53	6	34.7	93.2	38	79.6	2.7	1	12.6	6.13	49.2	132	58.7	206	43	9
147	M98-60	6	31.6	88.2	32	78.7	4.8	1	14.2	7.66	54.6	115	67.2	113	32	23
148	M98-69	6	32.5	88.8	36	79.6	4.2	1	13.3	7.46	58.5	126	75.2	158	46	3
149	M98-87	6	29.6	79.0	38	78.9	4.1	1	13.1	6.88	54.2	118	86.5	129	35	20
150	M98-93	6	30.5	78.7	35	79.0	3.8	1	13.4	6.98	54.6	136	90.6	141	33	22
151	M98-94	6	28.6	67.6	38	79.6	3.9	1	12.5	6.77	56.6	121	83.2	104	39	16
152	M98-95	6	31.7	87.5	41	78.6	3.8	1	14.5	7.24	51.9	139	81.2	157	29	25
153	M98-97	6	34.3	87.0	35	80.3	4.0	1	12.5	6.82	58.0	81	69.7	143	42	12
154	M98-98	6	34.2	84.9	32	79.8	4.3	1	13.1	6.96	53.1	91	72.3	210	39	16
155	M98-100	6	32.4	81.5	34	80.1	4.0	1	12.8	6.77	55.1	87	71.6	155	42	12
156	M99-03	6	30.8	92.7	34	79.4	4.8	1	13.9	7.67	56.0	100	76.0	132	40	15
157	M99-04	6	34.5	95.4	39	79.2	4.6	1	14.1	7.32	53.2	106	68.3	212	29	25
158	M99-06	6	31.4	88.0	34	79.8	4.4	1	13.5	7.34	55.9	101	73.8	197	36	19
138	MOREX MALT CHECK	6	30.4	67.7	72	80.1	2.1	1	12.4	6.27	53.7	134	71.7	66	40	
Minima			27.1	60.6	25	78.4	2.7		10.9	5.41	44.4	75	55.0	83	29	
Maxima			36.2	95.4	41	80.4	5.1		14.6	7.67	58.5	168	90.6	218	49	
Means			32.6	86.8	35	79.4	3.9		13.3	6.84	53.1	121	68.9	154	40	
Standard Deviations			2.3	8.9	4	0.6	0.7		0.9	0.60	3.6	25	9.2	39	6	
Coefficients of Variation			7.0	10.3	11	0.7	17.1		6.6	8.78	6.7	21	13.3	26	15	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 ADVANCED LINES (GROUP 5) - MORRIS, MN
Table 12

Est12 Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
159	ROBUST	6	29.4	60.2	37	78.3	3.1	1	14.8	7.29	49.5	127	84.5	247	19	18
160	STANDER	6	31.0	83.7	35	78.1	3.7	1	15.0	7.73	52.0	140	85.7	259	26	13
161	MNBRITE	6	29.8	74.8	52	77.0	4.2	1	*16.7	*8.90	55.1	204	84.5	77	14	20
162	LACEY	6	31.2	77.5	45	77.8	2.2	1	14.5	6.35	44.1	153	64.6	209	32	4
164	M109	6	30.8	75.6	41	78.5	2.4	1	14.2	6.66	47.3	166	68.6	263	30	7
165	M111 (M96-48)	6	30.0	74.8	41	77.8	2.4	1	14.7	6.60	45.7	153	65.0	180	33	3
166	M112 (M96-100)	6	31.5	83.2	37	78.0	2.3	1	14.6	6.32	45.1	144	64.8	308	34	1
167	M113 (M97-51)	6	31.1	80.7	39	76.9	2.5	1	15.2	6.45	42.8	152	69.4	258	30	7
168	M114 (FEG26-93)	6	31.0	84.5	43	78.7	2.5	1	13.9	6.61	50.3	131	68.5	306	34	1
169	FEG33-89	6	29.1	80.3	44	77.6	2.4	1	14.5	6.52	46.0	160	67.9	156	31	5
170	FEG39-66	6	31.1	74.1	41	77.4	2.5	1	15.3	6.45	43.2	159	66.8	202	28	12
171	M96-203	6	30.7	76.9	39	79.0	n.d.	3	14.1	6.70	50.1	170	67.4	336	31	5
172	M97-103	6	29.7	71.8	41	78.1	3.2	1	14.9	7.41	50.3	157	79.9	242	22	17
173	M97-17	6	29.6	72.6	42	77.1	2.3	2	15.2	6.33	41.7	182	62.8	206	14	20
174	M97-30	6	32.0	83.7	45	77.6	2.4	1	14.3	6.59	46.8	150	62.9	300	30	7
175	M97-31	6	31.7	81.1	45	77.1	2.3	1	14.4	6.55	45.6	155	63.9	258	30	7
176	M97-53	6	30.8	81.7	39	77.1	2.6	1	14.7	6.82	47.1	146	63.7	220	25	15
177	M97-57	6	32.5	84.6	39	78.4	3.2	1	14.7	7.55	52.6	113	70.6	311	26	13
178	M97-67	6	30.8	77.4	44	78.6	3.1	1	14.3	7.54	53.3	127	76.7	195	30	7
179	M98-102	6	28.3	56.3	34	77.2	3.1	1	15.1	7.35	50.3	132	85.1	221	12	22
180	M98-61	6	30.5	80.9	39	77.7	3.1	1	14.3	7.11	50.2	144	77.9	241	25	15
181	M99-02	6	29.4	77.8	41	77.5	2.9	1	14.9	6.93	48.8	135	79.3	217	18	19
163	MOREX MALT CHECK	6	30.4	67.7	72	80.4	2.3	1	12.4	6.57	57.7	129	72.3	84	44	
Minima			28.3	56.3	34	76.9	2.2		13.9	6.32	41.7	113	62.8	77	12	
Maxima			32.5	84.6	52	79.0	4.2		15.3	7.73	55.1	204	85.7	336	34	
Means			30.6	77.0	41	77.8	2.8		14.6	6.85	48.1	150	71.8	237	26	
Standard Deviations			1.0	7.2	4	0.6	0.5		0.4	0.46	3.6	20	8.2	59	7	
Coefficients of Variation			3.4	9.4	10	0.8	18.5		2.6	6.65	7.5	13	11.4	25	26	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 ADVANCED LINES (GROUP 6) - MORRIS, MN
Table 13

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
182	ROBUST	6	30.8	74.2	43	77.5	2.4	1	14.9	6.93	48.6	168	53.3	257	23	17
183	STANDER	6	30.3	81.8	39	77.8	3.8	1	13.9	7.79	56.6	132	84.9	244	28	10
184	LACEY	6	31.0	82.9	44	78.3	2.5	1	14.9	6.85	46.5	148	67.1	210	37	4
186	M111 (M96-48)	6	29.6	74.5	45	78.1	2.6	1	14.0	6.68	49.0	147	67.8	132	32	8
187	M112 (M96-100)	6	30.9	82.2	43	77.9	2.7	1	13.2	6.49	49.8	141	66.2	264	39	2
188	M114 (FEG26-93)	6	31.5	84.5	45	78.3	2.7	1	13.9	6.77	49.3	133	66.6	301	34	6
189	FEG26-50	6	32.2	86.2	46	77.7	3.2	1	14.5	7.35	51.1	134	75.6	270	27	11
190	FEG38-12	6	28.7	67.7	43	77.6	2.4	1	14.0	5.77	42.7	97	56.9	191	22	19
191	M96-67	6	31.4	80.0	45	78.5	2.4	1	13.8	6.42	47.1	133	63.3	214	34	6
192	FEG4-66	6	31.7	82.9	45	78.6	2.6	1	13.3	6.45	50.3	141	63.1	286	42	1
193	M96-177	6	31.2	78.8	44	78.9	2.4	1	13.5	6.57	49.3	158	63.2	252	35	5
194	M97-125	6	28.6	67.7	34	79.1	2.9	1	11.8	5.42	47.4	93	62.7	224	38	3
195	M98-34	6	29.1	65.5	33	79.7	3.3	1	11.4	6.15	54.6	78	69.0	305	26	12
196	M98-53	6	32.0	79.5	47	78.1	2.7	1	13.5	6.78	50.4	129	64.8	271	30	9
197	M98-60	6	31.1	81.5	43	77.5	3.2	1	14.6	7.37	51.1	141	77.0	224	25	14
198	M98-69	6	30.5	80.3	43	78.2	3.3	1	14.1	7.32	53.0	138	75.7	228	26	12
199	M98-87	6	27.5	62.2	44	77.8	3.3	1	14.3	7.14	50.5	140	101.4	233	13	25
200	M98-93	6	31.4	84.4	43	77.2	3.4	1	15.1	7.48	49.9	155	98.9	237	18	21
201	M98-94	6	28.4	60.6	42	78.1	3.3	1	14.3	7.18	51.3	161	92.0	209	15	23
202	M98-95	6	31.1	82.6	47	77.6	3.8	1	14.9	7.64	52.5	146	86.4	234	22	19
203	M98-97	6	31.0	74.7	40	78.9	3.4	1	13.5	7.31	55.5	108	81.3	247	25	14
204	M98-98	6	31.1	67.6	40	78.3	3.3	1	13.9	7.14	52.5	117	76.8	275	25	14
205	M98-100	6	28.4	59.4	38	78.1	3.6	1	14.0	7.62	56.0	116	81.9	244	12	26
206	M99-03	6	28.8	78.7	41	78.3	3.5	1	13.8	7.50	54.7	113	89.5	241	23	17
207	M99-04	6	30.4	86.5	41	77.5	3.3	1	14.7	7.30	50.5	119	85.0	298	15	23
208	M99-06	6	28.6	78.1	45	78.4	3.5	1	14.1	7.50	53.4	120	86.0	238	18	21
185	MOREX MALT CHECK	6	30.4	67.7	72	79.6	2.1	1	12.4	6.51	55.1	130	72.4	60	40	
209	MOREX MALT CHECK	6	30.4	67.7	72	79.6	2.1	1	12.4	6.39	54.7	129	74.2	73	40	
Minima			27.5	59.4	33	77.2	2.4		11.4	5.42	42.7	78	53.3	132	12	
Maxima			32.2	86.5	47	79.7	3.8		15.1	7.79	56.6	168	101.4	305	42	
Means			30.3	76.3	42	78.2	3.0		13.9	6.96	50.9	131	75.2	243	26	
Standard Deviations			1.3	8.2	3	0.6	0.5		0.9	0.59	3.2	22	12.8	37	8	
Coefficients of Variation			4.4	10.8	8	0.7	15.2		6.2	8.50	6.3	17	17.0	15	32	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 ADVANCED LINES (GROUP 7) - ST. PAUL, MN
Table 14

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
210	ROBUST	6	28.4	63.9	53	76.1	2.6	1	16.2	7.97	49.3	188	62.3	204	15	24
211	STANDER	6	31.2	79.0	44	75.9	5.5	1	16.4	9.03	55.6	155	80.4	186	23	9
212	FEG41-51	6	30.7	68.1	48	76.3	4.6	1	16.0	8.65	54.3	157	68.2	134	27	5
213	FEG43-32	6	28.8	63.6	57	77.2	2.5	1	15.7	7.21	48.3	163	64.8	214	18	20
214	FEG43-82	6	30.7	78.9	47	75.9	3.4	1	16.6	8.18	49.1	148	72.2	230	23	9
215	FEG44-12	6	30.5	70.4	52	75.5	2.4	1	15.4	6.57	43.4	159	66.2	246	25	6
216	FEG55-24	6	29.2	60.0	51	75.1	3.8	1	16.6	8.45	51.7	193	76.7	197	18	20
217	FEG56-41	6	29.7	77.4	39	74.7	4.4	1	17.2	9.13	54.1	143	79.3	222	21	16
218	FEG57-22	6	25.2	*35.5	52	76.2	6.5	2	18.7	10.09	54.3	198	85.7	24	9	28
219	FEG59-36	6	25.3	56.7	47	76.3	5.8	1	15.2	9.64	64.8	155	85.5	21	13	27
220	ROBUST	6	29.1	68.5	48	76.0	2.8	1	16.2	8.31	52.5	202	64.3	186	14	25
221	STANDER	6	31.2	79.2	33	75.4	5.4	1	17.7	9.75	56.4	179	90.8	167	19	19
222	FEG43-46	6	30.9	78.5	49	75.0	3.0	1	16.3	7.78	49.3	154	69.7	254	23	9
223	FEG43-85	6	30.3	80.1	56	74.2	2.5	1	17.1	7.02	42.3	173	67.3	288	30	2
224	FEG44-50	6	31.7	80.9	40	74.8	3.8	1	16.7	8.45	51.9	132	78.7	247	22	13
225	FEG52-01	6	28.6	66.6	47	77.2	5.5	1	16.5	9.36	57.0	153	77.9	74	21	16
226	FEG52-16	6	29.1	61.0	51	76.6	2.6	1	16.0	7.31	47.2	197	69.4	132	22	13
227	FEG55-04	6	27.6	62.2	54	76.3	3.5	1	15.6	8.09	53.5	161	79.8	246	16	23
228	FEG56-43	6	31.6	74.2	45	74.2	4.6	1	18.0	9.31	52.0	132	77.4	199	23	9
229	FEG57-28	6	32.1	76.1	52	74.2	5.2	1	17.7	9.26	52.3	133	75.0	285	21	16
230	ROBUST	6	29.7	75.4	46	75.3	3.4	1	17.0	8.40	50.8	201	65.2	230	14	25
231	STANDER	6	31.7	85.0	33	75.7	6.0	1	17.0	9.51	57.0	147	81.4	236	22	13
232	FEG43-30	6	31.0	85.7	45	75.7	2.9	1	16.5	7.31	45.1	171	64.6	277	30	2
233	FEG43-47	6	34.1	89.0	47	75.4	3.0	1	16.3	7.41	45.9	155	65.7	294	31	1
235	FEG44-01	6	30.9	80.9	45	74.8	2.9	1	16.7	7.58	46.5	155	62.1	396	30	2
236	FEG55-14	6	29.8	73.6	57	77.7	4.2	1	14.6	7.83	54.7	141	79.2	156	24	8
237	FEG58-04	6	28.9	69.2	54	78.8	7.5	1	15.5	9.27	63.1	148	76.0	12	25	6
238	FEG59-12	6	26.7	65.7	49	78.1	8.4	1	16.4	9.53	58.6	123	77.6	25	17	22
234	MOREX MALT CHECK	6	30.4	67.7	72	79.5	2.0	1	12.4	6.23	53.6	132	73.0	69	40	
Minima			25.2	56.7	33	74.2	2.4		14.6	6.57	42.3	123	62.1	12	9	
Maxima			34.1	89.0	57	78.8	8.4		18.7	10.09	64.8	202	90.8	396	31	
Means			29.8	73.0	48	75.9	4.2		16.5	8.44	52.2	161	73.7	192	21	
Standard Deviations			2.0	8.6	6	1.2	1.6		0.9	0.96	5.4	23	7.9	94	6	
Coefficients of Variation			6.7	11.8	13	1.5	38.1		5.4	11.32	10.3	14	10.7	49	26	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 ADVANCED LINES (GROUP 8) - CROOKSTON, MN
Table 15

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
239	ROBUST	6	33.9	91.2	35	78.5	3.1	1	14.5	6.99	49.6	150	52.0	282	33	19
240	STANDER	6	34.6	94.1	30	78.8	4.9	1	14.0	7.48	54.5	111	73.8	253	26	26
241	FEG41-51	6	35.8	91.1	36	78.9	4.4	1	13.7	7.45	55.7	130	61.9	134	42	9
242	FEG43-32	6	33.4	85.6	45	78.6	2.7	1	13.4	6.16	46.7	119	51.7	274	41	10
243	FEG43-82	6	34.9	91.1	45	78.0	2.4	1	13.3	5.43	43.7	124	50.9	266	49	1
244	FEG44-12	6	32.9	84.0	40	78.1	3.0	1	13.7	6.31	48.6	124	58.1	215	32	22
245	FEG55-24	6	35.6	90.2	36	78.7	4.0	1	13.7	7.24	56.0	131	66.8	230	35	17
246	FEG56-41	6	33.4	91.7	31	77.4	4.5	1	15.7	7.80	50.5	123	61.4	383	23	27
247	FEG57-22	6	30.0	67.7	40	79.6	5.3	1	16.0	8.41	52.7	155	68.5	110	35	17
248	FEG59-36	6	29.3	67.0	42	79.1	5.3	1	13.5	8.32	62.6	131	77.3	58	33	19
249	ROBUST	6	32.7	89.7	37	78.8	3.1	1	14.2	6.91	50.3	159	56.8	198	36	14
250	STANDER	6	34.7	93.5	33	79.1	5.1	1	13.2	7.69	59.9	111	75.2	253	39	11
251	FEG43-46	6	34.3	92.2	42	77.3	3.3	1	15.0	6.80	45.6	143	60.2	278	31	23
252	FEG43-85	6	36.4	94.9	46	77.4	2.6	1	13.9	5.71	43.8	128	54.8	314	36	14
253	FEG44-50	6	32.8	81.6	42	78.0	3.9	1	12.9	7.17	56.0	112	68.0	225	33	19
255	FEG52-01	6	32.0	81.7	42	80.0	4.4	1	13.4	7.54	57.7	122	69.3	108	49	1
256	FEG52-16	6	33.8	88.1	43	79.2	2.8	1	13.7	6.10	45.2	172	53.6	168	49	1
257	FEG55-04	6	32.0	82.1	49	78.7	3.3	1	13.4	6.93	53.3	135	67.3	289	39	11
258	FEG56-43	6	35.7	90.9	31	77.3	4.3	1	15.5	8.01	53.9	138	67.5	312	23	27
259	FEG57-28	6	35.1	91.7	39	78.6	4.4	1	14.7	8.04	55.4	132	67.5	346	30	25
260	ROBUST	6	32.0	88.7	42	77.1	2.9	1	13.7	6.50	48.8	153	53.4	126	38	13
261	STANDER	6	32.9	92.0	35	79.2	5.4	1	13.0	7.76	63.8	109	79.8	103	46	5
262	FEG43-30	6	32.3	84.3	43	78.1	2.8	1	13.1	5.90	46.7	132	56.7	224	45	7
263	FEG43-47	6	35.4	92.5	46	78.3	2.4	1	12.9	5.54	45.1	105	51.3	348	48	4
264	FEG44-01	6	34.2	91.6	46	77.1	2.7	1	14.2	5.96	44.3	135	50.8	394	31	23
265	FEG55-14	6	33.0	83.7	48	80.0	3.1	1	12.0	6.46	54.0	122	68.2	280	43	8
266	FEG58-04	6	34.4	89.5	47	81.9	4.3	1	12.9	7.55	59.1	132	69.9	79	46	5
267	FEG59-12	6	31.8	87.4	40	80.6	4.8	1	14.4	8.36	60.2	136	82.4	109	36	14
254	MOREX MALT CHECK	6	30.4	67.7	72	79.4	2.0	1	12.4	6.23	54.2	133	69.6	65	40	
Minima			29.3	67.0	30	77.1	2.4		12.0	5.43	43.7	105	50.8	58	23	
Maxima			36.4	94.9	49	81.9	5.4		16.0	8.41	63.8	172	82.4	394	49	
Means			33.5	87.5	40	78.7	3.7		13.8	7.02	52.3	131	63.4	227	37	
Standard Deviations			1.7	6.9	5	1.1	1.0		0.9	0.89	5.9	16	9.5	95	8	
Coefficients of Variation			5.1	7.8	13	1.4	26.4		6.6	12.74	11.4	12	14.9	42	20	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 ADVANCED LINES (GROUP 9) - ST. PAUL, MN
Table 16

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
268	ROBUST	6	27.2	72.7	48	76.1	2.6	1	16.9	7.65	45.2	176	49.0	349	21	18
269	STANDER	6	32.0	88.0	34	75.9	5.6	2	16.9	8.80	52.6	137	53.9	468	22	14
270	M99-18	6	29.1	71.3	43	78.0	6.4	2	15.0	8.57	57.3	124	53.8	146	21	18
271	M99-19	6	29.7	81.6	49	77.8	5.1	1	15.3	8.55	56.0	118	62.9	201	20	24
272	M99-30	6	29.1	82.0	44	76.7	2.8	1	16.4	7.46	45.7	155	63.1	365	28	2
273	M99-42	6	30.5	78.2	45	75.9	3.0	1	16.6	7.41	47.5	140	59.7	312	23	10
274	M99-59	6	31.9	73.9	46	77.5	3.2	1	15.5	7.48	50.1	154	62.4	336	23	10
275	M99-60	6	31.3	80.4	44	76.2	3.2	1	16.0	7.65	48.6	128	60.2	439	22	14
277	ROBUST	6	28.3	69.6	52	76.2	2.6	1	16.7	8.12	49.3	183	59.6	265	15	31
278	STANDER	6	31.4	84.5	35	75.8	4.6	1	17.2	9.22	55.6	169	74.7	328	25	6
279	M99-22	6	29.8	76.2	44	76.5	3.4	1	17.0	8.02	49.5	164	71.2	255	21	18
280	M99-24	6	29.0	72.2	48	77.2	3.2	1	15.8	7.64	50.5	151	68.4	338	18	25
281	M99-32	6	28.7	77.1	44	76.2	3.0	1	16.2	7.77	49.0	186	77.6	216	18	25
282	M99-33	6	30.8	81.0	42	76.5	3.1	1	16.2	8.08	49.9	187	74.0	324	22	14
283	M99-39	6	30.3	79.0	43	77.3	4.3	1	16.1	8.76	54.7	128	76.2	177	23	10
284	M99-54	6	31.6	75.6	47	78.2	3.3	1	15.3	7.96	52.9	158	69.9	342	27	4
285	M99-62	6	29.8	73.5	44	77.1	3.0	1	15.5	7.71	50.6	153	69.3	354	21	18
286	M99-63	6	31.3	78.1	45	78.1	2.9	1	15.0	7.48	50.5	166	65.2	433	27	4
287	M99-64	6	30.8	77.9	45	77.3	3.1	1	16.1	7.77	51.0	166	67.1	362	23	10
288	M99-75	6	30.0	78.5	42	77.8	3.4	1	16.1	8.11	51.5	181	75.4	202	24	8
289	ROBUST	6	27.5	68.1	47	76.1	2.7	1	16.9	7.73	46.0	180	58.8	317	18	25
290	STANDER	6	31.1	82.2	37	75.9	5.2	1	17.3	9.28	55.3	161	83.3	336	22	14
291	M99-26	6	31.4	82.5	42	76.5	4.6	1	16.6	8.83	53.9	153	70.8	314	25	6
292	M99-27	6	31.1	67.9	45	77.4	3.3	1	15.6	8.07	53.4	185	65.7	361	17	29
293	M99-40	6	27.9	71.1	42	76.3	3.0	1	16.0	7.45	46.9	150	62.6	248	21	18
294	M99-52	6	28.8	72.5	48	77.4	3.5	1	16.5	8.09	50.4	162	71.5	265	18	25
295	M99-53	6	27.2	65.8	46	76.9	3.7	1	15.6	8.07	52.1	161	72.3	250	16	30
296	M99-66	6	29.2	75.2	48	78.0	3.7	1	15.2	8.70	59.2	156	75.2	100	32	1
298	M99-67	6	32.1	75.2	42	76.9	3.3	1	16.2	7.71	48.7	159	66.4	364	24	8
299	M99-68	6	28.9	77.2	50	76.9	3.1	1	15.9	7.87	51.2	155	71.8	250	21	18

Table 16

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
300	M99-69	6	28.8	75.3	44	77.8	4.4	1	15.0	8.40	57.4	144	74.2	194	28	2
276	MOREX MALT CHECK	6	30.4	67.7	72	79.6	2.4	1	12.4	6.88	59.4	116	77.9	26	33	
297	MOREX MALT CHECK	6	30.4	67.7	72	80.1	2.1	1	12.4	6.33	55.2	116	69.5	118	40	
Minima			27.2	65.8	34	75.8	2.6		15.0	7.41	45.2	118	49.0	100	15	
Maxima			32.1	88.0	52	78.2	6.4		17.3	9.28	59.2	187	83.3	468	32	
Means			29.9	76.3	44	76.9	3.6		16.1	8.08	51.4	158	67.3	297	22	
Standard Deviations			1.5	5.2	4	0.8	0.9		0.7	0.53	3.6	18	7.8	86	4	
Coefficients of Variation			4.9	6.8	9	1.0	26.2		4.2	6.54	7.0	12	11.7	29	17	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 ADVANCED LINES (GROUP 10) - ST. PAUL, CROOKSTON AND MORRIS, MN
Table 17

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
512	ROBUST	6	27.9	68.4	49	76.3	2.8	2	17.7	7.47	44.5	175	65.9	393	20	30
513	STANDER	6	29.0	76.2	37	75.7	5.6	1	16.7	8.72	52.4	143	86.4	313	18	34
514	M99-90	6	26.1	69.0	50	75.5	3.1	1	17.6	7.86	46.7	181	88.3	232	15	39
515	M99-91	6	30.3	80.2	41	75.9	4.9	2	15.9	7.98	51.3	91	73.8	314	17	37
516	M99-92	6	28.4	75.7	41	75.5	5.3	2	16.4	7.82	49.5	92	74.9	258	13	42
518	ROBUST	6	27.2	58.0	50	76.9	2.7	1	16.3	7.53	46.5	199	67.8	295	18	34
519	STANDER	6	29.2	74.3	38	76.6	5.6	1	17.4	8.82	51.2	167	90.0	233	14	41
520	M99-21	6	29.6	67.0	50	77.9	3.4	1	16.1	7.70	48.9	162	77.0	340	22	24
521	M99-25	6	29.6	63.2	48	77.8	3.7	1	15.9	7.65	48.6	153	77.7	230	22	24
522	M99-29	6	29.4	69.8	46	76.8	3.2	1	17.0	7.52	44.6	182	83.6	281	17	37
523	M99-70	6	30.1	72.5	48	78.6	4.9	1	15.3	8.31	54.4	134	78.8	213	24	19
524	M99-71	6	29.7	69.3	47	77.5	2.8	1	15.8	7.13	45.5	143	71.5	335	23	22
525	M99-73	6	29.5	68.3	44	78.3	3.8	1	15.3	7.68	53.1	176	82.4	164	25	17
526	M99-74	6	28.8	70.8	44	78.9	6.1	1	15.6	8.72	56.5	145	89.8	123	29	11
527	M99-98(NB38)	6	31.1	85.5	49	76.6	2.9	1	16.6	6.58	40.9	161	73.0	274	25	17
528	M99-101(NB43)	6	32.0	85.3	46	77.7	3.8	2	15.9	7.00	44.6	144	75.0	186	37	5
529	M99-102(NB47)	6	25.1	46.1	47	78.3	2.8	1	14.2	6.49	47.6	145	85.8	239	20	30
530	M99-103(NB50)	6	30.8	77.4	46	77.0	3.1	1	16.5	7.23	45.0	178	90.5	151	24	19
531	M99-106(NB60)	6	29.5	78.5	52	77.6	2.8	1	16.2	6.70	42.4	162	72.7	161	29	11
532	M99-107(NB65)	6	30.7	68.2	46	77.9	3.9	1	16.0	7.23	46.6	144	88.2	75	29	11
533	M99-108(NB66)	6	32.3	76.9	49	78.0	3.2	1	15.3	7.20	49.5	146	72.9	371	28	14
534	ROBUST	6	26.7	51.4	52	76.9	2.6	1	16.6	7.33	45.0	193	62.2	216	18	34
535	STANDER	6	27.3	69.5	48	77.7	4.4	1	16.0	8.17	52.9	155	86.3	188	20	30
536	M97-54	6	28.9	65.2	48	78.3	4.0	1	14.6	7.75	54.3	125	75.7	241	22	24
538	M97-77	6	28.8	63.4	51	77.9	3.6	1	15.5	7.33	48.6	126	68.8	148	22	24
539	M97-95	6	29.5	65.2	50	78.4	3.8	1	14.9	7.53	51.0	148	74.0	103	32	9
540	M97-115	6	28.2	62.3	47	77.5	3.5	1	14.6	7.44	52.5	156	73.2	152	21	29
541	M98-68	6	29.0	58.5	54	78.6	3.3	1	15.0	7.08	49.1	169	70.1	115	32	9
542	ROBUST	6	32.5	90.2	47	79.3	3.0	1	13.9	6.63	49.3	168	60.1	151	44	2
543	STANDER	6	33.5	90.5	34	79.5	4.1	1	13.4	7.05	54.3	110	78.9	221	39	3

Table 17

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
544	M97-54	6	34.8	89.6	31	80.2	5.6	1	13.8	7.76	56.9	106	77.5	204	34	7
545	M97-77	6	32.8	89.7	36	78.8	4.6	1	14.4	7.28	51.8	114	70.8	114	33	8
546	M97-95	6	34.1	92.8	39	80.0	4.8	1	14.0	7.43	56.8	113	77.5	69	37	5
547	M97-115	6	32.1	86.7	36	78.8	4.4	1	13.8	7.32	53.2	136	71.7	166	38	4
548	M98-68	6	31.8	90.4	40	79.4	3.8	1	13.4	6.75	51.4	120	69.5	103	45	1
549	ROBUST	6	30.3	75.9	40	77.3	2.5	1	15.3	6.63	44.1	167	66.0	237	28	14
550	STANDER	6	29.2	73.3	36	78.3	5.1	1	16.0	7.96	51.6	135	87.2	299	22	24
551	M97-54	6	31.4	79.7	41	78.5	4.1	1	14.5	7.39	52.1	115	83.6	304	20	30
552	M97-77	6	30.8	82.4	40	77.7	3.7	1	14.7	7.50	52.2	135	99.9	295	15	39
553	M97-95	6	31.3	80.1	45	78.0	3.3	1	14.6	6.91	48.1	122	84.5	203	23	22
554	M97-115	6	30.7	79.2	41	77.8	3.3	1	15.5	7.29	48.0	142	86.1	245	24	19
555	M98-68	6	30.5	79.1	48	78.3	3.2	1	14.6	6.98	48.9	141	83.4	224	27	16
517	HARRINGTON MALT CHECK	2	39.9	95.0	78	82.0	1.8	1	11.7	5.56	52.0	100	64.1	138	46	
537	HARRINGTON MALT CHECK	2	39.9	95.0	78	82.2	1.8	1	11.7	5.46	48.9	96	73.3	156	46	
Minima			25.1	46.1	31	75.5	2.5		13.4	6.49	40.9	91	60.1	69	13	
Maxima			34.8	92.8	54	80.2	6.1		17.7	8.82	56.9	199	99.9	393	45	
Means			30.0	74.2	45	77.8	3.8		15.5	7.45	49.6	146	77.9	219	25	
Standard Deviations			2.1	10.9	6	1.1	1.0		1.1	0.56	3.9	26	8.7	81	8	
Coefficients of Variation			6.9	14.7	12	1.5	25.0		7.2	7.56	8.0	18	11.2	37	32	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 EARLY GENERATION LINES (GROUP 11) - CROOKSTON, MN
Table 18

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1561	M104/M96-106 CRF5S 3002	6	35.5	88.7	48	78.0	n.d.	3	14.0	7.16	52.1	98	66.6	321	26	28
1562	M104/M96-106 3005	6	35.3	92.1	48	79.3	n.d.	3	13.8	7.30	53.1	111	60.8	117	39	12
1563	M104/M96-106 3014	6	34.3	88.9	40	78.8	3.5	2	14.0	7.13	51.9	133	63.9	181	32	21
1564	M104/M96-106 3016	6	33.4	82.9	37	78.1	3.3	2	14.1	7.17	52.2	144	67.9	151	32	21
1565	M104/M96-106 3025	6	33.3	82.9	36	78.2	n.d.	3	14.6	7.21	50.1	129	60.8	200	28	26
1566	M104/M96-106 3028	6	32.6	84.3	36	77.9	n.d.	3	14.6	6.91	47.5	149	57.0	136	35	17
1567	M104/M96-106 3033	6	32.0	80.8	34	77.4	n.d.	3	15.2	7.26	49.1	143	57.7	140	30	25
1568	M104/M96-106 3035	6	34.9	87.6	39	78.3	n.d.	3	14.3	6.92	49.1	126	57.5	178	31	23
1569	MNBRITE STP MAT	6	*27.5	*49.1	*66	77.5	3.6	2	*16.3	8.25	53.6	*260	65.8	38	8	32
1570	M104/M96-106 3042	6	33.6	87.9	41	78.2	n.d.	3	14.1	6.85	49.7	126	56.1	178	28	26
1571	M104/M96-106 3048	6	30.5	81.5	42	78.1	n.d.	3	14.1	6.70	48.8	124	52.0	87	31	23
1572	M104/M96-106 3051	6	32.5	88.2	47	79.1	n.d.	3	14.1	7.02	50.3	151	61.2	93	41	8
1573	M104/M96-106 3053	6	30.3	83.6	44	78.8	n.d.	3	13.8	6.62	49.3	125	52.5	81	39	12
1575	M104/M96-106 3059	6	33.6	87.3	42	78.6	n.d.	3	14.2	6.90	48.8	118	62.8	248	24	29
1576	ROBUST 3060	6	34.1	86.5	40	77.3	2.5	1	15.3	6.92	48.1	190	58.8	213	23	31
1577	M104/M96-106 3071	6	33.1	81.9	43	78.7	3.3	2	14.6	7.30	52.0	163	72.7	114	39	12
1578	M104/M96-106 3075	6	35.2	90.6	47	78.7	n.d.	3	14.2	6.78	48.4	138	53.3	108	35	17
1579	LACEY 3080	6	32.0	81.1	43	78.5	2.3	1	13.7	6.28	46.4	171	71.8	95	50	2
1580	M104/M96-106 3087	6	33.1	81.1	43	79.0	n.d.	3	13.5	6.95	52.2	114	64.0	78	37	15
1581	M96-106/M109 3122	6	32.9	85.3	39	77.9	2.4	1	13.9	6.29	46.6	156	57.6	223	40	10
1582	M96-106/M109 3127	6	34.4	89.3	41	77.9	2.7	1	13.1	6.40	51.2	151	65.1	179	43	6
1583	LACEY 3130	6	33.5	89.4	44	78.3	2.5	1	13.8	6.37	48.1	161	66.7	68	41	8
1584	M96-106/M109 3141	6	31.2	82.6	41	78.9	3.1	2	13.6	6.24	48.3	183	61.2	115	40	10
1585	M96-106/M109 3142	6	33.5	88.3	41	78.5	2.6	1	13.9	6.20	44.9	174	60.8	131	50	2
1586	M96-106/M109 3143	6	31.1	82.0	40	78.5	3.0	2	12.7	5.59	44.6	134	63.5	201	50	2
1587	M96-106/M109 3148	6	33.3	89.5	40	78.1	2.5	1	13.3	6.10	46.7	161	68.8	134	52	1
1588	ROBUST 3160	6	33.3	78.3	39	77.3	2.5	1	15.0	6.97	48.6	181	64.9	182	24	29
1589	M96-106/M109 3166	6	34.9	84.4	41	78.2	2.5	1	13.6	6.52	48.9	152	64.7	292	35	17
1590	M96-106/M109 3189	6	32.1	81.8	40	78.0	2.7	2	13.4	6.12	45.7	152	66.1	244	44	5
1591	M96-106-M109 3204	6	34.4	87.7	46	77.7	2.3	1	13.8	5.93	44.5	152	64.3	237	43	6

Table 18

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1592	M96-106/M109 3213	6	34.3	88.3	37	77.9	2.7	1	13.6	6.13	46.2	133	64.6	299	37	15
1593	M96-106/M109 3215	6	35.6	85.4	43	77.8	2.4	1	14.5	6.15	45.2	151	60.2	200	35	17
1574	HARRINGTON MALT CHECK	2	39.7	93.4	76	82.0	1.6	1	11.6	5.93	54.9	122	70.3	51	49	
1594	HARRINGTON MALT CHECK	2	40.0	94.8	77	81.9	1.6	1	11.2	5.69	53.1	114	75.5	62	47	
Minima			30.3	78.3	34	77.3	2.3		12.7	5.59	44.5	98	52.0	38	8	
Maxima			35.6	92.1	48	79.3	3.6		15.3	8.25	53.6	190	72.7	321	52	
Means			33.3	85.5	41	78.2	2.7		14.0	6.71	48.8	145	62.2	164	36	
Standard Deviations			1.4	3.5	4	0.5	0.4		0.6	0.54	2.6	22	5.1	71	9	
Coefficients of Variation			4.2	4.1	9	0.7	15.0		4.1	8.03	5.3	15	8.2	43	26	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 EARLY GENERATION LINES (GROUP 12) - CROOKSTON, MN
Table 19

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1595	M96-106/M109 3226	6	35.7	84.9	38	77.3	2.3	1	14.7	6.14	42.9	163	66.7	265	31	25
1596	M96-106/M109 3228	6	34.2	88.9	43	78.2	2.5	1	14.1	6.15	45.0	145	63.6	288	35	22
1597	M96-106/M109 3237	6	36.0	91.7	36	77.0	2.4	2	14.2	6.34	45.2	135	61.8	236	27	31
1598	M96-106/M109 3238	6	35.6	89.4	41	77.3	2.5	1	14.2	6.43	46.6	147	67.1	276	31	25
1599	STANDER 3240	6	34.3	86.5	39	78.4	n.d.	3	14.5	7.28	52.2	131	79.8	207	28	29
1600	M96-106/M109 3245	6	33.0	78.0	39	76.5	2.6	1	14.6	6.37	44.4	175	67.2	201	29	27
1601	M96-106/M109 3249	6	32.4	82.5	38	78.2	2.6	2	13.8	6.38	47.6	164	66.0	140	40	12
1602	M96-106/M109 3252	6	34.1	85.4	41	79.0	2.9	2	14.0	6.55	50.2	160	61.7	118	42	8
1603	M96-106/M109 3255	6	33.4	85.8	37	78.0	2.6	2	14.5	6.53	46.3	170	63.5	148	37	16
1604	M110/M96-64 3267	6	35.7	91.2	41	77.5	2.6	2	14.2	6.54	47.4	151	67.5	190	28	29
1605	M110/M96-64 3273	6	32.4	90.7	42	78.7	2.5	1	12.8	6.06	49.8	145	67.0	150	46	5
1606	LACEY 3280	6	32.7	85.9	39	78.5	2.4	1	14.5	6.38	45.6	162	66.0	78	41	10
1607	M110/M96-64 3287	6	35.9	90.5	39	77.9	2.6	2	14.6	6.76	48.6	160	71.3	116	36	18
1608	M110/M96-64 3292	6	33.3	89.9	43	79.2	2.2	1	13.0	6.32	52.1	145	72.6	109	53	1
1609	M110/M96-64 3294	6	35.6	91.1	38	79.3	2.8	2	14.0	6.94	53.3	189	74.0	54	40	12
1610	M110/M96-64 3299	6	36.7	94.1	45	79.6	2.3	1	12.9	6.47	51.3	160	68.4	106	53	1
1611	M110/M96-64 3307	6	36.4	89.2	44	79.8	2.5	2	14.4	6.85	48.5	223	72.3	93	35	22
1612	ROBUST 3310	6	34.4	91.8	40	78.1	2.5	2	15.5	7.25	49.0	227	63.0	147	25	32
1613	M110/M96-64 3311	6	36.5	91.5	42	78.9	2.5	2	14.7	6.79	48.8	187	67.6	106	36	18
1614	M110/M96-64 3322	6	35.2	89.3	40	78.8	2.5	2	13.5	6.59	51.2	166	68.3	116	44	7
1615	M110/M96-64 3323	6	35.2	90.1	43	79.5	2.3	2	12.9	6.46	54.2	154	67.5	111	52	3
1617	M110/M96-64 3328	6	35.2	87.8	43	79.2	2.6	1	14.4	7.13	51.9	222	72.5	87	36	18
1618	M110/M96-64 3333	6	32.7	84.6	37	78.3	2.8	2	14.0	6.47	48.1	171	61.7	175	35	22
1619	STANDER 3340	6	33.0	90.0	34	78.1	3.5	2	14.3	7.06	52.5	151	67.3	340	29	27
1620	M110/M96-64 3344	6	34.1	86.9	43	79.0	3.0	2	13.4	6.61	50.6	181	67.6	124	46	5
1621	M110/M96-64 3349	6	33.9	81.0	40	77.6	2.8	2	13.4	6.32	50.3	159	72.2	172	38	15
1622	M110/M96-64 3352	6	32.0	85.5	41	79.5	2.8	2	13.6	6.25	48.9	185	64.9	188	40	12
1623	M104/M110 3387	6	36.2	92.7	40	78.7	3.1	2	13.7	6.48	48.5	142	64.6	255	37	16
1624	M10/M110 3402	6	35.4	89.8	43	78.7	2.5	1	13.6	6.30	47.4	146	60.4	154	41	10
1625	M104/M110 3413	6	33.9	88.7	42	78.9	3.0	2	13.4	6.76	51.1	113	58.8	118	42	8

Table 19

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1626	M104/M110 3416	6	32.0	82.8	40	78.5	n.d.	3	13.5	5.99	45.3	156	50.6	225	48	4
1627	M104/M110 3427	6	33.3	83.0	42	78.2	3.1	1	13.5	6.65	49.7	110	57.1	159	36	18
1594	HARRINGTON MALT CHECK	2	40.0	94.8	77	81.9	1.6	1	11.2	5.69	53.1	114	75.5	62	47	
1616	HARRINGTON MALT CHECK	2	39.7	94.5	73	81.8	1.7	1	11.2	5.73	51.8	126	75.0	49	44	
Minima			32.0	78.0	34	76.5	2.2		12.8	5.99	42.9	110	50.6	54	25	
Maxima			36.7	94.1	45	79.8	3.5		15.5	7.28	54.2	227	79.8	340	53	
Means			34.4	87.9	40	78.5	2.6		13.9	6.55	48.9	162	66.3	164	38	
Standard Deviations			1.4	3.7	3	0.8	0.3		0.6	0.33	2.8	27	5.5	69	8	
Coefficients of Variation			4.2	4.3	6	1.0	10.6		4.5	5.02	5.7	17	8.4	42	20	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 EARLY GENERATION LINES (GROUP 13) - CROOKSTON, MN
Table 20

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1628	M104/M110 3442	6	33.4	89.5	40	78.0	3.4	2	14.1	6.42	47.0	124	53.9	265	26	30
1629	M104/M110 3444	6	34.5	85.8	40	80.3	4.0	1	13.9	7.23	53.3	117	55.5	99	41	8
1630	M104/M110 3454	6	32.8	83.1	40	78.3	2.9	2	13.3	6.47	49.2	152	55.0	220	42	6
1631	M104/M110 3461	6	30.9	79.9	37	79.2	n.d.	3	14.1	7.03	52.6	129	56.5	115	35	17
1632	M104/M110 3481	6	34.4	91.6	39	80.2	3.7	2	13.7	7.29	55.7	124	57.4	111	44	5
1633	M104/M110 3489	6	33.8	90.5	40	79.3	3.3	2	14.3	7.39	52.7	134	53.4	66	35	17
1634	M96-192/M96-46 3516	6	36.6	91.1	41	79.4	3.4	2	14.5	7.22	52.2	133	51.9	64	35	17
1635	M96-192/M96-46 3517	6	35.4	88.1	39	78.2	3.8	1	14.9	7.84	53.3	155	61.7	61	33	24
1636	M96-192/M96-46 3521	6	34.5	85.9	48	79.1	n.d.	3	13.5	7.26	55.8	126	51.1	120	48	1
1638	M96-192/M96-46 3528	6	34.9	84.9	43	79.3	4.3	2	14.5	7.03	51.0	147	55.5	71	38	13
1639	M96-192/M96-46 3531	6	34.2	87.4	43	78.5	3.7	2	14.2	7.23	51.0	135	52.9	71	32	25
1640	STANDER 3540	6	34.2	87.9	37	78.4	4.1	2	14.5	7.18	50.4	131	54.9	221	29	27
1641	M96-192/M96-46 3544	6	37.4	87.6	44	79.5	4.8	2	14.1	7.42	52.8	137	55.6	71	35	17
1642	M96-192/M96-46 3554	6	34.7	85.6	44	79.7	n.d.	3	13.7	6.93	51.6	126	53.7	152	39	11
1643	ROBUST 3560	6	33.0	86.6	43	77.4	2.6	1	14.9	6.69	47.9	149	51.8	*335	26	30
1644	M96-192/M96-46 3561	6	33.7	83.7	47	79.9	n.d.	3	13.9	7.20	55.6	118	48.5	175	35	17
1645	M96-192/M96-46 3564	6	34.6	85.8	52	79.6	n.d.	3	13.4	7.22	54.7	134	49.8	132	48	1
1646	M96-192/M96-46 3576	6	34.4	90.0	46	78.1	n.d.	3	13.1	7.35	57.2	106	60.0	190	34	23
1647	LACEY 3580	6	35.3	92.1	46	78.4	3.0	2	14.1	6.67	50.8	139	60.2	98	36	16
1648	M96-149/M110 3583	6	36.2	88.6	46	77.7	3.7	2	13.4	6.87	52.5	123	60.5	154	39	11
1649	M96-149/M110 3587	6	34.6	89.0	47	79.1	2.8	2	12.7	6.23	50.8	143	61.3	151	48	1
1650	M96-149/M110 3588	6	34.9	92.0	44	78.6	3.0	2	13.0	6.19	50.4	127	62.1	146	42	6
1651	M96-149/M110 3607	6	36.6	92.4	43	78.5	3.7	2	14.2	7.05	52.2	117	59.0	75	28	28
1652	ROBUST 3610	6	34.0	88.2	46	77.6	2.7	1	13.5	6.81	52.5	153	57.9	132	38	13
1653	M96-149/M110 3617	6	35.9	90.2	43	79.2	4.6	2	13.5	7.02	53.3	102	55.7	59	41	8
1654	M96-149/M110 3626	6	33.7	89.6	46	76.9	3.2	2	13.5	6.36	47.3	147	63.1	126	37	15
1655	M96-149/M110 3628	6	34.2	88.6	44	77.5	3.1	2	13.1	6.36	50.6	138	65.1	147	35	17
1656	LACEY 3630	6	34.7	91.0	42	78.5	2.9	2	13.3	6.25	48.8	137	55.9	84	46	4
1657	STANDER 3640	6	34.2	89.6	35	78.1	n.d.	3	14.3	7.31	52.1	111	62.7	195	24	32
1659	M96-149/M110 3641	6	35.6	89.1	34	78.4	n.d.	3	14.2	7.46	53.5	134	70.1	43	31	26

Table 20

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1660	M96-149/M110 3649	6	35.6	91.8	39	78.1	n.d.	3	14.9	7.63	53.3	136	60.7	51	28	28
1661	M96-149/M110 3653	6	34.7	89.0	40	78.4	2.8	1	13.9	6.37	47.8	178	59.0	172	41	8
1637	HARRINGTON MALT CHECK	2	39.3	95.0	76	82.0	1.8	1	11.8	5.80	53.1	101	62.5	58	46	
1658	HARRINGTON MALT CHECK	2	40.0	94.6	74	81.7	1.8	1	11.6	5.99	53.2	93	71.1	58	44	
Minima			30.9	79.9	34	76.9	2.6		12.7	6.19	47.0	102	48.5	43	24	
Maxima			37.4	92.4	52	80.3	4.8		14.9	7.84	57.2	178	70.1	265	48	
Means			34.6	88.3	42	78.7	3.5		13.9	6.97	51.9	133	57.3	124	37	
Standard Deviations			1.2	2.9	4	0.8	0.6		0.6	0.45	2.5	16	4.8	57	7	
Coefficients of Variation			3.6	3.3	9	1.1	17.7		4.1	6.42	4.9	12	8.3	46	18	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 EARLY GENERATION LINES (GROUP 14) - CROOKSTON, MN
Table 21

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1662	M96-149/M110 3656	6	35.1	91.3	39	78.3	n.d.	3	14.6	7.42	52.4	122	53.7	74	31	30
1663	M97-68/LACEY 3661	6	34.0	86.1	44	79.6	2.4	1	13.2	5.99	46.0	136	54.8	135	58	1
1664	M97-68/LACEY 3665	6	34.9	92.9	46	78.9	n.d.	3	13.4	6.58	50.5	115	48.9	103	41	13
1665	M97-68/LACEY 3677	6	33.6	91.1	42	78.3	2.7	2	13.6	6.44	48.3	152	53.7	51	40	19
1666	M97-68/LACEY 3718	6	32.9	89.2	44	78.7	2.6	1	13.9	6.26	46.0	148	50.5	59	46	8
1667	M97-68/LACEY 3730	6	35.2	93.3	47	79.4	n.d.	3	13.9	6.77	50.3	111	49.6	64	35	27
1668	LACEY 3730	6	34.9	95.0	44	78.9	2.5	1	13.6	6.24	47.8	148	51.1	42	41	13
1669	M97-68/LACEY 3734	6	34.0	93.8	43	78.5	n.d.	3	13.1	6.53	50.4	115	46.8	103	41	13
1670	M97-68/LACEY 3739	6	34.7	91.2	47	78.8	2.6	2	13.2	6.16	49.7	138	53.6	85	46	8
1671	MNBRITE STP MAT	6	*26.5	*42.9	*62	*76.8	4.5	2	*15.9	*8.56	54.0	205	60.8	24	8	32
1672	M97-68/LACEY 3741	6	34.8	94.7	44	77.9	3.6	2	14.7	6.86	48.9	116	51.1	137	29	31
1673	M97-68/LACEY 3751	6	33.7	87.3	48	79.7	3.2	2	13.6	6.45	50.2	123	51.6	115	44	12
1674	M97-68/LACEY 3753	6	32.6	87.0	40	79.0	n.d.	3	13.5	6.44	49.1	104	50.1	91	41	13
1675	ROBUST 3760	6	34.6	89.8	45	78.2	3.0	2	15.1	7.02	49.4	147	55.6	118	39	21
1676	M97-68/LACEY 3765	6	33.5	84.2	42	79.0	n.d.	3	13.2	6.23	48.4	103	50.3	97	41	13
1677	M97-68/LACEY 3769	6	32.4	85.9	44	78.6	2.9	2	13.3	6.16	49.1	140	60.3	95	46	8
1678	M97-68/LACEY 3771	6	33.3	85.1	46	78.5	2.8	1	12.5	6.09	48.7	137	63.6	104	47	6
1680	M97-68/LACEY 3773	6	35.1	90.4	44	79.4	3.4	1	14.1	6.71	49.4	123	56.1	47	36	24
1681	M97-68/LACEY 3779	6	33.8	88.3	40	78.3	2.7	1	13.3	6.06	47.9	139	54.3	105	47	6
1682	M97-68/LACEY 3781	6	33.1	89.3	43	79.7	3.3	1	13.6	6.68	50.3	114	56.8	33	34	28
1683	M97-68/LACEY 3783	6	35.2	89.4	43	78.8	3.0	1	14.1	6.70	48.4	133	61.6	141	33	29
1684	M96-186/M109 3806	6	36.6	89.3	42	79.4	2.7	1	13.9	6.81	49.9	166	68.2	98	48	5
1685	ROBUST 3810	6	33.3	89.6	46	78.6	2.3	1	13.8	6.58	49.4	171	57.7	115	45	11
1686	M96-186/M109 3812	6	35.2	87.3	47	79.3	2.7	1	14.0	6.87	52.3	175	66.5	52	39	21
1687	M96-186/M109 3814	6	35.9	87.8	42	79.2	3.2	1	14.2	7.05	52.5	174	62.5	33	36	24
1688	M96-186/M109 3817	6	36.0	88.6	43	79.3	3.0	1	14.1	7.22	51.8	191	70.8	92	40	19
1689	M96-186/M109 3819	6	35.9	88.0	43	79.6	2.7	1	14.3	6.67	48.3	183	65.5	42	36	24
1690	M96-186/M109 3822	6	35.9	87.7	42	79.2	4.2	1	13.9	7.56	54.5	144	64.0	39	41	13
1691	M96-186/M109 3824	6	35.0	91.0	41	80.4	2.7	1	13.7	6.47	49.1	182	63.6	32	38	23
1692	M96-186/M109 3827	6	36.5	89.3	43	79.4	2.6	1	12.8	6.38	50.1	171	65.2	48	49	2

Table 21

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1693	LACEY 3830	6	34.5	93.7	46	79.6	2.5	1	13.4	6.24	49.1	149	59.9	41	49	2
1694	M96-186/M109 3835	6	35.2	90.0	50	80.1	2.9	1	12.5	6.67	54.7	168	72.5	47	49	2
1679	HARRINGTON MALT CHECK	2	40.0	94.9	76	82.0	2.0	1	11.5	5.97	55.6	97	69.4	44	37	
Minima			32.4	84.2	39	77.9	2.3		12.5	5.99	46.0	103	46.8	24	8	
Maxima			36.6	95.0	50	80.4	4.5		15.1	7.56	54.7	205	72.5	141	58	
Means			34.6	89.6	44	79.0	3.0		13.7	6.59	49.9	145	57.8	77	40	
Standard Deviations			1.1	2.8	2	0.6	0.5		0.6	0.39	2.1	27	6.9	35	9	
Coefficients of Variation			3.3	3.1	6	0.7	17.4		4.3	5.92	4.3	19	12.0	46	21	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 EARLY GENERATION LINES (GROUP 15) - CROOKSTON, MN
Table 22

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1695	M96-186/M109 3844	6	35.3	90.2	53	79.4	3.3	1	13.1	6.81	54.7	165	66.9	96	53	1
1696	M96-186/M109 3853	6	34.0	86.3	47	79.4	3.5	1	12.9	6.64	53.2	170	65.4	61	49	2
1697	M96-36/LACEY 3939	6	34.7	91.2	48	79.3	2.7	1	13.8	6.64	50.1	164	68.6	59	44	5
1698	M96-36/LACEY 3942	6	33.4	91.7	52	78.4	3.0	1	15.6	7.32	48.4	195	70.5	21	30	23
1699	M96-36/LACEY 3947	6	33.1	95.4	56	78.1	2.5	1	14.2	6.30	45.0	167	61.0	22	35	20
1700	M96-36/LACEY 3948	6	32.2	86.4	51	79.2	2.7	1	14.1	6.46	47.4	148	63.5	63	39	11
1701	ROBUST 3960	6	33.8	91.5	46	78.4	2.7	1	15.4	7.21	47.0	190	61.3	126	42	8
1702	M96-36/LACEY 3971	6	32.9	89.0	50	78.8	2.7	1	13.3	6.51	50.5	147	70.6	43	46	3
1703	M96-36/LACEY 3974	6	33.1	93.4	48	77.9	2.4	1	14.9	6.76	46.3	174	69.2	56	38	14
1704	M96-36/LACEY 3976	6	33.5	89.5	44	77.8	3.1	1	14.5	6.65	47.7	146	62.3	126	37	15
1705	LACEY 3980	6	35.5	91.4	41	78.5	3.1	1	14.6	7.20	49.7	153	68.4	82	40	9
1707	M96-36/LACEY 3981	6	33.4	89.4	41	77.7	2.8	1	14.6	6.62	46.4	167	59.7	69	34	21
1708	M96-36/LACEY 3986	6	32.4	85.5	43	77.5	3.3	1	13.9	6.75	49.5	150	66.1	47	34	21
1709	ROBUST FEG QUAL CR	6	33.9	80.5	33	77.6	2.8	1	14.8	6.82	47.1	162	59.0	222	26	25
1710	MNBRITE STP MAT	6	26.2	41.8	62	76.8	4.0	1	15.8	8.50	55.5	223	67.0	35	9	29
1711	ROBUST STP MAT	6	27.3	44.3	53	77.2	2.6	1	16.3	7.88	50.7	206	61.9	140	16	27
1712	ROBUST STP MAT	6	27.3	44.0	55	77.5	2.7	1	15.4	7.84	53.9	195	60.3	138	20	26
1713	ROBUST STP MAT	6	27.1	40.4	56	77.5	2.5	1	15.7	7.57	48.3	193	57.4	177	16	27
1714	M96-36/LACEY 4016	6	33.6	91.7	48	78.6	2.7	1	14.6	6.96	48.5	156	65.2	47	36	18
1715	M110/M96-48 4021	6	33.7	88.8	39	79.1	3.1	1	14.3	7.50	55.1	155	66.4	75	39	11
1716	MNBRITE STP MAT	6	28.0	47.8	60	77.4	4.2	1	16.2	8.70	54.5	207	63.4	32	9	29
1717	LACEY 4030	6	34.9	93.8	42	79.4	3.0	2	13.6	6.98	51.6	151	63.7	55	43	7
1718	M110/M96-48 4032	6	35.4	91.3	43	78.6	2.9	1	14.2	7.35	52.5	163	67.9	65	36	18
1719	M110/M96-48 4034	6	35.4	89.9	45	79.4	3.0	1	13.8	7.22	53.6	148	66.1	63	44	5
1720	LACEY FEG QUAL CR	6	33.5	92.3	37	78.1	2.9	1	14.6	7.16	49.0	160	63.8	105	37	15
1721	STANDER 4040	6	34.1	90.8	41	78.4	4.3	1	15.1	8.34	55.3	146	76.3	95	40	9
1722	M110/M96-48 4041	6	34.8	92.2	41	79.2	3.1	1	14.4	7.25	51.7	168	63.9	77	39	11
1723	M110/M96-48 4042	6	32.9	84.3	41	79.4	2.8	1	13.2	6.71	51.3	159	63.5	34	46	3
1724	M110/M96-48 4043	6	34.4	85.0	46	78.0	2.9	1	14.4	7.06	50.8	150	64.7	84	37	15
1725	ROBUST 4060	6	34.9	92.3	41	78.1	2.9	1	15.5	7.72	50.1	190	60.8	160	30	23

Table 22

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1706	HARRINGTON MALT CHECK	2	39.7	94.8	73	81.4	1.7	1	12.0	5.59	50.7	101	59.4	103	54	
1726	HARRINGTON MALT CHECK	2	40.3	94.8	72	81.8	1.7	1	11.6	6.03	56.5	109	66.0	39	42	
Minima			26.2	40.4	33	76.8	2.4		12.9	6.30	45.0	146	57.4	21	9	
Maxima			35.5	95.4	62	79.4	4.3		16.3	8.70	55.5	223	76.3	222	53	
Means			32.8	82.1	47	78.4	3.0		14.6	7.18	50.5	169	64.8	82	35	
Standard Deviations			2.7	17.8	7	0.8	0.5		0.9	0.61	3.0	21	4.0	48	11	
Coefficients of Variation			8.3	21.7	15	1.0	15.6		6.2	8.49	6.0	13	6.2	59	32	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 EARLY GENERATION LINES (GROUP 16) - CROOKSTON, MN
Table 23

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2180	MNBRITE	6	33.2	76.3	47	77.2	3.5	1	15.6	8.25	55.2	211	74.1	121	24	34
2181	ROBUST	6	34.3	88.4	43	78.1	2.6	1	14.5	7.24	51.5	192	59.1	173	30	24
2182	STANDER	6	33.9	89.8	38	78.8	3.6	1	13.9	7.71	57.4	138	75.7	134	42	8
2183	LACEY	6	32.9	88.6	42	78.5	2.5	1	14.1	6.71	49.2	163	65.1	89	40	10
2184	MNBRITE	6	33.6	87.7	51	76.8	4.7	2	16.6	8.65	52.7	208	73.5	41	21	39
2185	FEG61-17	6	33.5	68.7	43	76.1	2.6	1	14.6	6.30	44.7	145	56.6	263	26	32
2186	FEG61-27	6	29.5	47.2	50	76.0	2.5	1	15.3	6.68	44.4	182	71.9	219	20	40
2187	FEG61-30	6	31.0	43.0	55	73.8	2.4	2	14.0	5.87	43.5	137	54.5	275	24	34
2188	FEG61-37	6	31.3	56.2	45	76.7	2.3	2	14.1	5.44	40.2	118	51.2	232	19	42
2189	FEG61-45	6	31.8	87.5	40	76.7	2.3	1	16.1	6.68	44.1	171	58.3	65	33	20
2190	FEG61-51	6	32.3	71.6	43	76.2	2.3	1	13.4	5.21	40.9	116	48.7	338	31	23
2191	FEG61-54	6	30.7	55.5	38	76.6	2.3	1	15.1	6.46	43.5	160	57.0	86	32	21
2193	FEG61-67	6	33.5	43.7	43	75.1	2.3	1	14.3	5.77	42.0	178	54.5	194	27	30
2194	FEG61-82	6	32.4	65.3	45	75.5	2.2	1	14.3	5.96	43.0	140	51.0	289	29	26
2195	FEG61-84	6	30.7	74.1	50	75.6	2.1	1	15.0	6.46	43.4	128	59.9	188	28	29
2196	FEG61-90	6	29.3	54.8	47	75.3	2.7	1	14.8	6.81	47.0	138	60.7	209	20	40
2197	ROBUST	6	34.3	85.6	38	77.6	2.8	1	15.1	8.11	53.7	200	61.0	198	22	37
2198	STANDER	6	36.4	90.3	40	79.0	3.5	1	14.3	7.95	56.8	159	76.1	113	40	10
2199	LACEY	6	32.1	89.3	47	78.9	2.2	1	13.2	6.35	49.6	152	60.7	73	46	2
2200	MNBRITE	6	33.6	87.9	51	78.1	3.6	1	16.0	8.09	53.1	201	66.5	36	23	36
2201	FEG63-07	6	34.4	90.3	44	78.7	3.3	1	13.8	7.01	54.4	136	64.4	165	38	15
2202	FEG63-09	6	35.8	88.7	42	79.9	3.8	1	13.9	8.10	59.8	159	80.8	35	38	15
2203	FEG63-27	6	36.2	90.9	38	79.1	3.7	1	14.8	8.02	55.2	151	69.5	73	39	13
2204	FEG63-30	6	34.3	91.2	47	81.2	4.0	1	13.6	7.73	57.9	147	72.8	59	44	3
2205	FEG63-56	6	34.2	81.5	44	80.0	3.9	1	13.7	7.97	58.1	152	73.1	45	44	3
2206	FEG63-67	6	37.9	91.5	39	79.6	4.6	1	15.0	8.29	55.8	164	71.1	39	36	17
2207	ROBUST	6	31.7	83.9	45	78.1	2.6	1	14.8	7.33	50.2	190	57.3	177	29	26
2208	LACEY	6	31.2	87.9	46	79.7	2.2	1	13.5	6.02	47.5	154	59.3	70	43	6
2209	FEG65-01	6	29.1	71.3	49	78.6	3.7	1	14.6	7.92	54.9	180	71.6	129	29	26
2210	FEG65-02	6	32.0	77.3	48	79.1	2.4	1	13.9	6.85	51.5	173	65.5	222	39	13

Table 23

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2211	FEG65-06	6	28.6	69.5	50	77.7	3.3	1	16.1	8.45	54.1	205	69.1	75	18	43
2212	FEG65-07	6	30.0	71.2	54	77.2	2.7	1	15.5	7.67	50.8	215	66.1	122	18	43
2214	FEG65-14	6	31.6	75.8	52	78.3	2.6	1	14.1	6.76	49.2	201	69.8	146	26	32
2215	FEG65-61	6	29.8	75.4	51	80.0	3.0	1	13.2	7.16	55.8	153	69.5	124	48	1
2216	LACEY	6	31.8	88.9	44	79.9	2.6	1	13.9	6.74	50.3	181	67.9	70	40	10
2217	ROBUST	6	32.5	87.6	44	80.0	3.5	1	13.8	7.72	59.6	160	81.6	178	41	9
2218	STANDER	6	32.2	86.7	44	79.4	2.4	1	13.5	6.18	47.6	152	59.6	71	44	3
2219	LACEY	6	32.9	85.5	53	78.7	3.7	1	15.0	7.69	51.2	176	59.8	55	36	17
2220	MNBRITE	6	28.8	60.7	47	73.8	2.7	1	16.1	6.63	41.3	201	59.8	221	11	45
2221	FEG69-26	6	32.4	67.3	44	76.8	3.0	1	13.8	6.61	49.5	185	62.5	115	30	24
2222	FEG69-38	6	32.4	75.9	45	74.1	2.8	1	14.4	5.94	41.3	151	51.3	267	27	30
2223	FEG69-51	6	30.4	68.0	45	76.0	2.9	1	14.1	6.26	46.4	153	55.2	132	32	21
2224	FEG63-16	6	36.9	92.2	40	79.1	3.8	1	14.6	8.08	57.5	140	71.0	146	36	17
2225	FEG70-25	6	32.1	82.2	53	76.7	2.6	1	17.0	8.05	48.1	217	67.2	148	22	37
2226	LACEY	6	27.8	76.8	48	78.8	2.2	1	13.5	6.38	47.7	178	66.4	128	43	6
2192	HARRINGTON MALT CHECK	2	37.6	94.5	74	81.8	1.8	1	12.0	6.30	57.2	113	71.4	74	45	
2213	HARRINGTON MALT CHECK	2	39.3	94.2	75	82.0	1.8	1	11.4	5.98	54.7	124	71.9	67	48	
Minima			27.8	43.0	38	73.8	2.1		13.2	5.21	40.2	116	48.7	35	11	
Maxima			37.9	92.2	55	81.2	4.7		17.0	8.65	59.8	217	81.6	338	48	
Means			32.4	77.1	46	77.7	2.9		14.5	7.07	50.0	167	64.4	141	32	
Standard Deviations			2.3	13.7	5	1.8	0.7		0.9	0.90	5.7	27	8.1	77	9	
Coefficients of Variation			7.0	17.8	10	2.4	22.9		6.4	12.72	11.3	16	12.7	55	29	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 MIXED LINES, OLD AND NEW (GROUP 17) - ST. PAUL, MN
Table 24

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2441	11-51-43	6	29.5	73.6	46	71.8	2.9	1	18.2	7.72	43.7	163	68.9	287	26	3
2442	M31	6	28.2	53.4	44	74.5	4.5	2	16.9	9.21	55.7	113	72.4	103	17	20
2443	EXCEL	6	29.7	65.5	46	76.5	4.3	2	17.0	9.00	53.2	168	82.6	166	17	20
2444	LION	6	27.5	39.9	52	77.5	3.0	1	16.2	8.00	51.0	185	82.8	98	17	20
2445	LARKER	6	28.7	51.3	54	74.9	2.5	1	16.3	7.13	44.9	207	71.5	113	23	11
2446	STANDER	6	30.4	73.5	39	74.5	5.0	1	18.3	9.91	54.6	208	90.4	127	16	27
2447	ROBUST	6	28.2	57.6	48	74.9	2.8	1	17.7	8.22	47.5	215	73.9	169	14	30
2448	M46	6	30.1	68.6	44	75.2	3.8	1	17.0	8.67	51.9	208	82.3	131	17	20
2449	MNBRITE	6	29.0	70.3	53	75.4	6.4	1	18.9	10.63	57.2	229	78.6	49	14	30
2451	M27	6	30.0	41.8	45	73.3	2.8	1	16.3	6.92	43.9	204	66.2	246	16	27
2452	M30	6	26.9	54.5	50	75.7	3.5	1	17.1	8.23	49.8	236	96.9	79	5	36
2453	M105	6	28.7	75.1	44	77.2	4.3	1	16.0	8.58	53.9	144	84.5	139	25	6
2454	M37	6	28.9	55.5	42	76.6	4.8	1	16.3	8.66	54.0	174	89.4	111	22	15
2455	BARBLESS	6	29.6	57.1	53	73.9	2.6	1	16.9	7.28	44.8	178	73.2	172	26	3
2456	LARKER	6	28.5	60.9	47	74.0	2.6	1	17.5	7.18	41.4	201	72.8	108	18	18
2457	M73	6	30.1	57.5	49	77.7	4.1	1	15.6	8.34	54.4	182	73.1	52	20	17
2458	FEMINA	6	32.6	72.8	31	76.9	5.1	1	16.9	8.78	54.3	108	85.7	115	18	18
2459	PEATLAND	6	25.0	21.8	61	73.0	2.6	1	17.0	7.19	42.6	123	67.6	176	21	16
2460	SWAN	6	28.5	70.5	45	72.6	2.8	1	18.3	8.33	47.4	240	82.0	91	15	29
2461	M108	6	29.2	61.9	46	77.2	4.8	2	16.5	8.97	55.4	146	81.7	71	17	20
2462	M81	6	30.5	69.6	41	77.3	4.6	2	16.5	8.89	56.4	159	85.3	118	23	11
2463	M39	6	27.6	52.8	52	76.1	2.7	1	16.3	7.89	49.4	201	77.2	167	12	34
2464	PARAGON	6	29.5	68.0	38	73.2	3.3	1	18.8	8.67	46.9	189	80.0	120	27	2
2465	CLUB MARIOUT	6	*36.6	52.1	36	*66.1	2.9	2	17.4	5.85	35.2	171	45.2	244	23	11
2466	LACEY	6	30.2	67.5	39	76.1	2.9	1	17.0	8.05	48.5	163	76.1	144	23	11
2467	M22	6	27.4	37.5	46	74.9	2.6	1	15.9	7.07	45.7	113	76.7	171	17	20
2468	M28	6	27.0	38.6	60	76.7	2.6	1	15.8	7.30	46.4	191	75.1	97	25	6
2469	M35	6	27.8	59.2	44	75.2	3.7	1	17.2	8.63	51.6	197	82.3	181	13	33
2470	EXCEL	6	29.4	59.8	46	76.6	5.3	1	16.1	8.74	55.0	142	78.8	81	25	6
2472	BARBLESS	6	30.3	64.1	52	74.8	2.7	1	16.6	7.24	44.0	172	73.6	161	28	1

Table 24

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2473	DICKSON	6	29.5	51.3	43	73.7	2.7	1	16.2	6.93	44.6	178	65.7	168	26	3
2474	MOREX	6	26.7	35.1	56	77.1	3.0	1	16.8	7.88	48.6	206	90.2	103	9	35
2475	M71	6	28.9	50.6	46	78.5	5.5	1	15.8	8.55	56.4	134	71.1	49	25	6
2476	VANTAGE	6	28.1	60.9	41	69.6	2.4	1	17.1	5.77	34.2	111	45.6	*399	14	30
2477	M75	6	28.5	65.0	45	76.2	5.2	1	16.7	8.60	52.4	142	69.0	82	25	6
2478	M72	6	32.3	78.2	31	74.0	5.4	1	18.8	9.51	51.6	181	99.6	186	17	20
2450	HARRINGTON MALT CHECK	2	39.4	94.5	76	81.0	1.6	1	11.5	5.73	52.3	122	81.1	53	43	
2471	HARRINGTON MALT CHECK	2	39.8	95.5	76	81.2	1.8	1	11.8	5.62	51.1	112	71.2	29	43	
Minima			25.0	21.8	31	69.6	2.4		15.6	5.77	34.2	108	45.2	49	5	
Maxima			32.6	78.2	61	78.5	6.4		18.9	10.63	57.2	240	99.6	287	28	
Means			28.9	58.2	46	75.2	3.7		16.9	8.13	49.1	175	76.9	134	19	
Standard Deviations			1.5	12.9	7	1.9	1.1		0.9	1.03	5.8	36	11.2	56	6	
Coefficients of Variation			5.2	22.1	15	2.5	30.6		5.3	12.68	11.7	21	14.6	42	29	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 MIXED LINES, OLD AND NEW (GROUP 18) - ST. PAUL, MN
Table 25

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2479	TROPHY	6	25.7	36.2	45	72.5	3.0	1	17.0	7.63	45.8	235	83.5	113	18	20
2480	CHEVRON	6	26.4	16.1	60	69.9	2.4	1	19.9	7.14	35.8	189	71.4	235	13	33
2481	M26	6	32.0	67.0	44	74.5	2.4	1	15.4	6.49	42.1	138	52.9	348	23	6
2482	M15	6	27.0	49.2	53	73.5	2.9	1	16.7	7.73	47.5	189	88.2	167	13	33
2483	LACEY	6	30.3	65.9	45	75.3	2.9	1	17.4	7.41	43.0	181	83.6	132	26	3
2484	M83	6	31.7	74.4	45	76.5	3.9	1	16.8	8.29	52.3	160	79.2	85	30	1
2485	M32	6	30.0	58.4	43	73.7	3.1	1	16.8	7.19	44.9	169	62.4	351	23	6
2486	BARBLESS	6	29.4	60.0	49	73.8	2.4	1	16.6	6.92	42.0	164	71.8	211	18	20
2487	M9	6	26.9	50.4	45	72.4	2.6	1	17.8	6.11	35.1	187	65.2	107	20	13
2488	M21	6	30.6	59.6	39	71.7	2.9	1	16.2	6.36	39.2	123	65.9	390	17	25
2489	M101	6	30.7	70.5	42	76.0	4.5	1	17.3	8.64	51.2	145	73.8	192	23	6
2490	M6	6	29.2	61.7	44	75.1	3.0	1	16.5	6.48	39.9	192	55.9	161	18	20
2491	LACEY	6	29.3	63.2	44	76.4	3.0	1	16.7	7.73	46.7	183	70.6	168	23	6
2493	MANKER	6	30.5	71.4	39	72.5	3.9	1	17.5	7.78	44.8	141	56.7	222	25	4
2494	M57	6	30.4	68.5	49	77.6	3.4	1	16.8	7.93	49.0	166	64.7	227	20	13
2495	M49	6	28.9	66.2	49	74.5	3.0	1	15.6	6.91	45.0	179	67.3	107	30	1
2496	STEPTOE	6	32.0	64.5	34	70.2	2.8	1	15.7	6.08	38.9	163	51.4	406	21	11
2497	EXCEL	6	29.9	62.0	42	75.6	4.6	1	16.9	8.64	52.6	113	74.2	172	14	31
2498	M59	6	31.2	70.3	34	76.1	4.0	1	16.2	7.83	48.4	141	73.2	284	20	13
2499	MNS93	6	28.4	58.3	53	72.0	5.4	1	19.6	9.29	48.7	255	70.3	50	14	31
2500	M33	6	30.2	62.4	45	72.4	3.5	1	18.6	8.17	44.5	200	59.3	201	18	20
2501	M76	6	32.1	76.1	38	76.4	3.9	1	17.8	8.97	51.1	244	73.0	82	24	5
2502	NDB_112	6	27.9	45.8	42	68.0	1.7	1	19.7	6.56	34.0	161	53.0	266	16	26
2503	BOWERS	6	29.2	59.4	46	71.1	2.1	1	16.5	5.80	36.3	145	49.5	385	21	11
2504	PARKLAND	6	28.9	61.8	52	73.7	2.5	1	17.3	7.50	43.9	165	62.7	255	23	6
2505	ROBUST	6	28.9	59.7	47	75.2	2.6	1	17.7	8.08	46.8	213	63.2	271	16	26
2506	WISC_691-1	6	27.7	24.1	63	72.2	1.5	1	16.6	5.76	35.0	119	48.0	384	12	35
2507	BONANZA	6	28.1	59.3	56	75.6	2.7	1	17.7	8.22	47.1	182	83.6	158	15	30
2508	ROBUST	6	29.4	65.5	46	75.1	2.7	1	17.2	8.10	47.5	202	65.3	240	11	36
2509	M106	6	28.7	59.2	43	77.1	3.2	1	16.0	8.33	52.6	200	79.5	119	18	20

Table 25

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2510	UM_570	6	29.0	47.9	51	73.7	2.7	1	17.8	8.07	45.6	231	71.0	160	19	18
2511	LARKER	6	28.4	48.8	52	75.0	2.4	1	17.1	7.30	43.3	207	62.9	196	19	18
2512	KINDRED	6	27.7	16.5	61	71.0	2.1	1	18.0	6.16	35.2	156	52.7	328	16	26
2513	M44	6	31.0	66.9	44	74.9	4.4	1	19.2	9.07	47.7	225	62.2	109	20	13
2514	M55	6	30.8	66.4	43	76.1	3.0	1	17.2	8.12	47.5	168	73.2	210	20	13
2515	CREE	6	29.5	49.7	48	75.1	2.3	1	15.7	7.08	45.3	204	60.3	214	16	26
2492	HARRINGTON MALT CHECK	2	39.9	94.5	75	81.5	1.7	1	11.6	5.56	51.1	111	72.0	103	54	
Minima			25.7	16.1	34	68.0	1.5		15.4	5.76	34.0	113	48.0	50	11	
Maxima			32.1	76.1	63	77.6	5.4		19.9	9.29	52.6	255	88.2	406	30	
Means			29.4	57.3	47	74.0	3.0		17.2	7.50	44.3	179	66.7	214	19	
Standard Deviations			1.6	14.5	7	2.2	0.8		1.1	0.95	5.4	35	10.5	97	5	
Coefficients of Variation			5.4	25.3	14	3.0	27.8		6.5	12.69	12.1	20	15.7	45	24	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 MIXED LINES, OLD AND NEW (GROUP 19) - ST. PAUL, MN
Table 26

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2516	Royal	6	27.8	57.0	45	75.3	2.6	1	16.4	7.49	45.9	167	69.2	271	21	6
2517	M100	6	28.2	52.4	45	76.9	2.4	1	15.7	7.44	47.6	163	68.3	214	18	18
2518	M78	6	29.4	61.2	50	78.0	2.7	1	15.7	7.69	50.9	163	72.2	98	29	2
2519	M29	6	31.5	71.9	40	74.1	2.7	2	17.9	7.14	41.5	239	60.5	193	15	28
2520	M38	6	26.1	37.9	58	77.6	3.7	1	15.7	8.64	58.0	163	87.3	128	20	12
2521	M66	6	29.9	70.7	47	77.2	3.4	1	16.6	8.13	50.6	113	81.3	175	11	35
2522	M8	6	28.2	54.9	44	73.7	2.4	1	16.9	7.64	47.6	172	63.7	221	18	18
2524	M104	6	28.5	62.9	40	76.4	4.1	1	17.3	8.63	51.5	155	75.5	135	25	4
2525	MNB (MCIA)	6	31.1	63.2	54	79.8	2.4	1	14.4	7.11	52.7	143	64.9	219	30	1
2526	M48	6	28.8	57.1	48	77.2	3.0	1	15.9	7.93	51.3	150	71.1	178	21	6
2527	CIHO2947 "MANCHURIA"	6	28.0	29.5	58	72.8	2.2	1	16.4	6.84	43.7	141	54.8	266	21	6
2528	LION	6	27.7	61.7	46	76.4	3.3	1	17.3	8.69	52.2	172	79.4	199	19	17
2529	M2	6	30.0	67.7	44	73.0	2.5	1	16.0	7.10	45.4	137	62.7	219	20	12
2530	LARKER	6	30.3	48.1	59	75.7	2.4	1	16.9	7.18	42.8	204	65.8	210	18	18
2531	M10	6	27.0	59.1	43	74.3	2.5	1	17.0	7.68	46.6	183	70.4	168	21	6
2532	TRAILL	6	28.6	34.0	43	73.4	2.4	1	16.5	7.22	45.7	155	65.7	203	23	5
2533	FOX	6	29.9	67.9	43	70.7	2.4	1	19.4	7.09	38.2	126	55.2	394	15	28
2534	BEACON	6	27.5	29.0	63	76.7	2.5	1	16.5	7.59	47.4	186	76.1	80	16	25
2535	M1	6	29.8	49.8	42	74.1	2.8	1	17.1	7.92	47.3	173	69.5	251	18	18
2536	DORSETT	6	25.8	27.6	*18	*68.3	2.8	1	19.3	6.37	*33.3	122	49.0	345	13	33
2537	M23	6	29.5	53.6	41	73.4	2.4	1	16.0	7.14	47.1	164	61.0	449	18	18
2538	EXCEL	6	29.6	59.3	38	75.7	4.3	1	18.1	9.44	54.6	156	72.9	211	18	18
2539	M96	6	30.2	68.7	40	75.9	4.3	1	17.3	9.14	53.1	139	84.4	210	14	31
2540	ROYAL	6	27.8	52.9	38	74.9	3.3	1	17.3	8.35	49.7	160	78.6	240	16	25
2541	M50	6	29.9	57.3	47	74.1	2.8	1	17.0	7.86	47.6	204	59.1	353	11	35
2542	M84	6	29.1	68.1	41	77.2	4.2	1	17.2	9.06	52.9	150	74.7	182	21	6
2543	M17	6	28.4	47.1	46	73.2	2.4	1	16.4	7.30	45.4	190	68.7	237	20	12
2545	STANDER	6	32.2	81.3	29	74.3	5.0	1	18.5	10.07	55.5	211	82.2	207	16	25
2546	BARBLESS	6	29.5	40.3	56	74.6	2.4	1	16.8	7.53	45.7	189	62.2	283	20	12
2547	LACEY	6	29.7	69.0	42	75.8	2.9	1	17.3	8.29	49.2	176	69.1	232	18	18

Table 26

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2548	M69	6	30.5	70.4	44	76.4	3.8	1	16.8	8.80	52.5	170	70.5	261	20	12
2549	ROBUST	6	29.0	66.8	43	75.2	2.9	1	17.9	8.71	49.0	195	64.0	310	15	28
2550	M7	6	28.5	57.4	46	74.0	2.7	1	16.8	7.62	45.9	163	63.2	191	26	3
2551	CHERI	6	31.0	63.7	35	74.9	4.1	1	18.8	8.69	47.8	113	69.1	344	13	33
2552	M18	6	29.4	53.4	44	75.4	2.7	1	16.6	7.81	48.7	206	65.2	188	14	31
2553	M82	6	32.5	69.1	38	75.1	4.0	1	17.7	8.90	51.1	149	69.7	263	21	6
2523	HARRINGTON MALT CHECK	2	40.1	94.7	71	81.3	1.7	1	11.4	5.65	49.5	103	74.0	98	47	
2544	HARRINGTON MALT CHECK	2	39.3	93.7	72	81.5	1.8	1	11.4	6.06	54.5	107	72.8	110	42	
Minima			25.8	27.6	29	70.7	2.2		14.4	6.37	38.2	113	49.0	80	11	
Maxima			32.5	81.3	63	79.8	5.0		19.4	10.07	58.0	239	87.3	449	30	
Means			29.2	56.7	45	75.2	3.0		17.0	7.95	48.6	166	68.8	231	19	
Standard Deviations			1.5	13.2	7	1.8	0.7		1.0	0.83	4.1	28	8.5	78	4	
Coefficients of Variation			5.2	23.3	16	2.4	24.1		6.1	10.38	8.4	17	12.3	34	24	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 MIXED LINES, OLD AND NEW (GROUP 20) - CROOKSTON, MN
Table 27

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2750	M71	6	36.3	87.7	40	81.2	3.6	1	13.3	7.81	59.6	96	41.3	115	43	2
2751	M27	6	35.4	74.6	34	77.5	2.3	1	13.8	6.38	48.6	117	72.1	405	22	30
2752	STANDER	6	32.5	90.6	38	79.7	4.4	1	14.3	8.37	60.4	95	58.5	100	36	10
2753	M46	6	33.6	84.9	35	78.1	3.0	1	15.6	7.89	52.9	79	59.4	224	23	29
2754	M39	6	31.5	81.7	38	79.4	2.9	1	14.5	7.74	53.7	156	69.0	231	35	12
2755	BARBLESS	6	32.7	78.9	40	76.8	2.4	1	14.5	6.31	44.6	133	54.6	303	26	24
2756	M37	6	30.7	75.5	35	79.4	3.9	1	13.4	7.69	58.9	123	76.0	192	43	2
2757	PEATLAND	6	27.6	*42.7	48	75.2	2.3	1	15.4	6.41	42.7	107	57.0	349	14	36
2758	M30	6	30.1	71.8	37	78.8	2.6	1	13.9	6.94	50.0	104	46.4	143	28	23
2759	DICKSON	6	30.5	56.9	38	77.1	2.2	1	13.6	6.13	47.3	141	55.2	301	25	26
2760	M75	6	34.7	89.9	42	79.7	3.6	1	14.2	8.13	57.3	131	69.1	219	33	13
2761	MNBRITE	6	34.2	88.8	46	78.2	3.9	1	16.5	8.97	55.5	188	70.1	114	37	8
2762	M28	6	27.9	62.1	42	79.0	2.6	1	13.6	6.56	49.5	135	60.5	110	32	18
2764	LARKER	6	32.7	85.8	33	77.8	2.4	1	14.5	6.05	44.6	140	51.7	379	32	18
2765	M35	6	30.9	75.5	30	78.7	2.9	1	13.9	7.12	51.5	131	69.0	329	32	18
2766	ROBUST	6	34.4	87.2	37	79.5	2.7	1	15.2	7.61	52.3	175	58.1	268	36	10
2767	BARBLESS	6	33.3	79.0	38	77.4	2.3	1	13.8	6.49	47.4	150	57.0	300	29	22
2768	II-51-43	6	32.3	77.3	46	74.6	2.7	1	16.0	6.53	41.3	133	49.8	496	21	31
2769	LION	6	31.3	80.9	39	79.7	2.7	1	14.2	7.40	52.8	151	66.2	183	38	6
2770	MOREX	6	30.3	71.0	40	79.4	2.6	1	14.7	7.32	51.4	170	73.3	169	33	13
2771	M22	6	29.1	*48.9	36	76.5	2.5	1	15.0	6.75	47.7	138	58.6	239	15	35
2772	EXCEL	6	35.0	84.7	33	79.1	3.6	1	14.8	8.36	57.6	129	66.9	340	33	13
2773	M72	6	35.7	90.3	32	79.8	3.4	1	14.0	7.74	58.5	127	71.6	340	33	13
2774	VANTAGE	6	30.6	72.1	32	73.2	1.9	1	15.3	5.24	34.7	88	43.7	*725	17	33
2775	M31	6	32.5	71.9	36	77.4	3.2	1	14.6	8.17	58.0	134	65.2	389	18	32
2776	LACEY	6	32.9	87.4	35	79.8	2.5	1	13.9	6.99	51.2	152	65.3	200	41	4
2777	M105	6	31.8	83.4	35	79.9	3.0	1	13.7	7.46	55.0	125	71.2	318	37	8
2778	SWAN	6	30.9	83.3	42	76.4	2.3	1	14.9	7.17	51.2	182	69.1	159	25	26
2779	M73	6	34.1	81.7	37	81.0	3.4	1	12.8	7.54	61.0	163	74.7	123	53	1
2780	EXCEL	6	34.1	87.3	36	79.4	3.6	1	14.4	8.18	57.7	96	41.2	303	26	24

Table 27

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2781	FEMINA	6	35.2	74.0	34	79.5	3.2	1	13.7	6.44	48.2	117	72.0	308	32	18
2782	LARKER	6	31.7	80.4	31	77.5	2.6	2	14.4	5.91	42.3	95	58.6	464	25	26
2783	M108	6	33.9	85.8	42	80.2	3.3	1	13.2	7.48	58.8	79	59.4	208	39	5
2785	CLUB MARIOUT	6	37.5	69.5	27	*70.6	3.1	2	15.7	5.79	36.8	130	41.3	418	17	33
2786	PARAGON	6	34.5	78.7	41	78.3	2.9	1	15.2	6.79	46.9	137	65.0	251	33	13
2787	M81	6	36.8	91.7	38	80.6	3.4	1	13.8	7.74	58.0	125	69.7	220	38	6
2763	HARRINGTON MALT CHECK	2	39.7	94.3	73	81.7	1.7	1	11.6	5.89	52.8	107	64.3	91	50	
2784	HARRINGTON MALT CHECK	2	40.3	95.0	71	82.3	1.8	1	11.0	5.99	57.2	106	73.1	104	47	
Minima			27.6	56.9	27	73.2	1.9		12.8	5.24	34.7	79	41.2	100	14	
Maxima			37.5	91.7	48	81.2	4.4		16.5	8.97	61.0	188	76.0	496	53	
Means			32.8	80.1	37	78.4	2.9		14.4	7.16	51.3	130	61.3	263	31	
Standard Deviations			2.4	8.3	5	1.8	0.6		0.8	0.85	6.7	28	10.1	105	9	
Coefficients of Variation			7.3	10.3	12	2.3	19.6		5.9	11.93	13.1	21	16.5	40	29	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 MIXED LINES, OLD AND NEW (GROUP 21) - CROOKSTON, MN
Table 28

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2788	UM_570	6	32.3	78.0	39	77.0	2.7	1	13.4	6.81	52.4	104	46.4	216	27	28
2789	KINDRED	6	29.3	46.9	44	75.6	2.0	1	13.3	5.73	43.4	96	47.9	598	29	25
2790	M15	6	30.8	76.5	41	77.7	2.6	1	13.2	6.80	54.9	132	68.5	332	34	16
2791	M59	6	34.3	85.1	33	77.7	2.3	1	13.6	5.62	41.9	131	58.6	243	35	13
2792	M32	6	31.7	71.7	40	77.8	2.4	1	13.0	6.12	48.4	104	52.5	453	27	28
2793	EXCEL	6	33.4	82.2	43	79.8	3.9	1	12.8	7.82	64.1	110	82.0	183	39	9
2794	M26	6	33.9	81.9	36	77.1	2.8	1	13.2	6.31	50.1	117	62.8	488	29	25
2795	M9	6	32.5	80.6	37	79.6	3.5	1	12.9	6.92	55.3	111	74.3	402	39	9
2796	M83	6	36.4	92.3	36	76.9	3.3	1	13.5	7.51	53.2	139	65.8	289	33	18
2797	PARKLAND	6	32.4	76.4	48	74.5	3.0	1	14.2	7.19	51.1	166	51.1	216	24	30
2798	ROBUST	6	34.2	88.2	38	79.4	2.6	1	15.1	7.26	50.6	163	59.0	331	36	12
2799	MNS93	6	30.2	65.8	49	77.6	2.6	1	14.8	6.84	48.8	119	61.3	260	13	36
2800	M33	6	34.5	79.9	36	80.5	3.8	1	14.3	7.82	58.4	120	72.1	149	30	23
2801	M106	6	34.4	88.3	35	81.4	3.4	1	13.7	7.80	59.3	142	79.1	160	44	5
2802	NDB_112	6	30.7	70.0	33	*71.3	2.0	2	16.7	5.96	36.1	118	49.8	254	15	35
2803	M49	6	32.3	80.1	33	77.2	2.9	2	13.6	6.58	51.1	140	61.8	97	34	16
2804	BARBLESS	6	31.9	72.6	42	76.9	2.3	2	13.7	6.12	47.0	142	58.5	287	29	25
2806	CREE	6	28.3	34.9	38	77.4	2.2	1	13.1	6.21	49.4	163	61.1	137	35	13
2807	BOWERS	6	33.4	80.9	34	75.7	2.2	2	13.2	5.48	44.1	106	49.6	484	40	8
2808	WISC_691-1	6	29.1	55.7	39	76.1	1.7	1	14.6	5.61	40.0	81	47.7	397	18	33
2809	LACEY	6	34.3	87.5	32	79.4	2.8	1	14.0	7.15	54.2	163	74.2	110	43	6
2810	STEPTOE	6	35.8	76.4	30	74.5	2.9	2	12.8	5.44	43.5	96	41.2	390	35	13
2811	MANKER	6	33.8	85.6	31	76.9	4.1	1	15.0	8.18	54.6	117	72.2	308	19	32
2812	M21	6	33.8	80.7	32	75.5	2.6	1	14.3	6.15	45.4	95	58.5	492	24	30
2813	LARKER	6	32.5	83.7	33	77.9	2.2	1	13.9	6.33	48.1	79	59.5	185	31	21
2814	M101	6	36.1	89.3	36	79.8	3.8	1	13.6	7.99	59.5	133	76.8	166	41	7
2815	M6	6	32.7	78.5	40	78.4	2.3	2	13.3	5.81	44.5	160	55.8	135	55	1
2816	M76	6	35.5	88.3	34	80.5	3.8	1	14.2	7.89	57.5	173	78.7	60	39	9
2817	M55	6	33.3	80.3	34	79.5	2.8	1	13.3	7.04	55.2	144	71.8	114	53	2
2818	BONANZA	6	33.0	83.3	44	78.3	2.6	1	15.0	7.15	49.2	104	46.5	118	33	18

Table 28

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2819	M57	6	32.3	82.7	42	80.4	3.0	1	12.9	7.15	57.2	134	71.3	116	50	3
2820	M44	6	34.4	89.3	39	78.0	3.7	1	15.9	8.07	52.0	184	71.6	143	30	23
2821	ROBUST	6	32.9	86.0	37	78.5	2.6	1	14.1	7.24	52.1	178	62.6	237	33	18
2822	CHEVRON	6	28.0	*17.7	*59	73.9	1.8	1	16.4	6.27	38.6	157	56.5	462	16	34
2823	TROPHY	6	28.2	59.9	43	77.4	2.3	1	13.3	6.42	49.8	161	70.5	148	31	21
2824	LACEY	6	33.7	86.1	40	78.7	2.6	1	13.7	6.69	50.5	151	71.9	92	45	4
2805	HARRINGTON MALT CHECK	2	39.1	94.7	73	82.0	1.6	1	11.1	5.78	54.9	114	65.7	86	45	
Minima			28.0	34.9	30	73.9	1.7		12.8	5.44	36.1	79	41.2	60	13	
Maxima			36.4	92.3	49	81.4	4.1		16.7	8.18	64.1	184	82.0	598	55	
Means			32.7	77.9	38	77.8	2.8		13.9	6.76	50.3	131	62.5	257	33	
Standard Deviations			2.2	12.4	5	1.8	0.6		1.0	0.80	6.3	28	10.9	142	10	
Coefficients of Variation			6.7	15.9	12	2.3	22.7		7.0	11.85	12.5	22	17.4	55	30	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 MIXED LINES, OLD AND NEW (GROUP 22) - CROOKSTON, MN
Table 29

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2825	M18	6	29.8	60.7	37	77.3	2.3	1	13.8	6.43	47.8	165	65.2	176	26	27
2827	M10	6	31.6	86.3	36	77.1	2.3	1	13.6	6.53	48.9	138	62.1	192	30	22
2828	LACEY	6	34.6	92.5	35	79.1	2.7	1	14.2	7.02	51.5	153	66.4	110	43	2
2829	M50	6	36.2	88.6	44	78.2	2.4	1	14.3	6.85	49.2	181	35.3	408	27	25
2830	M1	6	30.9	62.8	37	77.2	2.3	1	13.8	6.32	48.7	131	61.8	224	22	32
2831	M38	6	31.4	80.6	37	79.9	4.8	1	14.2	8.44	63.6	115	77.5	72	31	21
2832	BARBLESS	6	32.6	78.2	38	76.2	2.7	1	14.8	6.58	46.6	132	63.0	263	26	27
2833	DORSETT	6	*24.9	*31.3	*11	72.7	2.3	1	14.4	5.41	38.8	87	51.9	304	16	35
2834	CIHO2947 "MANCHURIA"	6	30.4	61.1	43	78.2	2.1	1	15.0	6.38	44.0	113	48.6	210	22	32
2835	M100	6	35.9	92.3	37	77.8	2.7	1	13.1	6.85	52.9	140	64.9	119	44	1
2836	M29	6	33.2	84.3	31	78.0	2.5	1	14.0	6.42	47.0	180	62.7	255	35	13
2837	M104	6	32.8	88.1	37	80.6	3.6	1	14.0	7.68	56.9	121	74.1	152	41	3
2838	M96	6	34.7	83.6	33	79.4	3.9	1	14.4	8.04	56.4	131	79.9	216	33	16
2839	FOMA	6	34.2	92.5	40	80.9	2.5	1	14.0	6.95	53.0	121	70.0	78	36	11
2840	BEACON	6	30.8	69.8	50	77.9	2.0	1	14.8	6.41	45.8	163	66.0	77	32	18
2841	EXCEL	6	35.7	87.1	38	79.5	3.7	1	14.6	8.23	59.7	132	70.7	203	33	16
2842	M7	6	30.9	76.8	37	78.2	2.4	1	13.8	6.58	49.9	122	62.8	113	39	6
2843	LARKER	6	32.7	80.9	31	78.2	2.3	1	14.6	6.54	46.5	157	61.0	191	38	7
2844	STANDER	6	33.7	89.7	32	79.9	3.7	1	13.9	7.66	57.5	121	69.3	240	38	7
2845	M23	6	33.4	79.1	31	77.5	2.0	1	13.8	6.00	46.8	143	54.2	*587	34	14
2846	ROYAL	6	31.6	77.2	36	78.6	2.7	1	14.5	6.57	47.3	139	61.2	307	27	25
2848	FOX	6	35.6	88.2	36	74.5	2.4	1	*17.3	6.13	36.9	164	51.7	*627	26	27
2849	TRAILL	6	31.4	48.7	35	76.3	2.2	1	13.7	5.85	44.4	96	41.2	193	26	27
2850	M48	6	32.2	78.6	45	79.9	3.2	1	13.4	6.80	52.2	117	72.0	170	40	5
2851	M8	6	29.3	66.3	39	76.7	2.2	1	13.8	6.40	48.1	95	58.4	217	16	35
2852	M84	6	32.7	81.8	34	79.7	3.3	1	15.0	7.95	54.9	79	59.5	239	29	23
2853	M66	6	32.7	85.6	40	80.2	3.1	1	13.7	7.18	53.1	124	76.7	295	38	7
2854	ATLAS	6	34.0	52.5	28	72.3	3.4	2	13.1	4.62	36.7	51	44.2	317	20	34
2855	ROYAL	6	32.2	80.0	34	77.9	2.9	1	14.8	6.77	46.6	123	62.6	352	32	18
2856	M17	6	29.4	54.3	38	77.2	2.1	1	12.7	5.82	49.3	118	57.4	235	24	31

Table 29

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2857	M82	6	36.6	81.3	38	79.5	3.5	1	13.8	7.75	56.7	104	46.4	187	37	10
2858	ROBUST	6	33.8	96.2	37	79.7	2.7	2	14.8	7.24	51.9	134	62.3	309	32	18
2859	CHERI	6	35.6	83.8	32	80.8	3.9	1	13.6	7.03	53.1	92	63.5	267	34	14
2860	M2	6	31.2	76.7	40	76.4	1.9	1	12.9	5.41	43.1	91	52.6	171	41	3
2861	M69	6	33.9	88.1	39	80.1	3.6	1	14.1	7.88	58.8	120	72.0	222	29	23
2862	LION	6	31.0	81.7	41	79.9	2.7	1	13.8	6.98	53.4	117	68.6	153	36	11
2826	HARRINGTON MALT CHECK	2	40.2	95.0	74	81.9	1.7	1	11.5	5.87	54.6	118	70.9	70	47	
2847	HARRINGTON MALT CHECK	2	39.7	94.6	73	81.6	1.7	1	11.6	5.85	53.6	107	66.7	59	46	
Minima			29.3	48.7	28	72.3	1.9		12.7	4.62	36.7	51	35.3	72	16	
Maxima			36.6	96.2	50	80.9	4.8		15.0	8.44	63.6	181	79.9	408	44	
Means			32.8	78.7	37	78.2	2.8		14.0	6.77	50.0	125	61.6	213	31	
Standard Deviations			2.0	12.1	4	2.0	0.7		0.6	0.84	6.1	28	10.3	80	7	
Coefficients of Variation			6.1	15.3	12	2.6	24.3		4.2	12.35	12.2	22	16.7	38	23	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2002 EXPERIMENT 21, PRELIMINARY MALTING BARLEY YIELD TRIAL - OSNABROCK, ND
Table 30

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
405	MOREX	6	29.8	*67.3	35	75.7	3.3	1	15.7	6.58	43.0	160	62.1	105	30	17
406	ROBUST	6	31.1	80.9	37	76.7	2.4	1	15.7	6.33	40.7	169	47.6	237	25	40
407	STANDER	6	34.2	90.0	36	78.6	*5.3	1	14.7	*8.12	*56.8	141	72.1	150	36	5
408	DRUMMOND	6	30.9	85.3	41	77.3	2.5	1	14.9	5.99	41.0	169	59.9	122	35	6
409	ND20222	6	34.9	93.9	37	76.8	3.5	1	15.7	6.62	45.1	161	60.9	135	38	2
410	ND20227	6	33.7	90.9	36	73.7	2.6	1	14.7	6.31	44.3	181	53.8	286	28	29
411	ND20228	6	32.5	87.1	37	76.7	3.3	1	14.8	6.62	45.3	189	56.5	159	31	13
412	ND20229	6	34.5	93.3	33	75.1	2.4	1	14.5	6.19	43.2	188	53.2	373	28	29
413	ND20232	6	32.9	91.1	36	76.8	*6.9	1	14.9	*8.47	*59.0	163	66.3	72	29	26
414	ND20233	6	33.7	89.5	40	77.7	2.4	1	15.1	6.57	44.4	184	53.2	223	28	29
415	ND20235	6	34.5	91.3	39	74.2	2.0	1	15.5	5.60	37.6	159	43.6	487	30	17
416	ND20237	6	31.2	84.2	35	76.5	3.1	1	16.4	7.11	44.6	188	59.2	266	27	33
418	ND20241	6	33.4	92.0	35	76.4	3.3	2	15.4	6.64	44.4	175	60.5	205	30	17
419	ND20243	6	34.7	92.9	34	75.9	3.6	1	14.9	6.64	43.8	174	57.7	276	31	13
420	ND20246	6	31.1	85.1	38	76.4	2.7	1	15.3	6.16	41.5	184	58.1	309	22	45
421	ND20247	6	32.9	91.4	37	76.1	2.5	1	15.4	6.27	41.2	183	58.8	492	23	44
422	ND20252	6	30.4	81.5	39	76.3	2.4	2	14.9	5.25	35.2	158	58.0	497	31	13
423	ND20255	6	33.4	95.2	43	77.5	1.9	1	14.9	6.01	41.4	206	65.6	350	19	48
424	ND20257	6	32.8	92.3	37	76.1	2.4	1	14.9	6.10	41.6	180	57.8	326	26	34
425	ND20259	6	34.9	89.2	33	75.7	2.6	1	15.2	6.33	42.2	145	69.8	326	31	13
426	ND20267	6	35.0	93.2	39	76.9	2.8	1	16.2	5.82	37.0	185	60.1	321	26	34
427	ND20268	6	33.4	93.1	41	77.2	2.3	1	15.9	6.33	41.1	204	68.8	152	22	45
428	ND20270	6	31.0	92.7	41	76.0	2.1	2	15.3	5.20	34.7	183	58.6	400	24	43
429	ND20271	6	33.9	94.7	42	75.8	2.1	1	16.0	5.67	36.2	196	58.7	251	30	17
430	ND20274	6	34.0	93.7	41	76.2	1.9	2	15.5	5.27	34.5	203	53.6	443	25	40
431	ND20275	6	36.8	95.8	38	77.1	2.3	1	15.5	5.75	38.2	187	61.3	408	26	34
432	ND20278	6	33.7	92.2	45	77.3	1.9	1	15.1	5.35	36.4	172	59.2	406	33	7
433	ND20279	6	33.1	91.8	43	76.8	2.3	1	15.6	5.47	36.3	186	61.7	465	30	17
434	ND20281	6	32.7	95.0	44	77.9	1.9	1	14.7	5.68	39.7	204	72.9	298	30	17
435	ND20282	6	30.5	86.9	42	76.1	2.4	1	15.5	5.73	37.7	202	64.5	383	21	47

Table 30

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
436	ND20283	6	30.4	88.8	42	75.9	2.1	1	15.4	5.55	36.9	200	65.7	340	25	40
438	ND20285	6	31.1	90.1	40	76.0	2.0	1	15.5	5.39	35.4	166	53.7	319	32	10
439	ND20286	6	32.8	90.9	37	76.6	2.0	1	15.1	5.23	36.1	165	57.5	533	33	7
440	ND20287	6	34.6	90.0	38	77.2	1.9	1	15.1	5.04	33.6	157	54.5	601	29	26
441	ND20289	6	33.0	86.2	36	75.8	2.0	1	15.7	5.17	34.1	175	56.3	400	29	26
442	ND20293	6	31.4	89.6	37	77.5	2.5	1	14.8	5.53	39.9	165	59.8	367	32	10
443	ND20298	6	34.5	93.6	37	78.2	2.7	1	14.1	5.77	41.1	168	55.2	394	33	7
444	ND20299	6	34.8	92.4	41	77.8	2.7	1	14.1	5.52	40.5	167	54.7	475	37	3
445	ND20302	6	32.9	87.5	36	78.4	3.3	1	14.3	5.97	42.8	150	60.7	247	41	1
446	ND20303	6	35.4	93.0	35	78.1	2.6	1	14.0	5.66	40.6	154	59.6	371	37	3
447	ND20306	6	35.5	95.1	32	77.0	3.4	1	14.9	6.17	41.9	157	67.3	217	26	34
448	ND20307	6	35.0	94.3	31	77.6	2.5	1	14.6	5.67	41.2	185	63.9	204	30	17
449	ND20314	6	34.9	87.6	32	77.9	3.2	1	15.4	6.10	41.1	171	59.0	295	30	17
450	ND20319	6	35.6	91.4	35	78.1	3.1	1	15.0	6.25	42.9	191	65.9	282	32	10
451	ND20320	6	35.7	94.3	38	77.7	2.4	1	14.8	5.80	40.1	183	60.9	441	26	34
452	ND20330	6	34.6	93.0	29	76.8	2.2	1	15.3	5.51	36.5	197	60.9	380	30	17
453	ND20331	6	34.1	91.7	35	76.9	2.2	1	15.0	5.73	38.2	185	65.0	342	26	34
454	ND20334	6	33.8	92.6	29	74.8	2.3	2	15.6	5.01	32.6	166	48.0	654	28	29
417	HARRINGTON MALT CHECK	2	39.9	95.0	78	82.2	1.9	1	11.7	5.89	53.8	112	74.5	62	50	
437	HARRINGTON MALT CHECK	2	39.9	95.0	78	81.8	1.7	1	11.7	5.30	49.5	109	70.0	146	50	
Minima			29.8	80.9	29	73.7	1.9		14.0	5.01	32.6	141	43.6	72	19	
Maxima			36.8	95.8	45	78.6	3.6		16.4	7.11	45.3	206	72.9	654	41	
Means			33.4	90.8	37	76.7	2.5		15.2	5.88	39.7	177	59.6	329	29	
Standard Deviations			1.7	3.5	4	1.0	0.5		0.5	0.50	3.5	17	5.9	129	5	
Coefficients of Variation			5.0	3.9	10	1.4	19.3		3.5	8.52	8.7	9	10.0	39	16	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R.D. Horsley and J.D. Franckowiak, North Dakota State University - Fargo

2002 EXPERIMENT 22A, PRELIMINARY MALTING BARLEY YIELD TRIAL - OSNABROCK, ND
Table 31

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
455	MOREX	6	*28.8	*65.6	36	75.5	2.7	1	15.6	5.82	38.5	176	58.2	278	21	52
456	ROBUST	6	34.3	85.7	38	76.4	1.6	1	15.6	4.98	33.2	174	46.8	419	29	19
458	STANDER	6	34.3	91.0	38	79.4	*3.6	1	14.7	7.16	49.2	171	*74.3	339	36	1
459	DRUMMOND	6	30.4	*77.1	42	77.1	1.8	2	14.4	5.36	37.3	193	59.1	300	26	36
460	ND20336	6	32.7	83.5	42	75.6	1.6	2	16.4	5.09	31.7	151	56.6	347	28	26
461	ND20337	6	*29.8	80.0	39	75.1	2.2	2	16.3	5.86	36.5	156	57.2	215	25	44
462	ND20338	6	34.5	*76.7	39	77.4	1.8	2	16.8	5.94	36.3	171	60.3	425	26	36
463	ND20339	6	36.7	93.3	38	77.3	2.6	1	15.1	6.33	42.0	170	55.1	450	31	14
464	ND20340	6	35.8	93.1	39	77.4	2.3	1	15.6	6.11	40.2	177	55.3	479	26	36
465	ND20341	6	*28.7	*63.3	*29	75.3	2.5	1	*17.5	7.20	41.7	219	67.3	148	14	54
466	ND20342	6	37.0	93.4	39	77.6	2.1	2	15.2	5.91	39.6	183	56.3	515	25	44
467	ND20343	6	35.8	95.5	39	77.1	2.3	1	15.0	6.00	41.3	170	55.6	490	29	19
468	ND20344	6	35.8	94.0	37	77.6	2.6	1	15.4	6.23	41.3	173	58.9	427	26	36
469	ND20345	6	34.2	93.2	36	77.3	2.8	1	16.0	6.46	42.0	179	59.8	360	26	36
470	ND20347	6	36.4	93.6	36	77.0	2.2	1	15.7	5.98	39.2	177	57.0	572	29	19
471	ND20348	6	36.9	94.8	39	77.8	2.2	1	14.7	6.00	41.3	175	57.6	503	33	4
472	ND20349	6	37.0	93.4	39	76.4	2.0	1	14.9	5.65	38.1	172	55.4	513	33	4
473	ND20350	6	35.2	93.6	38	77.1	2.4	1	14.9	6.14	42.4	172	60.6	534	31	14
474	ND20351	6	35.7	94.0	33	77.5	2.5	1	15.5	5.89	40.5	174	56.8	590	29	19
475	ND20352	6	32.6	93.8	*28	75.4	2.8	1	*17.5	6.56	37.6	178	53.8	392	26	36
476	ND20353	6	35.9	93.6	39	76.3	2.4	1	15.2	6.13	42.9	180	54.5	485	31	14
478	ND20355	6	35.5	88.2	36	77.5	2.0	1	14.4	5.61	39.3	187	55.7	509	30	18
479	ND20356	6	33.1	*77.5	42	75.9	1.9	2	14.4	4.54	31.9	142	43.4	*832	20	53
480	ND20362	6	35.6	93.6	41	76.9	2.8	1	16.0	6.05	38.2	187	52.1	488	23	48
481	ND20363	6	37.0	92.4	39	77.6	2.2	2	14.7	5.63	39.9	178	55.9	491	32	7
482	ND20364	6	35.9	93.5	44	77.5	2.2	2	15.6	5.65	38.6	173	55.9	513	32	7
483	ND20365	6	36.8	96.0	38	77.7	2.6	2	15.2	5.84	39.0	182	53.3	612	29	19
484	ND20366	6	35.3	93.7	40	77.7	3.0	1	15.4	6.62	43.1	193	58.9	492	28	26
485	ND20367	6	33.2	90.8	38	77.8	2.2	1	14.3	6.11	44.1	209	63.7	362	28	26
486	ND20368	6	34.4	89.4	40	77.6	2.0	1	14.4	5.72	40.1	*116	54.0	601	22	51

Table 31

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
487	ND20369	6	34.9	92.7	42	76.8	2.5	1	15.6	5.93	39.1	161	54.3	474	29	19
488	ND20370	6	35.6	92.5	38	77.0	2.5	2	14.4	5.67	41.1	159	51.6	476	32	7
489	ND20371	6	37.1	94.7	39	77.3	2.5	1	15.3	6.33	43.7	188	66.5	415	28	26
490	ND20372	6	36.4	94.2	41	77.9	3.1	1	15.3	7.06	47.9	193	64.9	467	27	35
491	ND20373	6	35.3	92.9	39	77.2	2.6	1	15.5	6.39	43.3	199	56.9	555	28	26
492	ND20374	6	35.6	92.4	39	77.2	2.6	1	15.3	6.23	41.7	183	56.5	531	23	48
493	ND20375	6	35.5	94.7	41	77.6	2.5	1	15.1	5.77	39.6	180	55.1	445	26	36
494	ND20376	6	36.0	91.1	42	77.4	2.5	1	15.2	5.96	40.3	186	53.0	410	26	36
495	ND20377	6	36.1	94.0	43	77.2	2.3	2	14.9	5.08	34.3	176	50.9	494	28	26
496	ND20378	6	35.7	93.5	45	78.3	3.4	1	14.9	6.56	46.2	185	58.8	225	35	3
498	ND20379	6	35.9	92.8	42	77.8	2.3	2	14.6	5.64	39.7	174	54.5	485	36	1
499	ND20380	6	35.5	93.7	45	76.7	2.4	2	15.8	5.97	38.9	186	55.1	452	25	44
500	ND20381	6	36.3	93.8	41	77.5	2.6	1	15.4	6.45	43.4	186	58.1	320	28	26
501	ND20382	6	35.8	95.1	45	76.8	2.3	1	15.5	6.27	40.6	194	60.2	496	23	48
502	ND20383	6	36.0	93.5	39	77.7	2.4	1	15.2	6.32	43.3	170	56.5	432	31	14
503	ND20384	6	36.8	93.1	40	77.0	2.4	2	15.0	6.10	41.6	172	52.3	585	25	44
504	ND20385	6	39.2	95.7	40	77.7	2.3	1	15.3	6.19	42.9	181	58.7	460	28	26
505	ND20386	6	38.5	94.2	43	77.3	2.8	2	14.6	5.94	42.5	159	54.3	490	33	4
506	ND20387	6	35.4	92.2	39	77.1	2.4	2	15.0	5.97	40.4	176	55.0	462	28	26
507	ND20389	6	34.4	87.8	44	76.5	2.7	2	15.8	5.57	37.2	150	46.7	529	32	7
508	ND20390	6	36.4	93.3	43	77.1	2.3	2	14.9	5.58	37.7	169	50.7	527	32	7
509	ND20391	6	35.2	91.0	43	76.5	2.4	2	15.0	5.53	37.6	163	49.2	477	32	7
510	ND20392	6	34.2	91.5	45	78.2	2.1	1	14.5	6.13	42.6	186	62.1	349	32	7
511	ND20393	6	36.4	95.1	43	76.4	2.3	2	15.9	5.59	35.4	185	49.6	628	29	19
457	HARRINGTON MALT CHECK	2	39.9	95.0	78	81.9	1.7	1	11.7	5.55	49.7	122	72.1	37	50	
477	HARRINGTON MALT CHECK	2	39.9	95.0	78	82.1	1.7	1	11.7	5.60	51.1	110	72.8	43	46	
497	HARRINGTON MALT CHECK	2	39.9	95.0	78	82.0	1.8	1	11.7	5.55	50.7	97	66.2	83	50	
Minima			30.4	80.0	33	75.1	1.6		14.3	4.54	31.7	142	43.4	148	14	
Maxima			39.2	96.0	45	79.4	3.4		16.8	7.20	49.2	219	67.3	628	36	
Means			35.5	92.5	40	77.1	2.4		15.2	5.98	40.1	177	56.0	454	28	
Standard Deviations			1.5	3.0	3	0.8	0.3		0.5	0.50	3.4	14	4.6	101	4	
Coefficients of Variation			4.1	3.3	7	1.0	14.4		3.6	8.33	8.6	8	8.2	22	15	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R.D. Horsley and J.D. Franckowiak, North Dakota State University - Fargo

2002 EXPERIMENT 24, PRELIMINARY MALTING BARLEY YIELD TRIAL - OSNABROCK, ND
Table 32

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
691	MOREX	6	28.3	53.8	39	75.4	2.3	1	15.9	5.87	37.6	160	56.7	336	21	20
692	ROBUST	6	34.7	82.1	43	76.4	1.7	1	15.4	5.02	33.4	155	43.2	446	26	13
693	STANDER	6	37.2	93.2	42	78.7	2.8	1	14.4	6.07	43.2	149	58.8	455	38	1
694	DRUMMOND	6	31.4	78.3	44	77.2	1.8	1	14.8	5.28	37.8	189	61.1	269	27	12
695	ND20585	6	32.8	90.5	44	77.1	2.1	1	15.4	5.78	39.0	185	55.6	263	26	13
696	ND20586	6	33.1	90.4	45	76.1	1.9	1	14.5	5.22	37.1	172	53.2	409	33	2
698	ND20587	6	33.4	91.1	42	77.0	2.1	1	14.8	5.32	37.2	164	58.4	330	33	2
699	ND20588	6	32.1	91.3	43	77.1	1.8	1	15.0	5.11	34.9	167	55.1	301	29	10
700	ND20589	6	29.2	69.9	44	74.0	2.4	1	15.9	5.40	35.4	140	55.6	353	25	15
701	ND20590	6	32.8	91.3	42	77.2	2.0	1	15.1	5.67	39.0	155	56.5	344	33	2
702	ND20591	6	33.8	99.3	40	77.4	1.9	1	14.4	5.62	39.7	150	56.4	376	33	2
703	ND20594	6	32.1	86.2	45	76.0	2.0	1	14.7	5.10	35.7	149	52.0	414	29	10
704	ND20595	6	32.9	67.2	47	75.7	2.2	1	15.0	4.91	33.5	111	48.5	379	17	24
705	ND20596	6	31.6	67.2	49	75.9	2.3	1	16.0	5.29	34.0	125	51.3	352	24	19
706	ND20598	6	28.3	46.7	38	73.5	1.9	1	15.9	5.54	35.7	156	49.2	306	25	15
707	ND20600	6	29.7	78.6	34	75.2	2.2	1	18.6	5.90	32.6	221	59.7	258	17	24
708	ND20601	6	27.7	43.5	35	71.4	1.5	1	17.4	5.04	29.2	193	52.3	357	16	26
709	ND20603	6	26.9	57.8	34	72.3	1.8	1	18.4	5.48	30.2	173	44.6	408	20	21
710	ND20604	6	29.3	70.5	40	75.4	2.0	1	15.9	5.22	34.0	154	52.1	370	25	15
711	ND20605	6	32.0	76.4	47	77.4	1.8	1	15.0	5.24	35.3	159	52.9	450	30	8
712	ND20606	6	34.9	84.8	45	75.2	2.1	1	16.3	5.51	35.5	151	53.6	472	33	2
713	ND20607	6	33.2	83.2	43	75.2	1.8	1	16.1	5.47	34.4	159	48.5	496	33	2
714	ND20612	6	35.7	92.2	36	76.1	2.4	1	14.8	5.67	39.0	184	55.4	398	30	8
715	ND20613	6	29.4	58.3	39	73.6	1.9	1	17.6	5.87	34.3	184	53.1	329	18	23
716	ND20614	6	30.0	63.8	37	72.8	1.7	1	18.6	5.34	28.9	222	50.6	489	20	21
717	ND20615	6	28.5	67.2	39	73.1	1.9	1	16.7	5.62	33.8	175	50.0	385	25	15
697	HARRINGTON MALT CHECK	2	40.0	94.4	73	81.8	1.7	1	11.4	5.30	48.5	97	72.9	99	45	
Minima			26.9	43.5	34	71.4	1.5		14.4	4.91	28.9	111	43.2	258	16	
Maxima			37.2	99.3	49	78.7	2.8		18.6	6.07	43.2	222	61.1	496	38	
Means			31.6	76.0	41	75.5	2.0		15.9	5.44	35.4	165	53.3	375	26	
Standard Deviations			2.7	15.5	4	1.8	0.3		1.3	0.30	3.3	25	4.4	67	6	
Coefficients of Variation			8.4	20.4	10	2.4	13.7		8.1	5.60	9.2	15	8.2	18	23	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R.D. Horsley and J.D. Franckowiak, North Dakota State University - Fargo

2002 EXPERIMENT 22B, PRELIMINARY MALTING BARLEY YIELD TRIAL - OSNABROCK, ND
Table 33

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
719	MOREX	6	29.3	*67.0	38	76.0	2.7	1	14.7	5.83	40.8	174	54.7	264	21	52
720	ROBUST	6	34.3	87.0	41	77.0	1.9	1	14.9	5.34	36.1	170	43.0	390	30	17
721	STANDER	6	35.3	92.6	39	79.0	*3.8	1	14.9	7.02	48.0	177	*75.2	257	36	4
722	DRUMMOND	6	31.4	*80.9	41	77.5	1.9	1	14.2	5.33	38.0	204	62.0	301	25	44
723	ND20394	6	38.4	96.4	44	76.4	2.0	1	15.4	5.50	35.7	213	53.2	505	26	36
724	ND20395	6	34.7	92.2	47	77.1	2.5	1	15.2	5.46	37.3	192	55.3	362	30	17
725	ND20396	6	38.5	95.6	46	76.7	2.2	1	15.5	5.57	37.1	182	52.6	500	30	17
726	ND20397	6	36.9	93.6	43	76.6	2.2	1	15.1	5.68	37.9	180	56.3	490	30	17
727	ND20398	6	36.9	93.5	45	77.2	2.5	2	15.2	5.69	38.7	205	53.0	472	25	44
728	ND20399	6	36.7	91.8	42	77.0	2.6	1	15.3	6.00	40.5	205	57.8	345	22	50
729	ND20400	6	35.9	92.2	44	77.9	2.6	1	14.7	6.21	42.5	192	63.5	473	32	11
730	ND20401	6	36.8	91.4	45	77.7	2.3	1	14.8	6.19	41.8	203	62.0	422	23	47
731	ND20402	6	33.2	91.9	44	76.8	2.1	1	15.0	5.54	38.6	191	59.8	439	30	17
732	ND20403	6	34.6	92.1	45	76.5	1.9	1	15.5	5.24	34.6	191	54.6	412	30	17
733	ND20404	6	37.8	96.9	45	76.4	2.1	1	15.6	5.37	35.3	174	55.1	430	33	7
734	ND20405	6	38.4	96.8	47	76.5	2.2	1	15.3	5.26	35.5	167	51.5	496	33	7
735	ND20406	6	33.8	93.3	43	76.6	2.3	1	15.1	5.82	39.4	186	58.5	408	26	36
736	ND20407	6	34.1	91.0	44	76.6	1.9	1	15.0	5.54	37.4	189	56.3	441	30	17
737	ND20408	6	30.9	91.7	41	77.4	2.4	1	14.7	6.34	44.2	196	59.8	290	27	33
739	ND20409	6	31.7	85.0	44	76.9	1.7	1	14.7	5.29	37.3	140	52.5	551	32	11
740	ND20411	6	32.0	88.2	41	77.0	2.0	1	15.8	5.78	38.9	223	62.1	499	21	52
741	ND20412	6	33.0	86.0	42	77.3	1.8	1	14.5	5.67	39.2	220	57.8	478	26	36
742	ND20413	6	32.6	89.0	43	76.9	1.8	1	15.9	5.41	35.0	215	55.3	477	26	36
743	ND20414	6	33.5	93.0	43	77.3	1.8	1	16.0	5.58	37.0	196	54.6	422	30	17
744	ND20415	6	32.7	92.6	43	77.7	1.9	1	15.4	6.04	40.6	237	65.1	350	23	47
745	ND20416	6	33.9	94.4	41	76.6	1.9	1	15.5	6.22	41.4	243	60.1	334	19	55
746	ND20417	6	33.6	93.3	44	77.4	1.9	1	14.5	6.01	42.2	217	55.7	329	24	46
747	ND20418	6	32.3	90.3	37	77.3	2.0	1	15.0	5.66	38.6	221	57.3	420	26	36
748	ND20419	6	33.0	92.3	43	77.3	2.1	2	14.8	5.97	40.8	222	57.2	402	21	52
749	ND20420	6	34.2	93.9	42	78.3	2.3	2	14.8	6.37	44.0	149	58.2	396	37	2
750	ND20421	6	34.0	93.9	39	77.8	2.1	2	14.8	6.47	43.8	250	62.4	290	27	33
751	ND20422	6	35.4	94.4	42	77.5	2.2	2	15.8	6.01	39.8	130	64.4	515	22	50
752	ND20423	6	35.3	93.4	39	76.3	2.0	2	15.4	5.68	37.6	170	62.2	499	32	11
753	ND20424	6	37.6	94.5	38	78.6	2.7	2	15.1	6.04	41.0	177	60.0	342	32	11
754	ND20425	6	34.8	92.0	43	77.8	2.2	2	15.6	6.18	42.1	125	61.5	382	31	16

Table 33

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
755	ND20426	6	35.2	91.0	42	77.7	1.9	2	15.6	5.55	36.1	143	57.7	362	36	4
756	ND20427	6	34.6	91.4	37	76.8	1.9	2	15.5	5.45	37.0	129	54.6	479	29	29
757	ND20429	6	34.5	89.4	40	77.7	2.0	2	14.5	5.77	40.2	174	62.1	502	32	11
758	ND20430	6	35.8	93.5	44	78.8	2.3	1	14.5	6.06	41.8	123	63.5	341	30	17
760	ND20431	6	38.2	93.7	42	78.6	2.6	1	15.0	6.22	43.0	121	66.4	303	35	6
761	ND20432	6	36.4	95.4	41	77.6	2.4	1	15.0	6.33	42.8	182	64.8	443	28	31
762	ND20433	6	34.9	93.7	41	76.8	2.6	1	16.0	6.52	41.2	168	64.9	339	26	36
763	ND20435	6	39.0	95.2	44	77.0	2.1	2	15.3	5.17	35.0	174	54.7	539	28	31
764	ND20436	6	35.3	87.0	40	77.1	1.9	1	15.0	5.26	36.3	179	57.8	453	33	7
765	ND20437	6	34.2	91.2	41	76.9	2.1	1	14.9	5.30	37.1	130	64.5	471	30	17
766	ND20438	6	37.6	94.5	40	76.8	1.8	1	15.0	5.05	34.2	180	48.5	653	26	36
767	ND20439	6	35.5	92.9	46	76.3	1.9	2	15.7	5.23	34.3	198	51.3	326	29	29
768	ND20440	6	34.7	95.1	37	76.7	2.0	1	16.3	5.72	35.6	183	61.0	539	26	36
769	ND20442	6	34.4	92.3	40	77.2	2.5	1	15.0	6.00	42.0	136	59.0	573	23	47
770	ND20443	6	35.2	93.7	38	78.4	3.0	1	15.2	6.44	44.2	147	65.8	478	38	1
771	ND20445	6	34.2	88.7	39	78.2	2.3	1	14.5	5.82	40.7	181	59.2	343	30	17
772	ND20447	6	34.9	91.5	39	77.5	1.8	1	14.5	5.43	38.5	149	56.3	330	33	7
773	ND20448	6	34.9	92.8	41	77.7	1.8	1	14.5	5.69	40.7	162	60.1	340	37	2
774	ND20449	6	34.2	89.4	37	76.2	1.7	1	14.7	5.60	38.3	184	56.4	413	30	17
775	ND20450	6	34.4	*82.5	47	76.1	1.9	2	13.6	4.43	33.2	141	43.7	514	27	33
718	HARRINGTON MALT CHECK	2	39.8	95.4	73	82.1	1.9	1	11.7	5.42	49.5	99	72.6	96	50	
738	HARRINGTON MALT CHECK	2	40.2	95.6	75	82.1	1.6	1	11.7	5.39	48.4	117	69.4	104	56	
759	HARRINGTON MALT CHECK	2	39.7	95.2	77	81.7	1.7	1	11.6	5.50	51.7	113	72.3	119	50	
Minima			29.3	85.0	37	76.0	1.7		13.6	4.43	33.2	121	43.0	257	19	
Maxima			39.0	96.9	47	79.0	3.0		16.3	7.02	48.0	250	66.4	653	38	
Means			34.8	92.3	42	77.2	2.1		15.1	5.75	39.1	180	57.9	420	29	
Standard Deviations			2.0	2.6	3	0.7	0.3		0.5	0.45	3.1	32	5.1	87	5	
Coefficients of Variation			5.9	2.8	6	0.9	13.9		3.3	7.88	8.0	18	8.8	21	16	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R.D. Horsley and J.D. Franckowiak, North Dakota State University - Fargo

2002 EXPERIMENT 23, PRELIMINARY MALTING BARLEY YIELD TRIAL - OSNABROCK, ND
Table 34

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
776	MOREX	6	28.5	*61.5	33	76.2	2.0	1	16.0	5.58	35.8	165	55.5	313	25	36
777	ROBUST	6	35.2	87.7	42	76.8	1.5	1	14.8	5.08	34.5	202	42.8	599	19	51
778	STANDER	6	35.2	90.5	37	*79.1	*2.8	1	14.6	6.66	*48.1	174	66.7	438	36	1
780	DRUMMOND	6	31.3	78.5	43	77.6	1.7	1	14.9	5.47	37.4	199	60.0	286	27	31
781	ND20452	6	31.2	84.3	41	76.9	1.7	1	14.5	5.58	39.2	192	52.4	423	29	22
782	ND20453	6	29.8	81.7	41	76.8	2.1	1	15.0	5.91	40.9	189	59.5	308	23	41
783	ND20454	6	30.4	79.5	40	76.7	2.0	1	14.0	5.62	42.2	114	59.1	307	33	3
784	ND20456	6	34.8	88.0	41	76.2	2.1	1	15.9	5.81	37.4	175	52.2	435	29	22
785	ND20457	6	33.0	88.7	41	75.7	2.1	1	16.0	5.86	37.4	210	53.6	404	22	45
786	ND20459	6	36.0	87.3	40	75.9	2.2	1	15.2	5.51	36.7	128	52.0	540	30	13
787	ND20460	6	32.4	86.6	44	75.6	1.7	1	16.3	5.58	36.2	158	49.7	301	33	3
788	ND20461	6	32.7	86.4	44	74.6	1.6	1	16.4	5.38	33.1	163	46.1	294	33	3
789	ND20462	6	30.2	75.4	34	74.4	1.6	1	17.7	5.60	31.9	256	50.0	362	23	41
790	ND20463	6	30.7	82.0	34	74.8	1.7	1	17.6	5.61	32.5	*265	49.5	370	25	36
791	ND20465	6	34.1	89.1	39	76.1	1.8	1	14.6	5.88	42.7	179	55.3	478	34	2
792	ND20468	6	30.9	86.4	32	77.1	1.8	1	15.9	6.01	39.9	219	56.5	400	18	52
793	ND20469	6	31.2	79.2	45	75.7	1.8	1	16.3	6.03	37.8	159	54.3	270	23	41
794	ND20470	6	31.1	80.5	41	77.2	1.7	1	14.4	5.85	41.3	142	57.2	380	28	25
795	ND20472	6	32.3	83.8	42	75.7	1.6	1	15.5	5.57	37.2	181	48.4	412	30	13
796	ND20473	6	31.7	80.7	43	76.2	1.8	1	14.4	5.90	42.3	159	56.1	235	33	3
797	ND20477	6	33.2	86.4	48	75.8	1.6	1	15.6	5.61	37.8	181	57.4	289	30	13
798	ND20478	6	32.9	93.2	44	75.4	1.8	1	16.6	5.58	35.4	188	46.5	455	30	13
800	ND20480	6	31.4	83.0	38	74.9	1.8	1	16.5	6.40	38.9	245	58.4	269	18	52
801	ND20481	6	30.1	73.4	46	75.4	1.9	1	14.8	5.91	41.0	145	54.4	311	26	32
802	ND20486	6	31.0	73.6	36	74.7	1.9	1	16.1	6.21	38.7	213	55.7	202	16	56
803	ND20488	6	29.8	76.8	38	75.6	2.0	1	14.9	6.04	41.1	184	62.3	336	18	52
804	ND20489	6	32.2	84.5	37	76.4	1.8	1	14.8	5.83	41.6	191	59.7	296	26	32
805	ND20491	6	31.8	90.2	38	75.1	2.1	1	15.1	5.86	39.8	176	62.3	151	31	11
806	ND20492	6	31.7	84.7	41	75.6	1.9	1	15.5	5.48	35.6	149	56.0	311	32	7
807	ND20493	6	29.4	83.4	40	75.3	2.0	1	16.3	5.82	36.0	167	59.1	320	26	32

Table 34

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
808	ND20494	6	29.7	84.5	43	74.8	1.9	1	16.2	5.68	35.1	148	54.2	293	30	13
809	ND20495	6	31.6	86.6	42	75.3	1.7	1	15.4	5.20	34.0	127	53.0	218	25	36
810	ND20496	6	30.7	88.2	37	75.5	2.3	1	15.9	6.05	39.6	207	59.5	235	18	52
811	ND20497	6	30.8	87.8	42	75.8	2.1	1	16.5	5.83	36.3	145	58.5	383	28	25
812	ND20498	6	31.0	83.9	34	75.2	*3.5	1	18.2	*7.35	40.6	191	59.4	218	22	45
813	ND20501	6	31.8	86.4	33	75.5	2.3	1	17.8	5.99	35.2	193	54.1	188	28	25
814	ND20502	6	30.2	83.3	35	75.4	2.2	1	16.5	6.06	36.9	196	61.3	147	25	36
815	ND20505	6	30.2	80.9	40	74.9	2.0	2	16.9	5.50	33.6	157	51.7	449	31	11
816	ND20506	6	31.5	88.7	35	75.8	2.0	2	15.9	5.46	35.0	190	51.5	494	28	25
817	ND20507	6	30.6	82.9	39	77.3	2.1	1	14.8	5.60	38.8	191	63.1	303	29	22
818	ND20508	6	32.3	90.3	41	77.8	1.9	1	14.7	5.75	40.7	197	64.7	334	30	13
819	ND20510	6	32.1	76.2	39	77.2	2.1	1	14.6	5.67	40.2	191	65.5	321	28	25
821	ND20511	6	28.8	74.0	41	74.1	1.6	1	14.8	5.05	34.9	165	56.9	335	24	40
822	ND20512	6	29.5	81.8	38	74.7	1.8	1	15.4	5.45	36.5	180	57.5	426	30	13
823	ND20514	6	30.2	78.8	42	75.1	1.7	1	15.5	5.43	36.4	175	65.5	356	30	13
824	ND20520	6	30.8	81.6	41	75.1	1.9	1	14.8	5.33	37.4	176	58.7	307	32	7
825	ND20521		31.1	89.4	47	74.8	1.9	1	16.9	5.51	33.5	172	55.7	422	32	7
826	ND20522	6	30.7	84.9	39	75.5	2.0	1	14.5	5.22	36.1	170	57.6	362	32	7
827	ND20523	6	30.1	74.1	38	75.3	2.0	1	14.7	5.52	37.6	168	55.7	386	30	13
828	ND20524	6	32.0	87.2	40	75.2	2.2	1	16.9	6.03	36.8	189	65.0	211	22	45
829	ND20525	6	30.0	75.6	41	76.9	1.7	1	14.1	5.49	38.9	164	63.0	423	28	25
830	ND20527	6	31.1	82.1	39	74.6	*2.7	1	17.2	6.29	37.9	187	67.3	349	22	45
831	ND20530	6	31.7	81.1	40	75.4	2.3	1	18.0	6.24	35.5	195	59.3	286	22	45
832	ND20531	6	31.0	78.4	41	73.8	2.4	1	17.3	6.10	36.2	149	60.3	395	23	41
833	ND20532	6	29.5	*60.0	43	74.3	2.0	1	16.1	5.58	35.2	186	65.4	238	22	45
834	ND20535	6	30.2	78.3	35	75.9	1.9	1	15.2	5.11	34.5	157	61.1	273	26	32

Table 34

Lab No.	Variety	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score
779	HARRINGTON MALT CHECK	2	40.1	95.5	76	82.1	1.6	1	11.2	5.47	50.5	100	74.1	185	47
799	HARRINGTON MALT CHECK	2	39.9	94.8	73	82.0	1.6	1	11.3	5.79	52.3	105	72.2	142	41
820	HARRINGTON MALT CHECK	2	40.3	94.5	74	81.8	1.6	1	11.2	5.18	47.1	111	73.7	135	47
Minima			28.5	73.4	32	73.8	1.5		14.0	5.05	31.9	114	42.8	147	16
Maxima			36.0	93.2	48	77.8	2.4		18.2	6.66	42.7	256	67.3	599	36
Means			31.3	83.2	40	75.7	1.9		15.7	5.72	37.4	178	57.0	337	27
Standard Deviations			1.6	4.9	4	0.9	0.2		1.1	0.33	2.7	26	5.4	93	5
Coefficients of Variation			5.0	5.9	9	1.2	11.3		6.8	5.83	7.2	15	9.6	28	18

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R.D. Horsley and J.D. Franckowiak, North Dakota State University - Fargo

2002 EXPERIMENT 3, INTERMEDIATE MALTING BARLEY YIELD TRIAL - OSNABROCK, ND
Table 35

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
835	MOREX	6	30.1	63.1	36	75.5	1.8	1	16.0	5.28	33.7	174	66.1	380	27	30
836	ROBUST	6	35.7	90.7	42	76.7	1.8	1	15.6	5.46	36.8	181	52.5	553	30	25
837	LACEY	6	35.5	85.8	35	77.1	1.9	1	14.5	5.14	35.5	158	55.8	382	29	26
838	DRUMMOND	6	33.0	82.6	41	77.4	2.0	1	14.8	5.12	35.8	178	64.9	453	29	26
839	ND19486	6	32.7	84.3	35	77.6	2.4	1	14.2	5.46	39.5	167	64.7	605	33	13
840	ND19524	6	34.3	84.1	41	77.7	1.8	1	14.5	5.15	36.0	170	61.6	486	29	26
841	ND19525	6	31.8	81.1	43	77.9	2.0	1	14.2	5.28	38.0	176	55.8	354	36	7
843	ND19552	6	33.5	87.7	36	78.1	2.3	2	15.0	5.92	40.0	202	65.2	256	25	34
844	ND19557	6	34.1	88.1	40	78.0	2.0	2	14.0	5.49	39.2	182	60.0	269	33	13
845	ND19583	6	35.3	94.2	41	78.1	2.0	2	14.0	5.41	39.4	183	55.9	390	33	13
846	ND19595	6	33.1	88.0	40	77.9	2.1	2	14.2	5.67	40.0	168	60.9	392	36	7
847	ND19609	6	33.2	81.6	42	78.5	2.0	2	14.1	5.26	38.5	169	64.4	335	39	5
848	ND19610	6	31.2	75.7	35	78.0	2.2	2	14.1	5.29	39.1	166	64.9	279	33	13
849	ND19620	6	34.6	83.9	38	78.1	2.2	2	14.8	5.40	37.4	178	59.5	373	36	7
850	ND19632	6	31.8	72.1	36	77.1	2.3	2	14.1	5.72	43.4	182	68.2	177	27	30
851	ND19647	6	29.4	73.6	32	76.9	2.7	2	14.8	6.35	44.0	157	63.9	267	25	34
852	ND19648	6	31.9	90.1	35	77.8	2.4	1	13.9	6.03	43.6	138	57.5	346	36	7
853	ND19649	6	34.1	89.7	29	78.1	3.2	1	13.1	6.00	48.5	125	60.5	409	37	6
854	ND19651	6	31.5	84.4	31	78.1	2.9	2	14.0	5.77	42.6	143	60.9	339	41	2
855	ND19655	6	32.9	87.7	30	78.0	2.7	1	13.9	5.74	43.7	141	56.8	372	43	1
856	ND19656	6	32.9	87.9	29	77.6	3.0	1	14.2	5.79	42.4	130	58.5	409	31	21
857	ND19663	6	31.9	88.1	30	77.5	2.6	1	13.6	5.60	41.5	154	66.2	173	40	3
858	ND19665	6	35.9	90.6	33	77.4	2.9	1	14.2	6.06	43.5	154	61.9	347	31	21
859	ND19668	6	33.3	99.5	31	78.2	2.9	1	14.8	6.01	43.0	155	60.9	304	35	11
860	ND19669	6	32.5	89.9	28	77.8	2.8	1	13.8	6.09	45.4	151	62.0	414	40	3
861	ND19695	6	33.0	84.2	32	77.3	2.4	2	14.5	4.83	34.7	160	62.0	424	28	29
862	ND19708	6	31.5	81.1	33	76.5	2.1	1	14.9	5.23	36.9	172	55.8	459	32	18
863	ND19723	6	31.8	81.2	36	76.5	2.3	1	14.7	5.20	36.0	156	57.7	499	32	18
864	ND19728	6	30.9	76.5	37	77.0	2.0	1	15.0	5.32	36.8	189	60.6	467	27	30
865	ND19734	6	32.8	78.0	37	77.3	1.8	1	14.3	5.28	37.5	157	65.2	399	31	21

Table 35

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
866	ND19744	6	35.5	90.4	36	78.1	2.0	1	14.8	5.20	36.8	182	54.6	553	34	12
867	ND19787	6	30.8	68.7	38	77.2	2.0	1	15.0	5.15	35.3	167	64.2	463	23	38
869	ND19198	2	30.4	74.3	36	78.0	2.1	1	14.7	5.95	41.4	199	*76.4	271	12	42
870	ND19203	6	34.6	88.4	28	76.2	2.2	1	15.2	5.62	38.4	174	57.5	494	33	13
871	ND19223	6	32.4	79.9	41	74.9	2.0	2	15.3	5.06	33.8	162	49.2	400	26	33
872	ND19230	6	29.6	72.0	40	77.5	1.9	1	14.4	5.38	38.4	118	56.0	471	18	41
873	ND19238	6	30.1	65.8	40	76.1	2.0	1	14.3	5.25	39.0	137	58.6	372	24	37
874	ND19250	6	33.2	75.7	42	75.5	2.1	2	13.9	4.94	36.1	151	52.4	509	31	21
875	ND19253	6	30.6	68.5	46	77.5	2.3	2	13.2	4.70	36.5	110	50.1	480	22	39
876	ND19258	6	32.9	78.7	39	78.1	2.3	2	13.6	4.73	36.8	149	55.0	467	32	18
877	ND19267	6	30.0	66.4	39	76.2	2.2	1	15.2	5.61	38.0	162	61.8	411	25	34
878	ND19286	6	31.2	70.2	39	75.6	1.9	1	14.9	5.38	37.5	113	51.8	459	20	40
842	HARRINGTON MALT CHECK	2	40.2	95.0	77	82.4	1.8	2	11.1	5.47	51.1	104	73.7	89	50	
868	HARRINGTON MALT CHECK	2	39.4	94.1	77	81.6	1.9	1	11.5	5.85	55.0	108	73.9	88	45	
Minima			29.4	63.1	28	74.9	1.8		13.1	4.70	33.7	110	49.2	173	12	
Maxima			35.9	99.5	46	78.5	3.2		16.0	6.35	48.5	202	68.2	605	43	
Means			32.6	81.5	36	77.3	2.2		14.4	5.46	39.1	160	59.6	397	31	
Standard Deviations			1.8	8.5	5	0.9	0.4		0.6	0.39	3.4	22	4.7	96	6	
Coefficients of Variation			5.4	10.4	13	1.1	16.7		4.2	7.09	8.7	13	8.0	24	21	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R.D. Horsley and J.D. Franckowiak, North Dakota State University - Fargo

2002 EXPERIMENT 3, INTERMEDIATE MALTING BARLEY YIELD TRIAL - WILLISTON, ND
Table 36

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
879	MOREX	6	31.5	81.4	44	78.7	2.3	1	15.4	6.24	42.2	194	70.9	156	37	22
880	ROBUST	6	33.4	87.4	37	77.9	2.1	1	17.1	6.73	41.5	225	62.9	138	30	31
881	LACEY	6	32.9	89.3	45	80.2	2.6	1	13.6	6.34	47.4	158	69.3	102	48	3
882	DRUMMOND	6	31.5	83.2	41	78.1	2.2	1	15.6	6.10	40.0	238	71.4	86	29	34
883	ND19486	6	33.4	90.5	39	79.2	2.6	1	15.4	6.66	46.0	226	76.1	116	41	9
884	ND19524	6	32.5	89.4	47	80.2	2.1	1	14.2	5.79	43.2	192	65.2	215	41	9
885	ND19525	6	33.3	91.4	48	79.3	2.3	2	14.2	6.09	44.2	184	68.9	166	40	12
886	ND19552	6	32.1	92.3	41	78.8	2.3	2	15.5	6.50	44.8	220	71.4	101	37	22
887	ND19557	6	31.9	92.0	44	78.6	2.2	2	15.3	6.56	44.9	191	70.1	112	40	12
888	ND19583	6	32.5	93.9	40	78.5	2.2	1	15.8	6.58	43.8	225	70.1	147	34	26
889	ND19595	6	31.4	88.9	48	79.3	2.2	1	14.0	6.48	46.5	182	70.7	181	40	12
891	ND19609	6	32.1	88.3	45	80.1	2.4	2	13.3	6.14	47.7	172	70.3	131	52	2
892	ND19610	6	30.5	79.5	40	78.5	2.0	2	14.7	5.68	39.9	203	68.5	94	36	25
893	ND19620	6	33.1	85.4	45	79.5	2.7	2	14.8	6.14	43.6	198	69.1	82	44	7
894	ND19632	6	30.7	73.9	41	78.2	2.5	1	15.0	6.10	41.6	196	65.8	52	30	31
895	ND19647	6	30.6	88.4	42	79.3	2.5	1	13.6	6.34	48.4	151	67.3	135	47	4
896	ND19648	6	30.9	92.0	37	77.7	2.4	1	15.1	6.72	45.1	184	67.1	139	34	26
897	ND19649	6	32.6	87.9	33	78.3	3.0	1	14.0	6.68	49.9	144	75.9	134	45	6
898	ND19651	6	30.4	86.5	34	77.0	2.7	1	16.0	7.19	45.1	195	77.5	103	34	26
899	ND19655	6	31.4	88.8	36	78.4	2.8	1	14.0	6.66	49.5	157	75.0	184	40	12
900	ND19656	6	32.0	91.4	37	78.4	2.4	1	14.4	6.52	46.8	169	76.9	148	41	9
901	ND19663	6	29.5	79.9	38	76.8	*4.1	2	14.3	6.72	49.9	125	71.1	143	20	42
902	ND19665	6	33.0	91.2	42	77.9	3.2	1	15.1	6.92	47.7	178	75.2	97	37	22
903	ND19668	6	32.1	91.1	37	78.2	2.8	1	15.5	6.56	45.2	183	75.0	125	39	17
904	ND19669	6	32.5	94.6	33	78.7	2.6	1	13.9	6.47	46.9	151	73.1	187	46	5
905	ND19695	6	32.8	89.3	35	77.4	2.1	1	15.7	5.69	37.6	220	70.4	37	26	37
906	ND19708	6	31.6	89.6	40	78.5	2.0	1	14.6	6.14	43.0	201	72.2	55	33	30
907	ND19723	6	30.5	85.6	37	78.1	2.1	1	15.2	6.21	43.2	208	68.3	147	30	31
908	ND19728	6	32.0	92.0	49	79.9	2.3	1	12.8	5.98	49.0	165	68.9	130	56	1
909	ND19734	6	32.0	86.5	39	77.9	2.3	1	16.6	6.43	40.5	232	80.7	85	27	36

Table 36

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
911	ND19744	6	34.5	94.7	38	78.6	2.0	1	14.5	6.23	43.6	212	65.1	120	38	19
912	ND19787	6	33.4	86.5	43	77.5	1.9	1	15.8	6.27	40.0	240	75.8	129	26	37
913	ND19198	6	31.2	88.5	42	78.3	2.7	1	15.1	7.09	47.8	273	*87.9	44	25	39
914	ND19203	6	33.5	89.4	41	78.5	2.3	1	13.9	6.15	45.6	186	68.1	152	43	8
915	ND19223	6	31.2	85.3	47	77.8	2.0	1	14.7	6.04	43.0	190	66.5	87	38	19
916	ND19230	6	29.8	79.7	44	77.9	2.5	1	15.8	6.17	40.2	171	65.4	63	28	35
917	ND19238	6	29.7	77.6	46	78.4	2.5	1	14.7	5.83	42.4	177	62.0	52	39	17
918	ND19250	6	31.5	71.9	50	77.7	2.7	1	15.3	5.85	39.3	201	64.1	64	23	40
919	ND19253	6	30.3	74.5	47	78.9	3.3	1	14.5	6.00	42.7	157	67.1	36	38	19
920	ND19258	6	31.5	86.5	40	76.2	2.0	1	17.7	6.53	38.7	*310	72.9	79	21	41
921	ND19267	6	31.0	81.7	44	77.3	2.1	1	15.5	6.32	43.6	192	74.1	105	34	26
922	ND19286	6	32.1	84.1	45	75.9	1.7	1	14.6	5.47	39.1	146	61.7	94	40	12
890	HARRINGTON MALT CHECK	2	39.8	95.1	72	82.0	1.8	1	11.5	5.45	49.6	99	68.6	140	46	
910	HARRINGTON MALT CHECK	2	39.8	94.4	78	82.0	1.8	1	11.4	5.67	50.3	118	76.3	28	38	
Minima			29.5	71.9	33	75.9	1.7		12.8	5.47	37.6	125	61.7	36	20	
Maxima			34.5	94.7	50	80.2	3.3		17.7	7.19	49.9	273	80.7	215	56	
Means			31.8	86.7	41	78.4	2.4		14.9	6.32	44.1	190	70.2	113	36	
Standard Deviations			1.2	5.6	4	1.0	0.3		1.0	0.38	3.3	30	4.5	43	8	
Coefficients of Variation			3.6	6.5	11	1.2	14.4		6.5	5.95	7.5	16	6.4	38	22	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R.D. Horsley and J.D. Franckowiak, North Dakota State University - Fargo

2002 EXPERIMENT LA41, LANGDON PRELIMINARY YIELD TRIAL - LANGDON, ND
Table 37

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
923	LACEY	6	36.9	93.0	40	79.1	2.3	1	14.8	6.16	41.6	178	63.6	209	36	17
924	CONLON	2	44.1	96.7	42	81.0	2.1	1	13.6	5.67	44.1	129	72.8	314	44	10
925	DRUMMOND	6	*34.8	93.2	44	79.3	2.2	1	14.4	6.18	44.0	*206	67.7	230	34	23
926	ND16461-1	2	44.4	94.1	40	80.6	1.7	1	11.9	5.05	43.1	98	66.0	424	48	8
927	ND20788	2	48.8	96.0	42	81.5	2.2	1	12.5	5.14	41.5	134	53.0	485	53	5
928	ND20789	2	50.5	96.8	42	81.7	2.2	1	12.5	5.37	44.2	143	65.5	403	58	1
929	ND20790	2	47.7	98.2	38	81.7	3.1	1	13.9	6.35	47.8	128	68.6	399	36	17
930	ND20791	2	46.8	97.2	39	80.0	1.8	1	13.3	4.88	38.5	141	50.8	456	41	12
931	ND20792	2	48.2	98.0	43	82.0	3.4	1	13.2	6.40	51.7	97	70.1	459	34	23
933	ND20793	2	46.1	96.8	43	81.0	2.2	1	12.0	5.25	44.7	129	63.0	399	55	3
934	ND20794	2	44.1	96.5	35	81.1	2.0	1	13.1	5.13	41.5	115	62.0	295	45	9
935	ND20796	2	45.6	96.9	36	78.9	1.9	1	14.3	5.18	38.2	140	59.9	322	37	16
936	ND20798	2	47.5	98.3	35	81.6	2.9	1	12.2	5.69	48.9	126	70.8	208	49	7
937	ND20799	2	44.8	98.2	39	81.3	3.0	1	13.3	6.23	49.7	131	76.0	301	41	12
938	ND20801	2	44.7	96.9	37	81.4	2.2	1	11.6	5.19	47.0	96	71.0	289	51	6
939	ND20802	2	46.8	98.3	35	79.7	1.8	1	12.9	4.84	40.5	115	62.1	356	43	11
940	ND20803	2	47.4	98.1	35	78.8	2.5	1	13.4	6.07	45.6	106	83.2	290	34	23
941	ND20813	2	44.7	96.3	32	80.7	3.1	1	14.6	6.53	46.2	117	73.0	308	35	22
942	ND20814	2	41.5	96.2	36	78.5	1.6	1	13.9	5.04	36.8	133	58.5	161	39	14
943	ND20816	2	45.1	96.2	38	80.7	1.6	1	14.3	4.85	36.2	130	63.2	384	36	17
944	ND20817	2	46.2	97.4	38	81.3	2.3	2	12.9	5.57	44.0	116	68.1	307	54	4
945	ND20818	2	45.8	97.5	38	81.5	1.8	1	12.8	5.38	43.6	127	74.6	311	58	1
946	ND20821	2	45.2	95.9	36	82.0	4.2	1	14.7	7.59	54.4	118	73.4	163	36	17
947	ND20822	2	44.3	95.7	40	81.3	3.7	1	13.7	7.25	56.6	115	79.2	186	36	17
948	ND20824	2	44.1	93.8	39	80.2	2.3	1	14.0	5.77	42.6	111	58.5	237	38	15
932	HARRINGTON MALT CHECK	2	40.6	95.0	75	82.3	1.8	1	11.4	5.83	54.8	105	84.2	40	40	
Minima			36.9	93.0	32	78.5	1.6		11.6	4.84	36.2	96	50.8	161	34	
Maxima			50.5	98.3	44	82.0	4.2		14.8	7.59	56.6	178	83.2	485	58	
Means			45.5	96.5	38	80.7	2.4		13.4	5.71	44.5	124	67.0	316	43	
Standard Deviations			2.6	1.5	3	1.1	0.7		0.9	0.74	5.1	18	7.8	94	8	
Coefficients of Variation			5.8	1.6	8	1.3	28.5		6.9	12.90	11.4	14	11.6	30	19	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 EXPERIMENT LA42, LANGDON PRELIMINARY YIELD TRIAL - LANGDON, ND
Table 38

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
949	LACEY	6	34.5	90.1	33	78.6	2.8	1	15.0	6.82	46.9	172	64.5	130	45	2
950	CONLON	2	44.7	97.1	37	81.4	2.3	1	14.1	6.11	44.4	117	73.3	248	38	6
951	DRUMMOND	6	34.8	90.8	43	79.2	1.9	1	14.8	6.21	43.1	180	67.4	229	38	6
952	ND16461-1	2	45.5	95.7	39	80.5	1.9	1	11.8	5.37	46.9	86	66.0	416	48	1
953	ND20833	2	45.0	96.5	38	81.1	2.2	1	12.5	5.82	48.3	101	85.7	227	43	3
955	ND20835	2	44.8	94.1	40	81.7	2.9	1	12.5	6.50	52.8	87	85.0	262	36	10
956	ND20837	2	43.2	97.1	37	80.7	1.9	1	13.3	5.96	47.3	114	57.6	223	38	6
957	ND20840	2	45.6	96.4	40	78.6	2.2	1	15.7	5.71	37.6	99	53.3	434	26	20
958	ND20847	2	44.1	95.4	38	78.3	1.7	1	14.1	5.28	38.7	94	49.3	363	30	17
959	ND20848	2	46.6	95.2	44	78.2	1.8	1	14.0	5.14	37.4	100	55.4	465	34	11
960	ND20849	2	45.7	97.0	40	80.2	2.0	1	14.3	5.72	42.3	98	57.3	315	34	11
961	ND20850	2	49.8	97.3	37	77.5	2.1	2	13.7	4.70	35.2	84	40.1	528	18	23
962	ND20851	2	43.5	94.8	35	78.3	1.7	1	14.0	5.30	39.8	106	51.1	269	34	11
963	ND20855	2	45.1	98.1	41	79.6	1.7	1	13.7	5.18	38.7	126	55.1	350	40	5
964	ND20858	2	41.7	97.4	42	80.5	2.0	1	14.1	6.00	43.4	109	66.9	326	34	11
965	ND20859	2	42.0	96.2	46	81.7	*3.9	2	13.5	6.64	49.5	91	65.4	384	28	19
966	ND20863	2	50.0	97.3	38	77.6	1.9	2	14.4	5.26	36.9	102	46.1	520	29	18
967	ND20867	2	41.2	91.1	42	77.4	1.7	1	16.5	5.61	35.9	120	48.1	345	25	21
968	ND20868	2	40.5	92.7	38	77.4	2.0	1	16.4	5.58	34.8	124	52.8	379	32	15
969	ND20871	2	38.8	92.2	41	78.0	1.9	1	13.3	4.87	37.0	100	53.6	438	24	22
970	ND20874	2	42.4	94.7	43	78.4	1.9	1	14.5	5.48	38.6	124	50.5	327	37	9
971	ND20876	2	43.4	97.7	41	79.5	2.0	1	13.7	5.63	42.3	130	51.7	335	41	4
972	ND20877	2	45.6	98.3	45	78.7	1.6	1	13.3	4.88	39.0	105	43.7	457	32	15
954	HARRINGTON MALT CHECK	2	39.8	95.5	75	81.7	1.7	1	11.9	5.83	53.2	107	78.1	37	43	
Minima			34.5	90.1	33	77.4	1.6		11.8	4.70	34.8	84	40.1	130	18	
Maxima			50.0	98.3	46	81.7	2.9		16.5	6.82	52.8	180	85.7	528	48	
Means			43.4	95.4	40	79.3	2.0		14.1	5.64	41.6	112	58.3	346	34	
Standard Deviations			3.8	2.4	3	1.4	0.3		1.1	0.56	5.1	24	11.9	102	7	
Coefficients of Variation			8.8	2.6	8	1.8	16.1		8.1	9.95	12.2	22	20.5	29	21	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 EXPERIMENT LA43, LANGDON PRELIMINARY YIELD TRIAL - LANGDON, ND
Table 39

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
973	LACEY	6	36.0	92.2	36	79.0	2.4	1	15.0	6.17	41.3	172	56.9	246	33	22
974	CONLON	2	44.8	97.4	38	80.5	1.9	1	14.2	5.48	40.6	138	63.4	315	40	15
976	DRUMMOND	6	34.1	*89.1	45	79.2	2.1	1	14.2	6.08	44.6	188	69.5	195	41	13
977	ND16461-1	2	45.4	95.9	40	80.4	2.0	1	12.0	5.23	44.5	87	60.6	446	48	4
978	ND20878	2	40.4	92.9	43	79.7	1.8	1	13.3	5.36	40.9	122	56.9	453	44	9
979	ND20879	2	41.8	95.7	43	79.7	2.1	1	13.3	5.21	39.4	111	53.7	414	41	13
980	ND20880	2	43.5	95.3	42	78.5	1.9	1	14.3	5.69	41.5	135	54.4	462	33	22
981	ND20881	2	40.1	95.8	41	78.5	1.8	1	14.5	5.53	40.2	110	48.3	460	33	22
982	ND20882	2	39.7	95.9	42	78.1	1.7	1	14.4	5.08	37.2	115	48.3	470	31	26
983	ND20886	2	47.3	96.5	38	78.6	1.7	1	14.9	5.38	37.4	150	57.3	364	37	17
984	ND20887	2	42.2	99.7	35	78.9	1.8	1	13.7	5.52	40.7	146	56.0	337	37	17
985	ND20888	2	46.3	96.0	34	79.9	1.8	1	13.9	5.33	39.4	124	51.8	191	43	10
986	ND20890	2	44.0	95.9	38	80.0	1.8	1	13.1	5.63	44.8	145	61.9	118	49	2
987	ND20892	2	46.3	94.6	32	80.3	2.0	1	13.1	5.60	45.3	119	56.2	250	47	5
988	ND20894	2	43.7	94.2	35	81.0	2.2	1	13.2	6.02	45.8	146	61.6	188	49	2
989	ND20902	2	45.6	94.7	40	77.7	1.7	1	14.3	5.21	36.4	130	53.8	524	33	22
990	ND20903	2	45.7	96.7	41	80.0	1.5	1	13.3	4.97	39.2	104	50.9	558	42	12
991	ND20904	2	46.1	96.6	43	79.5	1.8	1	13.6	5.27	40.2	137	50.0	342	40	15
992	ND20906	2	46.0	95.0	37	78.7	1.7	1	13.1	5.23	43.2	140	63.6	390	47	5
993	ND20907	2	43.3	93.6	38	79.6	1.9	1	13.2	5.71	45.6	161	64.2	241	43	10
994	ND20908	2	42.3	93.1	42	79.8	1.7	1	13.3	5.44	43.4	150	64.5	328	50	1
995	ND20912	2	44.6	96.0	39	80.3	1.6	1	13.9	5.05	38.0	110	56.3	486	37	17
996	ND20913	2	47.2	97.6	39	79.9	1.7	1	13.0	5.10	40.7	105	66.6	521	47	5
998	ND20914	2	48.5	95.5	46	78.3	1.5	1	13.4	4.77	36.5	102	48.8	549	35	20
999	ND20915	2	46.2	96.2	39	78.6	1.3	1	13.2	4.65	36.6	108	53.5	363	35	20
1000	ND20916	2	42.6	96.3	40	77.8	1.4	1	13.8	4.51	33.8	117	49.8	550	26	27
1001	ND20919	2	44.0	95.5	33	79.5	1.6	1	12.7	4.90	39.2	127	55.9	387	46	8
1002	ND20920	2	39.4	94.0	41	77.7	1.5	1	13.3	4.11	31.3	92	40.2	603	18	29
1003	ND20921	2	43.1	96.5	41	77.7	1.5	1	13.3	4.30	33.3	97	42.5	622	21	28

Table 39

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
975	HARRINGTON MALT CHECK	2	39.6	94.2	74	81.8	1.7	1	11.6	5.76	54.1	117	70.7	30	43	
997	HARRINGTON MALT CHECK	2	39.8	95.0	75	82.3	1.9	1	11.4	5.73	52.3	114	73.8	62	45	
Minima			34.1	92.2	32	77.7	1.3		12.0	4.11	31.3	87	40.2	118	18	
Maxima			48.5	99.7	46	81.0	2.4		15.0	6.17	45.8	188	69.5	622	50	
Means			43.5	95.5	39	79.2	1.8		13.6	5.26	40.0	127	55.8	392	39	
Standard Deviations			3.3	1.6	3	0.9	0.2		0.7	0.49	3.8	24	7.0	136	8	
Coefficients of Variation			7.7	1.6	9	1.2	13.7		4.8	9.31	9.5	19	12.6	35	21	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 EXPERIMENT LA44, LANGDON PRELIMINARY YIELD TRIAL - LANGDON, ND
Table 40

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1004	LACEY	6	33.0	*78.9	39	78.7	2.7	1	15.0	6.49	44.4	191	65.5	212	33	12
1005	CONLON	2	45.4	97.1	37	81.1	1.7	1	13.5	5.36	40.1	123	71.9	394	43	3
1006	DRUMMOND	6	33.7	*87.8	43	79.4	1.8	1	14.4	5.79	41.1	194	65.3	312	36	7
1007	ND16461-1	2	44.2	93.7	39	79.8	1.5	1	13.1	5.17	40.9	103	67.1	481	42	4
1008	ND20923	2	40.3	95.2	43	78.9	1.3	1	13.9	4.45	33.3	107	46.0	546	26	21
1009	ND20924	2	42.7	95.0	43	79.4	1.3	1	13.8	4.45	33.4	101	42.5	582	24	23
1010	ND20925	2	45.2	95.0	43	80.2	1.6	1	14.0	5.65	42.5	141	66.3	385	41	5
1011	ND20927	2	41.9	91.6	44	80.3	1.9	1	12.9	5.82	46.6	120	61.9	333	50	2
1012	ND20930	2	40.9	92.3	43	80.1	1.7	1	14.0	5.44	39.5	111	61.2	414	36	7
1013	ND20932	2	41.5	95.6	35	79.4	2.7	1	15.6	6.83	44.9	183	66.4	235	30	17
1014	ND20935	2	42.7	96.9	40	79.3	1.9	1	15.6	5.92	38.4	170	65.8	324	30	17
1015	ND20937	2	46.6	96.4	37	78.3	2.4	1	14.1	5.36	40.0	137	56.0	276	37	6
1016	ND20938	2	43.1	95.3	33	77.9	1.3	1	14.4	4.65	32.7	130	53.9	433	29	20
1017	ND20941	2	42.6	94.1	33	79.0	2.5	1	14.4	4.60	33.0	121	51.0	421	33	12
1018	ND20943	2	46.4	95.8	40	79.9	2.4	1	13.6	6.28	49.1	184	67.1	303	26	21
1020	ND20948	2	44.9	95.0	32	79.3	2.7	1	14.6	6.39	45.2	158	86.1	238	32	16
1021	ND20949	2	40.8	91.5	36	80.7	3.5	1	13.8	6.74	48.9	155	73.4	198	35	9
1022	ND20951	2	49.1	97.0	33	78.1	2.7	1	14.8	6.63	47.1	145	65.4	211	30	17
1023	ND20953	2	44.7	96.6	39	78.5	2.4	1	14.6	6.28	43.4	167	79.2	169	35	9
1024	ND20954	2	45.3	98.1	38	79.1	2.7	1	14.2	6.36	46.4	172	77.5	133	35	9
1025	ND20960	2	42.2	95.0	40	80.6	2.0	1	12.9	5.65	45.5	125	55.2	403	51	1
1026	ND20965	2	47.5	96.4	36	79.9	2.9	1	14.2	6.61	47.1	127	65.1	302	33	12
1027	ND20967	2	49.7	95.6	32	77.5	2.1	1	14.7	5.57	39.7	157	60.7	316	33	12
1019	HARRINGTON MALT CHECK	2	40.4	94.9	75	82.0	1.6	1	11.6	5.54	50.5	111	72.9	92	56	
Minima			33.0	91.5	32	77.5	1.3		12.9	4.45	32.7	101	42.5	133	24	
Maxima			49.7	98.1	44	81.1	3.5		15.6	6.83	49.1	194	86.1	582	51	
Means			43.2	95.2	38	79.4	2.2		14.2	5.76	41.9	144	63.9	331	35	
Standard Deviations			4.0	1.8	4	0.9	0.6		0.7	0.75	5.1	29	10.3	118	7	
Coefficients of Variation			9.3	1.9	10	1.2	27.1		5.1	12.95	12.3	20	16.0	35	20	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 EXPERIMENT LA45, LANGDON PRELIMINARY YIELD TRIAL - LANGDON, ND
Table 41

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1028	LACEY	6	*32.5	*76.2	42	78.6	3.0	1	14.7	7.04	48.9	185	64.1	117	35	17
1029	CONLON	2	44.8	97.8	41	80.9	2.1	1	13.4	5.91	45.0	134	69.7	218	46	3
1030	DRUMMOND	6	*33.5	93.7	48	79.4	2.0	1	13.6	5.85	44.2	155	66.9	319	49	1
1031	ND16461-1	2	44.0	98.2	39	80.3	2.2	1	13.2	6.09	48.3	138	69.4	274	38	11
1032	ND20968	2	41.5	*87.0	36	79.9	2.0	1	13.0	5.37	43.4	111	62.2	325	49	1
1033	ND20970	2	45.1	98.1	35	80.8	2.6	1	14.7	6.85	46.9	152	73.4	304	38	11
1034	ND20973	2	46.3	96.8	32	79.4	2.1	1	14.2	5.43	38.9	131	52.7	356	37	15
1035	ND20975	2	41.4	95.5	39	81.3	4.3	1	14.6	8.22	57.6	122	73.7	110	42	8
1036	ND20976	2	43.3	95.4	43	82.5	*5.8	1	13.9	8.61	63.8	94	68.5	35	29	28
1037	ND20977	2	45.4	96.6	35	79.5	1.6	1	13.9	5.09	39.1	94	47.0	177	36	16
1038	ND20981	2	42.7	94.0	40	82.0	4.7	1	14.1	7.94	57.4	102	71.0	201	33	20
1039	ND20982	2	41.7	93.3	43	82.5	3.1	1	14.6	6.99	50.3	101	68.3	337	32	25
1040	ND20984	2	42.7	93.2	40	79.4	1.9	1	14.7	5.84	42.1	130	59.2	444	41	9
1042	ND20985	2	39.4	91.7	37	79.2	2.2	1	14.9	6.20	42.9	138	67.4	414	32	25
1043	ND20987	2	41.6	94.2	39	79.4	3.1	1	14.2	6.87	49.3	136	74.7	211	32	25
1044	ND20990	2	44.6	95.0	45	81.2	2.2	1	13.3	5.76	44.5	110	61.6	326	46	3
1045	ND20994	2	44.3	96.3	42	79.3	2.3	1	12.9	5.84	47.6	128	63.0	271	43	6
1046	ND20995	2	43.7	96.8	41	79.5	2.3	1	13.3	6.24	47.3	137	63.5	208	38	11
1047	ND20996	2	40.4	95.8	41	79.2	2.1	1	14.5	5.55	39.4	110	56.9	448	33	20
1048	ND20997	2	41.4	93.0	39	78.4	2.0	1	13.9	5.01	37.6	109	55.7	474	33	20
1049	ND20999	2	44.1	97.4	41	78.7	2.0	1	14.1	5.83	42.0	133	61.3	296	33	20
1050	ND21000	2	40.8	91.1	41	81.4	1.7	1	13.5	5.44	42.0	120	68.1	271	44	5
1051	ND21001	2	45.3	96.1	34	79.7	1.7	1	14.6	5.44	38.8	148	61.1	256	40	10
1052	ND21004	2	43.1	97.7	39	81.1	4.5	1	14.6	8.26	57.6	156	71.2	113	43	6
1053	ND21005	2	41.8	96.1	40	81.1	2.9	1	14.3	6.68	48.1	131	67.4	276	35	17
1054	ND21006	2	44.9	97.8	41	80.9	3.0	1	14.7	6.98	49.3	134	64.9	225	33	20
1055	ND21008	2	44.2	94.4	39	79.8	2.2	1	14.2	6.40	46.4	145	70.2	222	38	11
1056	ND21010	2	43.2	91.7	46	78.9	2.7	1	13.7	6.06	44.5	121	61.8	457	35	17
1041	HARRINGTON MALT CHECK	2	39.3	94.6	76	81.7	1.7	1	11.3	5.70	51.4	97	68.2	132	37	
Minima			39.4	91.1	32	78.4	1.6		12.9	5.01	37.6	94	47.0	35	29	
Maxima			46.3	98.2	48	82.5	4.7		14.9	8.61	63.8	185	74.7	474	49	
Means			43.1	95.3	40	80.2	2.5		14.0	6.35	46.5	129	64.8	274	38	
Standard Deviations			1.8	2.1	4	1.2	0.8		0.6	0.98	6.4	21	6.5	112	6	
Coefficients of Variation			4.1	2.2	9	1.5	32.8		4.2	15.44	13.8	16	10.1	41	15	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 EXPERIMENT LA46, LANGDON PRELIMINARY YIELD TRIAL - LANGDON, ND
Table 42

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1057	LACEY	6	*33.7	*81.3	36	78.9	2.5	1	14.6	6.56	44.9	191	63.1	189	38	6
1058	CONLON	2	44.3	96.4	37	80.3	2.0	1	13.4	5.58	42.3	140	70.2	251	50	2
1059	DRUMMOND	6	*31.3	*76.6	50	78.5	2.3	1	15.0	6.40	43.7	222	70.5	139	35	10
1060	ND16461-1	2	44.9	95.6	39	80.2	1.9	1	12.6	5.25	42.1	107	66.6	397	52	1
1061	ND21017	2	45.1	94.0	41	76.5	2.1	1	15.5	5.85	38.2	202	69.2	223	22	27
1062	ND21018	2	43.1	95.3	41	78.8	2.2	1	14.4	5.87	41.7	174	65.7	227	30	20
1063	ND21019	2	44.2	97.1	37	79.8	3.0	1	15.8	6.90	45.3	178	72.1	262	35	10
1065	ND21021	2	45.6	95.8	41	77.6	1.7	1	14.5	5.13	35.9	222	63.4	250	26	24
1066	ND21028	2	42.1	96.4	35	78.4	1.7	1	14.4	4.85	35.4	138	48.4	383	33	15
1067	ND21030	2	41.3	94.6	47	78.8	1.4	1	15.2	5.33	35.9	167	58.9	298	33	15
1068	ND21031	2	44.0	96.8	46	79.6	1.4	1	14.7	5.05	35.1	138	51.0	358	40	5
1069	ND21032	2	41.3	95.5	45	80.4	1.7	1	14.7	6.08	43.1	181	69.1	303	30	20
1070	ND21034	2	42.8	92.4	44	80.1	2.3	1	14.2	6.42	46.9	169	66.8	354	35	10
1071	ND21035	2	42.3	97.0	40	81.0	3.4	1	14.2	7.12	51.1	122	67.3	292	33	15
1072	ND21036	2	41.2	93.3	42	78.7	1.7	1	13.2	4.53	35.2	119	51.3	365	34	14
1073	ND21039	2	45.8	95.2	40	80.0	3.9	1	13.9	7.44	53.6	118	76.4	285	30	20
1074	ND21042	2	41.4	93.8	42	80.6	4.2	1	13.6	7.71	58.5	125	68.7	132	35	10
1075	ND21043	2	45.5	94.2	36	81.1	3.2	1	13.2	6.77	52.4	142	68.3	208	41	4
1076	ND21044	2	39.6	*86.5	37	79.4	3.3	1	15.4	7.25	48.6	177	67.6	172	25	26
1077	ND21046	2	43.2	95.6	36	80.6	4.2	2	14.7	7.91	55.3	139	68.0	246	32	18
1078	ND21047	2	42.9	93.1	36	81.5	3.7	1	13.6	7.45	57.8	144	73.1	113	43	3
1079	ND21050	2	45.3	97.4	36	79.8	3.4	1	15.1	6.67	45.3	129	60.6	371	38	6
1080	ND21051	2	43.5	94.9	38	78.7	2.0	1	14.5	5.38	38.4	152	58.9	355	37	8
1081	ND21052	2	41.0	93.8	39	78.8	1.8	1	14.4	5.10	36.3	139	64.0	382	36	9
1082	ND21053	2	46.4	97.3	39	78.2	1.8	1	15.5	5.83	38.2	217	62.0	216	26	24
1083	ND21055	2	41.7	94.0	40	79.3	1.9	1	14.6	5.59	40.6	181	65.0	180	32	18
1084	ND21057	2	43.0	94.4	38	78.4	1.6	1	14.2	5.16	37.2	191	57.3	307	30	20
1064	HARRINGTON MALT CHECK	2	39.5	94.2	74	81.7	1.6	1	12.1	5.66	50.9	115	71.7	69	50	
Minima			39.6	92.4	35	76.5	1.4		12.6	4.53	35.1	107	48.4	113	22	
Maxima			46.4	97.4	50	81.5	4.2		15.8	7.91	58.5	222	76.4	397	52	
Means			43.3	95.2	40	79.4	2.4		14.4	6.12	43.7	160	64.6	269	34	
Standard Deviations			1.8	1.4	4	1.2	0.9		0.8	0.96	7.2	34	6.8	84	7	
Coefficients of Variation			4.2	1.5	10	1.5	36.6		5.4	15.77	16.6	21	10.6	31	20	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 EXPERIMENT LA47, LANGDON PRELIMINARY YIELD TRIAL - LANGDON, ND
Table 43

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1086	LACEY	6	*32.5	*80.0	42	78.7	2.5	1	14.8	6.46	45.5	173	64.3	185	41	2
1087	CONLON	2	40.9	94.1	39	79.9	1.8	1	14.6	5.44	37.9	130	73.3	362	39	5
1088	DRUMMOND	6	*28.0	*53.1	49	76.8	2.5	1	16.0	6.80	43.9	252	76.5	81	23	25
1089	ND16461-1	2	45.0	96.0	39	80.5	1.9	2	11.7	4.61	39.6	77	60.1	453	38	6
1090	ND21058	2	48.0	97.4	31	78.2	2.1	1	15.6	6.09	40.4	205	56.3	351	23	25
1091	ND21059	2	46.5	98.9	31	77.4	1.7	1	16.0	5.48	35.1	264	55.9	225	26	24
1092	ND21061	2	43.5	96.2	43	80.5	2.3	1	14.8	6.57	44.9	153	66.9	271	38	6
1093	ND21062	2	47.5	96.5	39	81.0	5.3	1	14.2	8.02	56.8	89	76.3	145	29	22
1094	ND21063	2	40.6	93.7	39	79.4	4.2	1	15.0	7.13	49.3	109	76.1	254	29	22
1095	ND21069	2	45.4	95.8	35	80.1	3.5	1	14.6	6.68	47.2	132	70.9	120	36	12
1096	ND21072	2	46.7	91.9	39	78.2	2.3	1	14.0	6.24	44.9	124	69.3	180	38	6
1097	ND21073	2	44.1	96.1	42	80.3	2.1	1	13.8	6.26	46.8	131	65.7	154	41	2
1098	ND21077	2	43.3	96.0	36	77.4	2.0	1	14.3	5.02	36.2	131	64.6	253	33	19
1099	ND21082	2	43.5	93.0	41	80.3	1.9	1	15.2	5.53	36.9	132	64.9	247	40	4
1100	ND21083	2	43.8	90.9	39	81.0	3.6	1	15.3	7.31	48.7	125	73.4	250	36	12
1101	ND21087	2	39.4	92.1	36	80.0	2.5	1	13.5	6.26	46.3	132	67.5	194	38	6
1102	ND21088	2	44.6	98.8	35	80.1	3.0	1	14.5	6.34	46.4	133	69.0	235	38	6
1103	ND21089	2	42.7	93.2	36	79.9	2.2	1	13.9	6.22	45.3	173	64.6	260	35	16
1104	ND21090	2	48.9	95.8	31	79.3	2.1	1	14.3	6.44	47.0	145	62.6	232	35	16
1105	ND21091	2	46.9	95.6	40	82.0	3.0	1	13.5	7.34	55.5	119	81.4	215	35	16
1106	ND21092	2	45.3	95.6	35	81.3	3.1	1	13.7	7.24	53.2	149	79.7	235	36	12
1108	ND21095	2	40.1	89.1	41	80.1	2.8	1	14.9	6.51	44.8	180	77.2	164	31	21
1109	ND21096	2	42.3	94.3	36	79.7	1.6	1	14.8	5.56	38.9	173	73.2	236	37	11
1110	ND21097	2	44.4	92.1	37	80.4	3.2	1	14.4	7.06	50.0	154	73.0	259	33	19
1111	ND21098	2	45.6	97.8	38	81.7	4.0	1	14.4	7.61	54.1	132	81.7	155	36	12
1112	ND21099	2	46.8	96.9	37	82.0	2.9	1	13.1	6.38	51.6	121	79.5	182	44	1
1085	HARRINGTON MALT CHECK	2	40.2	94.3	76	81.9	1.7	1	11.5	5.68	53.8	109	73.0	91	47	
1107	HARRINGTON MALT CHECK	2	39.7	94.9	78	82.0	1.7	1	11.4	5.45	48.8	98	71.5	205	38	
Minima			39.4	89.1	31	76.8	1.6		11.7	4.61	35.1	77	55.9	81	23	
Maxima			48.9	98.9	49	82.0	5.3		16.0	8.02	56.8	264	81.7	453	44	
Means			44.4	94.9	38	79.9	2.7		14.4	6.41	45.7	148	70.1	227	35	
Standard Deviations			2.5	2.5	4	1.4	0.9		0.9	0.81	6.0	43	7.4	78	5	
Coefficients of Variation			5.7	2.6	11	1.7	33.3		6.3	12.60	13.1	29	10.5	34	15	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 EXPERIMENT LA48, LANGDON PRELIMINARY YIELD TRIAL - LANGDON, ND
Table 44

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1113	LACEY	6	35.7	88.2	35	78.2	2.0	1	15.0	5.90	41.8	187	67.9	256	33	18
1114	CONLON	2	46.4	98.2	36	80.7	2.1	1	13.6	5.54	41.5	126	75.2	351	40	7
1115	DRUMMOND	6	33.5	86.8	44	78.3	1.8	1	14.9	5.96	42.0	213	69.9	318	34	17
1116	ND16461-1	2	46.4	97.3	37	80.1	1.8	1	12.6	5.19	43.7	114	68.3	443	52	2
1117	ND21105	2	37.7	88.2	39	77.8	1.9	1	15.1	5.14	34.9	115	59.7	363	23	23
1118	ND21106	2	41.2	96.1	39	81.1	2.0	1	13.7	5.88	44.1	115	73.6	325	40	7
1119	ND21109	2	45.3	95.7	35	81.4	2.1	1	12.6	5.54	45.4	138	57.8	362	58	1
1120	ND21110	2	44.5	94.0	38	80.3	1.9	1	13.3	5.84	46.7	143	58.5	308	46	4
1121	ND21112	2	45.7	90.8	36	79.0	2.2	1	12.9	4.94	39.2	127	49.1	454	47	3
1122	ND21113	2	46.6	95.3	40	80.0	1.9	1	13.4	5.30	42.0	96	59.5	449	43	6
1123	ND21114	2	39.8	92.8	36	79.5	1.8	1	13.9	5.40	39.4	139	71.0	307	37	11
1124	ND21116	2	38.8	88.8	40	78.9	1.5	1	14.2	5.11	37.0	163	71.4	336	29	20
1125	ND21117	2	41.2	95.0	33	80.1	2.0	1	14.4	5.99	43.9	163	76.4	220	37	11
1126	ND21118	2	42.0	95.0	36	78.3	2.3	1	14.5	5.81	40.6	135	71.2	324	33	18
1128	ND21119	2	43.0	95.2	35	81.6	2.0	1	13.9	5.73	42.2	152	74.4	264	44	5
1129	ND21120	2	36.9	84.1	39	78.5	1.8	1	15.9	5.72	38.0	174	82.9	301	17	24
1130	ND21122	2	45.0	95.5	36	79.1	2.9	1	13.0	5.95	46.1	113	75.6	422	40	7
1131	ND21125	2	31.9	*60.3	43	75.7	1.8	1	16.8	6.07	37.0	200	61.6	179	12	25
1132	ND21126	2	42.7	95.5	34	79.2	2.3	1	14.1	6.14	43.9	151	70.5	188	38	10
1133	ND21129	2	44.2	97.2	37	80.9	2.7	1	13.9	6.66	50.2	131	79.4	183	36	13
1134	ND21130	2	41.1	92.1	38	79.0	3.0	1	14.3	6.72	47.8	151	86.7	211	26	21
1135	ND21131	2	43.2	96.0	39	79.5	2.8	1	13.4	6.29	49.9	128	90.0	208	35	14
1136	ND21138	2	52.9	98.5	41	78.3	2.8	1	13.6	5.90	45.2	169	63.7	459	35	14
1137	ND21143	2	38.1	81.0	43	80.4	*4.1	1	14.5	*7.62	53.1	129	89.0	194	25	22
1138	ND21147	2	46.3	97.1	42	79.1	2.4	1	13.7	6.18	45.6	146	56.8	366	35	14
1127	HARRINGTON MALT CHECK	2	39.3	95.1	75	81.4	1.6	1	11.7	5.30	47.1	111	74.1	173	50	
Minima			31.9	81.0	33	75.7	1.5		12.6	4.94	34.9	96	49.1	179	12	
Maxima			52.9	98.5	44	81.6	3.0		16.8	6.72	53.1	213	90.0	459	58	
Means			42.0	93.1	38	79.4	2.2		14.0	5.79	43.2	145	70.4	312	36	
Standard Deviations			4.7	4.7	3	1.3	0.4		1.0	0.46	4.4	28	10.5	91	10	
Coefficients of Variation			11.3	5.0	8	1.7	19.2		7.0	7.91	10.2	20	14.9	29	29	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 EXPERIMENT LA49, LANGDON PRELIMINARY YIELD TRIAL - LANGDON, ND
Table 45

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1139	LACEY	6	41.0	89.5	40	79.3	2.0	1	12.9	5.54	44.9	103	73.9	408	51	1
1140	CONLON	2	44.0	95.2	38	79.9	2.2	1	13.5	5.66	43.9	129	75.5	245	41	2
1141	DRUMMOND	6	33.6	81.6	42	78.0	2.1	1	15.6	6.09	41.1	209	74.7	149	26	22
1142	ND16461-1	2	34.8	87.6	38	79.1	2.8	1	14.3	6.45	46.1	172	69.8	175	28	18
1143	ND21148	2	45.0	96.7	39	80.0	2.9	1	13.8	6.57	48.5	143	70.6	170	36	6
1144	ND21151	2	41.1	94.2	36	81.0	*5.9	1	14.2	7.78	56.2	122	91.3	145	28	18
1145	ND21153	2	40.4	94.1	31	78.6	3.0	1	14.7	6.33	45.1	92	65.1	357	27	20
1146	ND21154	2	40.5	83.3	42	78.1	1.9	1	15.8	5.75	37.5	154	63.8	209	27	20
1147	ND21155	2	40.8	97.0	41	78.7	1.8	1	14.7	5.49	38.0	118	69.3	457	33	11
1148	ND21156	2	40.8	97.3	42	80.3	3.5	1	15.2	6.90	45.5	123	77.2	273	37	5
1149	ND21160	2	42.6	95.7	45	79.4	1.6	1	13.5	5.05	38.8	91	58.8	394	35	7
1151	ND21161	2	41.7	93.8	40	78.4	1.9	1	14.2	5.39	38.7	100	57.0	417	33	11
1152	ND21162	2	45.7	92.3	34	78.7	2.6	1	14.0	6.23	45.1	149	68.7	136	38	4
1153	ND21164	2	48.7	97.6	36	78.9	1.9	1	14.3	6.03	43.5	148	71.9	293	35	7
1154	ND21165	2	38.3	93.6	37	78.5	2.0	1	15.6	5.43	35.8	154	65.7	307	34	10
1155	ND21167	2	41.6	89.1	35	80.3	2.8	1	13.5	6.51	49.4	143	93.1	160	31	15
1156	ND21169	2	43.4	92.6	35	79.7	2.8	1	14.1	5.99	42.6	164	80.7	245	35	7
1157	ND21172	2	46.8	93.1	32	77.7	1.6	1	15.1	4.88	32.8	179	54.5	403	26	22
1158	ND21173	2	45.9	96.3	37	79.4	2.5	1	14.4	5.80	41.2	168	64.7	275	30	16
1159	ND21175	2	45.8	96.6	33	81.0	3.6	1	13.8	7.03	53.3	128	86.2	243	33	11
1160	ND21176	2	44.9	96.3	34	79.6	3.3	1	14.1	6.96	50.2	148	84.5	289	30	16
1161	ND19845	2	42.6	93.4	40	81.0	2.4	1	13.9	6.48	48.3	135	78.8	311	33	11
1162	CANELA	2	47.0	88.0	30	*73.1	2.3	1	16.2	5.89	37.6	100	67.1	540	24	25
1163	METCALFE	2	42.2	94.5	38	81.3	3.2	1	13.6	6.72	50.7	122	87.6	78	40	3
1164	HARRINGTON	2	34.0	*69.1	42	78.5	2.7	1	14.8	6.60	46.6	146	89.5	158	25	24
1150	HARRINGTON MALT CHECK	2	40.2	94.1	76	81.9	1.9	1	11.7	5.79	52.5	102	82.7	45	45	
Minima			33.6	81.6	30	77.7	1.6		12.9	4.88	32.8	91	54.5	78	24	
Maxima			48.7	97.6	45	81.3	3.6		16.2	7.78	56.2	209	93.1	540	51	
Means			42.1	92.9	37	79.4	2.5		14.4	6.14	44.0	138	73.6	273	33	
Standard Deviations			3.9	4.3	4	1.0	0.6		0.8	0.68	5.7	29	10.8	117	6	
Coefficients of Variation			9.3	4.6	10	1.3	23.6		5.7	11.05	13.0	21	14.7	43	19	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 SIDNEY FLOOD EXPERIMENT 212 - SIDNEY, MT
Table 46

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1433	MOREX	6	28.4	52.0	59	78.0	1.7	1	12.0	5.19	45.2	142	65.4	111	47	14
1434	ROBUST	6	30.0	62.6	62	78.8	1.4	1	12.4	5.00	43.1	150	52.4	133	52	6
1435	STANDER	6	30.7	81.4	56	80.4	2.2	1	11.7	5.83	53.3	132	81.4	77	45	18
1436	LACEY	6	32.1	75.2	58	79.5	2.0	1	11.7	4.93	46.0	136	61.5	70	52	6
1437	DRUMMOND	6	31.1	77.6	67	79.3	1.6	1	11.3	5.05	48.8	152	68.5	52	44	20
1438	ND18460	6	34.5	90.2	62	79.2	2.3	1	11.6	5.54	49.4	152	65.3	96	60	1
1439	ND18515	6	31.6	80.8	55	78.8	n.d.	3	11.6	5.80	50.8	137	69.6	76	43	22
1440	ND18546	6	30.2	74.7	58	78.8	2.3	2	12.1	5.50	49.4	146	67.4	49	49	12
1441	ND18549	6	30.0	69.1	64	79.0	1.9	1	10.8	5.20	50.3	128	72.3	27	35	29
1442	ND18554	6	31.4	70.5	61	79.1	2.1	2	11.3	5.03	47.2	143	61.6	40	40	25
1443	ND18556	6	30.5	75.1	56	79.0	2.1	1	11.6	5.30	48.4	145	67.9	44	53	4
1444	ND18566	6	30.1	70.4	59	79.0	1.8	2	11.6	4.97	43.8	140	63.4	76	47	14
1445	ND18567	6	31.6	75.8	62	79.1	2.1	2	11.4	4.87	46.2	138	69.1	50	45	18
1446	ND18578	6	30.5	73.6	58	79.4	2.0	2	12.1	5.50	48.3	151	68.6	87	56	2
1448	ND18579	6	31.5	77.4	66	79.4	2.1	1	10.8	5.21	50.6	124	67.2	86	49	12
1449	ND18650	6	30.6	73.1	61	78.3	n.d.	3	11.5	4.99	46.5	137	63.9	90	50	10
1450	ND18744	6	36.4	87.2	61	78.6	n.d.	3	12.5	5.17	44.3	135	66.8	136	53	4
1451	ND18803	6	32.7	79.0	63	78.6	n.d.	3	11.9	5.19	45.6	140	65.6	71	47	14
1452	ND18825	6	30.7	74.1	60	78.7	2.1	2	12.1	5.44	46.5	158	70.4	68	54	3
1453	ND18832	6	34.7	94.6	62	78.0	1.9	2	12.6	5.34	45.2	119	69.7	115	51	9
1454	ND18833	6	33.4	78.0	61	78.9	1.9	2	11.9	5.46	48.0	147	66.5	67	50	10
1455	ND18843	6	32.2	80.6	58	78.4	1.7	2	12.4	4.86	40.9	164	56.5	93	52	6
1456	ND18844	6	31.7	76.7	68	78.5	2.1	2	12.1	4.73	41.6	146	57.2	63	42	23
1457	CONLON	2	38.9	90.5	51	79.6	1.6	1	11.2	4.89	43.8	89	67.6	224	36	28
1458	ND16461-1	2	37.9	84.0	53	78.8	2.0	2	11.5	4.72	43.2	68	63.9	418	30	34
1459	MT960228	2	35.3	69.5	56	78.2	2.0	2	11.2	4.16	40.2	82	48.2	258	17	36
1460	ND19012	2	42.8	93.3	55	81.4	1.9	1	10.7	5.70	53.3	85	84.3	201	34	30
1461	ND19088	2	37.2	91.3	55	80.6	n.d.	3	10.5	4.83	46.6	64	66.2	254	32	32
1462	ND19098	2	44.0	91.6	56	80.2	1.6	1	12.1	4.82	42.8	83	55.3	357	44	20
1463	ND19119	2	46.2	94.6	57	80.6	2.2	1	11.9	6.18	54.5	81	72.3	162	39	26

Table 46

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1464	ND19130	2	38.0	84.4	50	79.4	1.9	1	11.4	4.33	41.0	82	52.2	466	23	35
1465	ND19854	2	39.5	92.6	58	81.3	n.d.	3	10.4	4.77	48.6	92	62.0	238	32	32
1466	ND19872	2	43.1	96.3	55	80.7	1.8	1	13.1	5.87	47.0	100	77.5	80	46	17
1467	ND19929	2	38.0	83.9	56	78.8	1.6	1	11.5	4.71	44.6	81	60.7	297	33	31
1468	ND19931	2	38.6	86.2	53	78.2	2.4	2	12.5	5.21	43.8	88	56.1	349	39	26
1469	ND20119	2	36.0	88.5	61	82.0	1.5	1	11.3	4.58	43.5	124	68.5	280	42	23
1447	HARRINGTON MALT CHECK	2	40.0	94.3	77	81.0	1.7	1	11.1	5.65	54.4	106	83.5	35	37	
1470	HARRINGTON MALT CHECK	2	39.7	95.1	76	81.5	1.7	1	11.7	5.77	53.5	107	76.2	53	46	
Minima			28.4	52.0	50	78.0	1.4		10.4	4.16	40.2	64	48.2	27	17	
Maxima			46.2	96.3	68	82.0	2.4		13.1	6.18	54.5	164	84.3	466	60	
Means			34.5	80.5	59	79.3	1.9		11.7	5.13	46.5	122	65.4	149	43	
Standard Deviations			4.6	9.9	4	1.0	0.2		0.6	0.44	3.6	30	7.6	116	9	
Coefficients of Variation			13.3	12.4	7	1.2	12.8		5.2	8.51	7.7	24	11.6	78	22	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 SIDNEY OVERHEAD EXPERIMENT 212 - SIDNEY, MT
Table 47

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1471	MOREX	6	30.9	*71.1	49	78.5	2.0	1	14.0	5.81	42.6	171	67.3	161	43	24
1472	ROBUST	6	33.3	86.7	52	79.6	1.7	1	13.4	5.64	44.3	168	57.8	228	58	5
1473	STANDER	6	32.3	88.8	46	80.9	2.5	1	13.4	6.53	50.7	155	78.9	137	53	13
1474	LACEY	6	34.5	88.8	49	80.4	1.9	1	13.2	5.52	44.9	155	62.7	93	65	1
1475	DRUMMOND	6	33.2	86.3	49	79.4	1.9	1	13.8	5.35	39.3	171	62.2	291	48	19
1476	ND18460	6	37.1	95.0	54	79.8	2.1	1	13.4	5.98	45.1	193	67.3	178	54	11
1477	ND18515	6	35.2	89.5	44	79.3	2.0	1	13.4	5.96	47.6	153	75.0	160	52	14
1478	ND18546	6	33.1	89.3	46	80.0	2.3	1	13.5	5.98	45.9	171	66.1	95	56	9
1479	ND18549	6	34.1	88.6	52	80.0	2.5	1	13.2	5.71	45.5	172	72.0	80	57	7
1480	ND18554	6	33.7	88.1	46	79.8	2.2	1	13.0	5.58	44.0	167	68.9	111	65	1
1481	ND18556	6	32.9	88.4	52	80.4	2.1	1	13.1	5.87	47.6	163	72.6	97	56	9
1482	ND18566	6	33.5	87.3	48	80.1	2.0	1	13.0	5.41	44.6	153	63.8	123	65	1
1483	ND18567	6	34.4	89.3	48	80.2	2.1	1	12.7	5.37	45.2	158	65.7	111	65	1
1484	ND18578	6	35.6	91.8	49	81.3	2.4	1	13.4	6.00	46.0	170	64.3	196	54	11
1485	ND18579	6	32.5	86.6	45	79.7	2.6	1	13.6	5.89	45.0	174	63.8	211	49	18
1486	ND18650	6	33.8	89.4	53	78.9	2.3	1	13.1	5.48	43.4	145	67.5	187	58	5
1487	ND18744	6	36.4	89.2	42	78.7	2.8	2	14.2	5.75	40.8	132	68.1	268	32	35
1488	ND18803	6	34.2	87.4	48	79.0	2.8	1	13.7	5.86	44.4	162	62.1	143	52	14
1489	ND18825	6	33.4	90.1	50	79.2	2.3	1	13.3	5.95	45.6	162	67.6	164	57	7
1490	ND18832	6	35.3	95.6	54	78.3	2.1	1	13.5	5.79	43.6	120	62.1	190	47	20
1492	ND18833	6	36.4	90.9	51	79.5	2.1	1	14.0	5.92	43.0	158	68.7	191	52	14
1493	ND18843	6	34.2	90.5	58	79.1	2.0	1	13.9	5.49	41.1	171	65.7	162	51	17
1494	ND18844	6	34.3	89.4	49	79.1	1.9	1	14.5	5.83	41.9	190	62.9	152	39	29
1495	CONLON	2	38.9	92.6	46	79.9	1.8	1	13.4	5.52	42.8	112	70.6	353	44	23
1496	ND16461-1	2	39.0	88.7	43	80.1	1.9	1	12.1	5.38	48.4	79	67.0	397	38	32
1497	MT960228	2	38.1	81.8	43	78.6	*3.5	2	12.5	5.16	43.1	101	59.2	211	40	28
1498	ND19012	2	44.1	95.4	44	81.9	2.3	1	11.9	6.19	55.3	95	79.4	221	39	29
1499	ND19088	2	38.1	93.6	45	81.8	2.1	1	11.4	5.38	48.4	69	69.4	215	38	32
1500	ND19098	2	46.1	95.6	52	81.3	1.8	1	12.1	5.44	47.4	77	66.5	293	46	21
1501	ND19119	2	*48.4	95.3	55	82.2	3.1	1	12.3	*7.23	*61.0	83	80.7	173	39	29

Table 47

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1502	ND19130	2	39.6	87.1	38	79.9	1.8	1	12.6	5.08	42.9	87	61.0	454	43	24
1503	ND19854	2	36.9	85.5	45	81.0	2.6	1	12.3	5.36	47.3	106	64.8	396	43	24
1504	ND19872	2	40.1	95.7	49	81.5	2.5	1	14.7	*7.43	53.5	111	87.6	79	36	34
1505	ND19929	2	37.8	85.7	44	78.8	1.9	1	12.5	5.53	46.4	110	74.2	284	42	27
1506	ND19931	2	39.8	92.1	45	80.2	2.7	2	12.8	6.05	49.4	87	58.0	268	32	35
1507	ND20119	2	39.5	93.7	48	82.8	1.7	1	13.1	5.75	45.1	154	72.4	319	46	21
1491	HARRINGTON MALT CHECK	2	39.9	94.3	75	81.4	1.7	1	11.6	5.60	52.5	111	72.0	54	50	
1508	HARRINGTON MALT CHECK	2	40.0	94.5	75	81.8	1.7	1	11.4	5.93	53.3	105	71.1	60	47	
Minima			30.9	81.8	38	78.3	1.7		11.4	5.08	39.3	69	57.8	79	32	
Maxima			46.1	95.7	58	82.8	3.1		14.7	6.53	55.3	193	87.6	454	65	
Means			36.1	90.0	48	80.0	2.2		13.2	5.69	45.5	139	67.9	205	49	
Standard Deviations			3.4	3.4	4	1.1	0.4		0.7	0.31	3.3	36	6.6	95	9	
Coefficients of Variation			9.3	3.8	9	1.4	16.4		5.6	5.48	7.3	26	9.7	46	19	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 MOTT EXPERIMENT 5 - MOTT, ND
Table 48

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1509	STANDER	6	31.7	83.8	46	80.6	2.3	1	13.7	6.99	53.7	166	83.1	108	44	12
1510	FOSTER	6	30.0	75.0	50	77.8	1.9	1	13.4	5.92	47.1	167	70.9	138	45	9
1511	LACEY	6	30.9	73.8	49	79.8	1.8	1	13.5	5.90	45.1	155	63.6	85	53	2
1512	DRUMMOND	6	30.0	77.8	47	79.1	1.8	1	14.4	5.97	43.4	198	67.9	128	43	13
1513	ND19470	6	31.2	79.9	35	78.7	2.5	1	11.6	5.70	50.3	116	73.6	391	40	18
1514	ND19474	6	31.4	79.7	42	80.3	2.1	1	12.8	5.97	48.1	147	74.4	185	49	6
1515	ND19480	6	31.9	84.1	43	80.4	2.2	1	12.1	6.11	50.9	140	71.9	151	48	7
1516	ND19491	6	31.9	86.1	38	80.8	2.5	1	11.2	5.60	53.1	104	75.2	238	40	18
1517	ND19493	6	30.6	80.8	37	81.1	2.3	1	11.6	5.60	49.6	113	73.5	216	45	9
1518	ND19495	6	32.2	79.8	36	81.0	2.2	1	11.3	5.62	53.4	105	72.7	151	42	15
1519	ND19698	6	30.5	83.5	31	81.4	2.8	2	11.2	5.44	50.1	95	66.2	271	39	20
1520	ND19703	6	28.0	68.9	40	79.9	2.2	1	12.9	5.77	45.2	143	68.4	137	51	3
1521	ND19709	6	28.0	66.9	43	80.5	2.0	1	12.3	5.62	47.6	123	70.4	158	45	9
1522	ND19711	6	28.8	74.7	45	80.2	1.9	1	12.4	5.87	51.2	141	75.6	135	51	3
1523	ND19718	6	30.3	80.9	31	80.8	2.8	2	11.5	5.43	50.6	80	58.0	551	39	20
1524	ND19742	6	32.1	86.8	41	81.9	2.0	1	11.8	5.53	50.1	129	68.3	139	57	1
1525	ND19743	6	32.2	83.5	37	81.4	2.2	1	12.1	5.59	48.6	125	70.8	252	50	5
1526	CONLON	2	37.1	92.9	47	80.5	1.8	1	13.2	5.61	42.6	94	62.9	381	34	23
1527	ND16461-1	2	40.5	92.0	38	80.0	2.2	1	12.6	5.40	44.1	77	61.3	611	47	8
1528	ND19119	2	44.3	92.0	42	82.2	3.1	2	12.6	6.56	54.8	79	64.0	237	38	22
1530	ND19121	2	37.3	87.5	45	80.2	1.8	1	14.0	6.28	46.8	103	67.6	411	28	24
1531	ND19836	2	36.1	75.8	49	80.4	1.6	1	12.3	5.10	42.0	103	56.4	383	42	15
1532	ND19912	2	37.0	86.2	40	80.1	2.0	1	12.9	5.31	43.7	79	54.0	422	41	17
1533	ND20020	2	40.5	89.8	38	81.7	1.9	1	11.8	5.49	48.7	76	62.8	403	43	13
1534	ND20126	2	36.6	84.5	44	80.2	1.9	1	13.1	6.23	49.4	115	75.8	211	25	25
1508	HARRINGTON MALT CHECK	2	40.0	94.5	75	81.8	1.7	1	11.4	5.93	53.3	105	71.1	60	47	
1529	HARRINGTON MALT CHECK	2	39.5	95.3	74	81.7	1.9	1	11.4	5.99	56.0	88	74.4	72	41	
Minima			28.0	66.9	31	77.8	1.6		11.2	5.10	42.0	76	54.0	85	25	
Maxima			44.3	92.9	50	82.2	3.1		14.4	6.99	54.8	198	83.1	611	57	
Means			33.2	81.9	41	80.4	2.1		12.5	5.78	48.4	119	68.4	260	43	
Standard Deviations			4.3	6.9	5	1.0	0.4		0.9	0.42	3.6	32	6.8	144	7	
Coefficients of Variation			12.8	8.4	13	1.2	17.1		7.2	7.18	7.4	27	10.0	56	17	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 WILLISTON RE-CROP EXPERIMENT 5 - WILLISTON, ND
Table 49

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1535	STANDER	6	31.2	87.4	35	78.9	3.7	1	16.6	8.56	53.0	207	90.0	94	25	24
1536	FOSTER	6	32.0	87.3	41	77.6	2.8	2	14.6	7.11	48.9	194	72.5	129	28	22
1537	LACEY	6	32.4	83.3	37	78.5	2.5	1	15.4	7.34	48.1	194	71.4	108	37	11
1538	DRUMMOND	6	31.7	83.5	44	78.1	2.4	1	15.9	7.10	46.2	239	74.9	84	34	14
1539	ND19470	6	32.0	85.7	24	78.4	2.9	1	14.1	7.21	52.0	157	82.2	250	29	21
1540	ND19474	6	32.0	81.4	41	79.0	3.1	2	13.2	7.04	54.4	141	79.3	243	41	4
1541	ND19480	6	32.0	90.4	38	80.0	3.2	2	14.1	7.39	54.7	152	78.4	237	34	14
1542	ND19491	6	32.5	89.6	36	81.1	2.8	1	11.6	6.41	57.1	103	76.7	308	39	8
1543	ND19493	6	32.0	82.1	35	80.3	2.6	1	12.4	6.31	53.2	123	81.8	203	40	7
1544	ND19495	6	33.1	84.7	37	80.1	2.9	1	11.8	6.54	56.4	98	80.0	154	39	8
1545	ND19698	6	31.0	83.2	32	80.0	2.3	1	12.5	6.31	50.9	100	73.3	150	41	4
1546	ND19703	6	30.2	80.8	35	79.3	2.2	1	14.3	6.80	48.0	162	74.2	128	42	3
1547	ND19709	6	29.7	80.0	42	79.3	2.3	1	13.0	6.52	50.7	148	78.4	207	43	2
1548	ND19711	6	29.6	81.5	41	79.0	2.3	1	13.5	7.05	52.7	125	78.4	113	47	1
1549	ND19718	6	30.9	86.4	33	80.0	2.2	1	11.9	5.99	53.9	80	65.0	274	41	4
1551	ND19742	6	32.9	91.8	41	80.7	2.7	2	13.5	6.72	52.1	140	74.0	284	37	11
1552	ND19743	6	33.3	86.7	33	80.3	2.5	1	13.8	6.72	50.2	178	80.6	202	38	10
1553	CONLON	2	38.5	95.3	45	78.8	2.3	1	14.9	6.48	43.4	120	77.0	347	32	19
1554	ND16461-1	2	39.7	93.3	45	79.4	2.2	1	13.5	5.92	46.7	101	71.2	414	35	13
1555	ND19119	2	43.6	93.3	41	80.4	2.8	1	14.7	7.65	54.6	117	77.8	179	33	16
1556	ND19121	2	36.6	89.1	41	78.5	2.1	1	15.7	7.06	46.2	137	71.7	353	28	22
1557	ND19836	2	37.3	85.5	42	78.4	1.8	1	14.3	5.51	38.9	123	52.4	385	30	20
1558	ND19912	2	35.7	87.3	44	78.8	1.8	1	14.6	5.71	40.1	114	55.6	302	23	25
1559	ND20020	2	39.7	92.8	39	80.6	2.1	1	12.8	6.01	47.9	98	67.5	225	33	16
1560	ND20126	2	39.6	92.8	42	80.2	2.2	1	13.7	6.73	49.6	134	78.3	133	33	16
1550	HARRINGTON MALT CHECK	2	39.7	94.5	77	81.8	1.9	1	11.7	6.24	57.5	84	74.0	79	43	
Minima			29.6	80.0	24	77.6	1.8		11.6	5.51	38.9	80	52.4	84	23	
Maxima			43.6	95.3	45	81.1	3.7		16.6	8.56	57.1	239	90.0	414	47	
Means			34.0	87.0	39	79.4	2.5		13.9	6.73	50.0	139	74.5	220	35	
Standard Deviations			3.8	4.5	5	0.9	0.4		1.3	0.67	4.7	39	8.0	95	6	
Coefficients of Variation			11.1	5.2	13	1.2	17.7		9.4	9.92	9.3	28	10.8	43	17	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 OSNABROCK EXPERIMENT 1 - OSNABROCK, ND
Table 50

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1789	MOREX	6	33.0	77.5	34	76.3	2.0	1	15.1	5.87	38.9	173	62.9	261	27	11
1791	ROBUST	6	33.1	80.9	37	76.0	1.8	1	15.8	5.89	38.0	196	50.7	355	26	12
1792	EXCEL	6	34.5	81.0	39	77.6	2.5	1	14.6	6.69	48.1	178	64.5	339	26	12
1793	STANDER	6	36.9	92.3	40	78.8	2.5	1	14.5	6.80	48.6	172	65.9	336	33	3
1794	MNBRITE	6	37.5	89.5	41	75.9	2.6	1	16.6	7.05	43.3	236	73.6	222	24	17
1795	LACEY	6	33.9	86.8	38	77.4	2.1	1	15.0	5.76	39.0	185	66.1	282	26	12
1796	FOSTER	6	36.2	92.7	36	76.7	2.2	1	14.3	6.00	42.2	183	63.2	361	28	5
1797	DRUMMOND	6	33.5	83.7	42	77.3	1.9	1	14.5	5.55	39.4	200	61.6	275	26	12
1798	LEGACY	6	34.6	85.0	43	77.3	2.4	1	14.9	6.44	44.0	188	74.1	387	28	5
1799	CONLON	6	*43.1	94.5	37	80.0	2.0	1	14.1	5.74	41.8	137	73.3	249	36	2
1800	ND16301	6	36.5	91.0	40	77.2	2.3	1	14.3	6.03	43.3	200	62.8	315	28	5
1801	ND16922	6	33.8	91.0	37	77.1	2.4	1	15.2	6.59	43.8	198	78.0	348	28	5
1802	ND17643	6	35.5	89.8	40	77.3	2.0	1	14.8	5.86	41.2	189	65.5	242	26	12
1803	ND17655	6	36.8	90.8	36	77.9	2.1	1	14.2	5.92	42.4	196	70.7	176	38	1
1804	ND17661	6	33.7	86.9	40	77.0	2.1	1	15.1	6.16	40.8	195	66.1	298	23	18
1805	ND17687	6	35.2	89.8	38	76.5	2.3	1	15.1	6.25	42.1	200	64.9	287	28	5
1806	ND17711	6	31.6	83.1	34	77.6	2.2	1	14.2	5.92	43.3	192	63.9	245	30	4
1807	M103	6	33.4	82.3	37	77.5	2.3	1	14.5	6.44	45.1	181	62.9	339	28	5
1790	HARRINGTON MALT CHECK	2	39.9	94.3	77	81.4	1.7	1	11.8	5.65	48.7	112	72.6	56	46	
Minima			31.6	77.5	34	75.9	1.8		14.1	5.55	38.0	137	50.7	176	23	
Maxima			37.5	94.5	43	80.0	2.6		16.6	7.05	48.6	236	78.0	387	38	
Means			34.7	87.1	38	77.3	2.2		14.8	6.16	42.5	189	66.1	295	28	
Standard Deviations			1.7	4.9	3	1.0	0.2		0.6	0.42	2.9	19	6.1	56	4	
Coefficients of Variation			4.8	5.6	7	1.2	10.0		4.1	6.73	6.8	10	9.3	19	14	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R. D. Horsley, North Dakota State University - Fargo

2002 CARRINGTON, EXPERIMENT 1 -CARRINGTON, ND
Table 51

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1808	MOREX	6	28.7	50.7	46	77.0	2.1	1	15.1	6.58	45.8	228	78.2	97	23	5
1809	ROBUST	6	29.8	54.8	44	78.0	2.0	1	15.7	6.75	44.1	242	66.5	161	23	5
1810	EXCEL	6	28.4	43.6	46	78.8	2.9	1	14.9	8.29	57.5	205	84.0	166	18	12
1811	STANDER	6	29.3	61.0	46	79.3	2.5	1	14.8	7.63	52.1	221	87.4	185	21	10
1813	MNBRITE	6	30.3	61.5	48	77.0	2.3	1	*17.8	7.89	45.4	293	84.5	207	15	15
1814	LACEY	6	28.5	48.8	50	78.0	2.0	1	15.3	6.74	45.7	230	70.3	138	27	1
1815	FOSTER	6	29.6	53.8	42	77.0	2.1	1	15.5	6.64	45.1	227	74.0	227	16	13
1816	DRUMMOND	6	29.2	55.9	43	77.7	2.0	1	14.7	6.69	45.7	253	76.2	102	23	5
1817	LEGACY	6	28.3	57.8	48	77.9	2.5	1	15.2	7.83	53.0	244	96.4	253	8	18
1818	CONLON	2	*36.9	81.2	43	77.9	1.7	1	15.2	5.88	38.8	167	78.3	286	16	13
1819	ND16301	6	29.8	59.7	47	78.4	2.1	1	15.3	6.90	47.6	254	76.7	113	25	4
1820	ND16922	6	29.6	65.2	45	77.8	2.1	1	15.2	7.07	47.6	236	86.8	240	12	17
1821	ND17643	6	30.7	67.1	48	78.5	2.1	1	15.5	6.89	47.5	246	79.8	118	27	1
1822	ND17655	6	32.3	66.9	48	78.8	2.3	1	14.7	7.06	49.7	249	85.6	76	21	10
1823	ND17661	6	30.0	63.6	47	78.1	2.2	1	15.0	6.74	45.7	233	79.1	155	23	5
1824	ND17687	6	31.1	66.7	48	78.5	2.4	1	14.8	7.20	49.0	249	79.9	94	27	1
1825	ND17711	6	30.5	63.3	47	78.8	2.2	1	15.0	7.00	48.9	212	76.3	160	23	5
1826	M103	6	28.2	45.1	44	77.7	2.2	1	14.9	7.24	51.7	228	79.6	228	15	15
1812	HARRINGTON MALT CHECK	2	39.8	95.1	73	81.9	1.6	1	11.6	5.74	51.8	115	72.7	52	46	
Minima			28.2	43.6	42	77.0	1.7		14.7	5.88	38.8	167	66.5	76	8	
Maxima			32.3	81.2	50	79.3	2.9		15.7	8.29	57.5	293	96.4	286	27	
Means			29.7	59.3	46	78.1	2.2		15.1	7.06	47.8	234	80.0	167	20	
Standard Deviations			1.1	9.2	2	0.7	0.3		0.3	0.57	4.1	26	6.9	62	5	
Coefficients of Variation			3.7	15.5	5	0.9	11.7		1.8	8.03	8.6	11	8.6	37	27	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R. D. Horsley, North Dakota State University - Fargo

2002 EXPERIMENT LA12, LANGDON ADVANCED YIELD TRIAL - LANGDON, ND
Table 52

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1827	ND16461-1	2	46.5	94.5	44	80.0	1.9	1	12.6	5.17	43.5	104	60.3	526	52	2
1828	LACEY	6	36.4	93.5	43	79.1	2.0	1	15.1	6.29	42.1	194	61.6	227	38	13
1829	CONLON	2	45.6	95.7	46	80.4	2.0	1	13.4	5.87	45.2	141	72.6	366	46	6
1830	DRUMMOND	6	35.9	88.9	46	78.9	2.0	1	13.8	5.84	43.3	183	68.2	399	43	9
1831	MT960228	2	44.5	95.1	43	79.6	1.6	1	12.8	4.79	38.1	125	56.9	273	46	6
1832	ND19012	2	46.1	94.3	45	81.9	3.2	2	12.1	6.29	52.8	107	70.5	452	42	10
1834	ND19088	2	41.7	96.8	42	81.9	2.2	1	11.8	5.45	46.8	94	65.1	298	50	3
1835	ND19098	2	48.9	95.7	41	80.7	2.0	1	12.7	5.07	43.1	75	53.5	432	48	5
1836	ND19119	2	49.6	97.0	50	82.1	2.3	1	12.5	6.14	50.6	95	65.0	250	39	11
1837	ND19130	2	45.4	93.6	48	80.3	1.7	1	12.4	4.75	41.4	90	49.1	491	39	11
1838	ND19854	2	44.2	95.6	39	81.6	1.8	1	12.5	5.25	44.9	127	61.4	380	58	1
1839	ND19872	2	42.9	95.2	43	81.3	2.5	1	13.4	6.06	46.6	103	68.9	184	46	6
1840	ND19929	2	42.3	94.4	46	79.1	2.0	1	13.6	5.63	42.3	150	59.4	313	38	13
1841	ND19931	2	41.8	92.9	44	78.4	2.4	2	13.7	5.64	42.0	115	53.2	359	33	15
1842	ND20119	2	44.9	97.1	47	81.1	1.8	1	13.2	5.41	42.8	169	60.9	429	50	3
1833	HARRINGTON MALT CHECK	2	39.6	95.0	76	81.8	1.9	1	11.5	5.73	52.2	109	68.8	57	41	
Minima			35.9	88.9	39	78.4	1.6		11.8	4.75	38.1	75	49.1	184	33	
Maxima			49.6	97.1	50	82.1	3.2		15.1	6.29	52.8	194	72.6	526	58	
Means			43.8	94.7	44	80.4	2.1		13.0	5.58	44.4	125	61.8	359	45	
Standard Deviations			3.9	2.0	3	1.2	0.4		0.8	0.51	3.7	36	6.8	100	7	
Coefficients of Variation			8.8	2.2	6	1.5	19.7		6.4	9.13	8.3	29	11.0	28	15	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 EXPERIMENT CR12, CARRINGTON ADVANCED YIELD TRIAL - CARRINGTON, ND
Table 53

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1843	ND16461-1	2	36.5	64.3	43	76.8	2.0	1	14.0	5.33	40.6	116	60.0	450	20	11
1844	LACEY	6	28.9	49.6	46	76.8	2.3	1	15.8	6.88	44.8	233	65.7	178	19	13
1845	CONLON	2	37.6	82.2	46	78.2	1.8	1	14.5	5.90	41.1	163	65.2	284	20	11
1846	DRUMMOND	6	29.2	55.3	52	77.9	2.0	1	14.7	6.41	44.6	236	66.9	136	27	7
1847	MT960228	2	36.4	66.7	48	76.4	1.8	1	15.0	5.51	38.9	141	53.1	393	23	9
1848	ND19012	2	39.1	76.3	41	79.1	2.3	1	13.6	6.53	49.0	143	75.7	423	22	10
1849	ND19088	2	33.1	62.8	42	79.2	2.2	1	13.2	5.78	46.4	115	62.3	374	30	3
1850	ND19098	2	39.7	74.5	41	78.3	1.8	1	14.4	5.46	39.8	129	54.2	567	29	4
1851	ND19119	2	43.0	87.7	41	80.3	2.5	2	13.0	6.22	48.1	97	55.6	394	33	2
1852	ND19130	2	39.3	69.6	40	77.9	1.8	1	14.5	5.10	36.7	124	51.0	744	25	8
1853	ND19854	2	33.6	60.6	39	79.2	2.5	2	13.3	5.60	43.4	157	54.3	430	36	1
1855	ND19872	2	36.4	81.9	44	80.4	2.1	1	14.9	6.48	46.4	129	71.8	282	28	5
1856	ND19929	2	34.4	62.2	44	76.9	1.8	1	15.5	5.74	37.6	163	59.4	393	16	15
1857	ND19931	2	36.0	64.0	45	76.9	2.3	1	14.6	5.81	40.1	136	51.2	469	19	13
1858	ND20119	2	39.2	86.3	45	80.8	1.9	1	14.5	5.91	41.8	171	59.8	646	28	5
1854	HARRINGTON MALT CHECK	2	40.2	95.3	72	81.6	1.6	1	11.9	5.69	51.3	123	64.9	155	51	
Minima			28.9	49.6	39	76.4	1.8		13.0	5.10	36.7	97	51.0	136	16	
Maxima			43.0	87.7	52	80.8	2.5		15.8	6.88	49.0	236	75.7	744	36	
Means			36.2	69.6	44	78.3	2.1		14.4	5.91	42.6	150	60.4	411	25	
Standard Deviations			3.9	11.5	3	1.4	0.3		0.8	0.50	3.8	40	7.5	161	6	
Coefficients of Variation			10.7	16.5	8	1.9	12.3		5.7	8.45	9.0	27	12.4	39	23	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 EXPERIMENT LA13, LANGDON INTERMEDIATE YIELD TRIAL - LANGDON, ND
Table 54

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1859	LACEY	6	36.4	92.8	42	78.9	1.7	1	14.3	5.75	40.4	169	54.1	343	36	20
1860	CONLON	2	45.0	97.6	42	81.4	1.5	1	13.5	5.65	44.2	128	68.2	425	49	5
1861	DRUMMOND	6	34.9	89.7	46	79.1	1.7	1	14.7	5.64	41.1	187	52.9	516	40	15
1862	ND16461-1	2	45.0	94.8	42	80.4	2.1	2	11.9	4.75	41.8	79	56.4	846	38	19
1863	ND16092-2	2	44.6	91.2	46	80.8	2.3	1	13.9	5.79	43.4	125	66.4	592	41	12
1864	ND18365	2	43.1	92.7	47	81.6	2.3	1	13.8	6.53	48.9	103	75.0	270	33	24
1865	ND19836	2	45.6	94.4	42	80.7	1.3	1	12.3	4.90	41.2	138	50.2	535	46	7
1866	ND19848	2	46.1	95.2	44	80.4	1.9	1	13.8	5.60	41.6	127	68.3	377	40	15
1867	ND19852	2	43.2	93.3	40	82.9	1.6	1	11.6	5.13	46.4	113	65.2	550	55	1
1868	ND19855	2	44.4	94.0	38	81.5	1.4	1	12.4	5.06	42.4	109	65.7	491	55	1
1869	ND19858	2	42.7	95.3	42	80.3	1.8	1	13.3	5.74	45.4	115	66.8	390	43	11
1870	ND19869	2	45.4	97.6	40	81.0	1.5	1	14.0	5.65	42.2	129	60.6	544	41	12
1871	ND19873	2	43.5	95.5	42	81.5	1.5	1	11.4	5.00	45.6	87	51.1	598	46	7
1872	ND19879	2	44.3	95.7	44	81.1	1.6	1	12.7	5.22	43.4	115	64.6	656	55	1
1873	ND19888	2	43.0	94.8	40	80.9	1.3	1	13.6	5.26	39.6	83	59.7	656	33	24
1874	ND19922	2	42.8	95.4	42	81.1	1.7	1	13.6	5.98	46.8	103	79.1	391	41	12
1875	ND19957	2	43.3	95.2	43	80.6	1.5	1	13.9	5.37	39.9	129	66.4	479	40	15
1877	ND19991	2	44.1	94.9	39	81.3	2.4	1	13.6	6.18	46.6	98	74.3	356	34	23
1878	ND20033	2	45.5	97.5	41	80.3	1.5	1	13.7	5.48	43.1	131	73.4	309	45	9
1879	ND20040	2	47.0	97.5	36	82.0	1.8	1	13.0	6.02	47.1	100	80.8	536	36	20
1880	ND20047	2	50.3	96.3	40	79.9	2.5	1	14.3	6.37	44.7	108	57.0	292	35	22
1881	ND20049	2	44.9	96.2	39	81.5	1.4	1	13.1	5.40	43.8	125	71.5	698	53	4
1882	ND20109	2	42.4	94.7	44	79.5	1.6	1	13.7	5.36	39.5	100	62.7	497	33	24
1883	ND20121	2	41.9	92.8	40	80.4	1.4	1	13.7	4.96	36.5	114	61.2	131	39	18
1884	ND20127	2	48.0	97.4	40	80.8	2.5	2	13.0	4.88	39.0	125	66.7	495	45	9
1885	ND20135	2	44.5	95.5	39	79.8	1.8	2	13.4	4.93	37.0	122	65.3	180	47	6
1876	HARRINGTON MALT CHECK	2	40.0	93.7	75	81.9	1.5	1	11.6	5.39	49.8	114	73.5	216	49	
Minima			34.9	89.7	36	78.9	1.3		11.4	4.75	36.5	79	50.2	131	33	
Maxima			50.3	97.6	47	82.9	2.5		14.7	6.53	48.9	187	80.8	846	55	
Means			43.9	94.9	42	80.8	1.7		13.3	5.48	42.8	118	64.8	467	42	
Standard Deviations			3.0	2.0	3	0.9	0.4		0.8	0.48	3.2	24	8.1	163	7	
Coefficients of Variation			6.9	2.1	6	1.1	21.7		6.3	8.72	7.4	20	12.6	35	17	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 EXPERIMENT CR13, CARRINGTON INTERMEDIATE YIELD TRIAL - CARRINGTON, ND
Table 55

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1886	LACEY	6	28.6	52.3	46	78.4	2.3	2	15.0	6.21	43.8	234	75.7	128	29	13
1887	CONLON	2	36.3	80.9	48	78.8	1.8	2	14.7	5.57	40.0	171	79.0	228	23	22
1888	DRUMMOND	6	29.5	61.6	44	78.7	2.2	2	13.9	5.78	42.5	231	78.4	95	37	4
1889	ND16461-1	2	37.9	70.7	40	78.6	2.0	2	13.0	5.09	39.7	119	70.3	310	28	15
1890	ND16092-2	2	37.1	78.1	44	80.9	2.5	2	14.4	6.67	48.9	150	94.1	229	15	25
1891	ND18365	2	34.9	64.1	49	80.4	2.5	2	14.5	6.79	48.1	118	107.0	243	12	26
1892	ND19836	2	35.2	62.4	41	78.3	2.0	2	13.6	5.02	37.1	149	54.4	219	26	18
1893	ND19848	2	40.8	86.5	48	81.0	2.5	2	13.6	6.42	49.1	139	76.2	247	29	13
1894	ND19852	2	37.3	77.2	37	81.2	2.1	2	12.3	5.17	44.8	165	57.8	247	44	2
1895	ND19855	2	37.0	68.6	36	79.5	2.2	1	13.1	5.05	39.9	170	57.2	206	32	7
1896	ND19858	2	34.6	74.5	43	77.8	2.4	1	14.1	5.85	42.5	176	52.6	136	24	21
1897	ND19869	2	38.3	86.3	39	80.2	2.4	1	14.1	6.29	46.6	168	63.6	308	30	10
1899	ND19873	2	36.3	76.2	42	79.6	2.2	1	12.8	5.49	44.3	136	48.4	259	45	1
1900	ND19879	2	36.7	77.9	38	78.8	2.3	1	12.3	5.55	46.1	166	58.8	346	39	3
1901	ND19888	2	34.9	68.4	42	79.0	1.9	1	14.4	5.28	38.8	120	49.0	405	27	17
1902	ND19922	2	35.0	76.1	41	78.4	2.1	1	14.3	5.96	44.1	162	59.0	255	25	19
1903	ND19957	2	38.6	86.8	49	80.2	2.0	1	14.0	5.43	39.5	164	56.2	221	32	7
1904	ND19991	2	38.7	83.2	43	80.9	2.4	1	14.9	6.51	45.9	152	68.5	229	30	10
1905	ND20033	2	37.4	81.4	46	77.6	2.0	1	14.5	5.45	38.9	190	48.5	175	19	24
1906	ND20040	2	39.2	87.9	33	80.9	2.8	1	13.3	6.21	49.3	134	62.5	187	36	5
1907	ND20047	2	40.1	85.8	49	80.7	*3.2	1	14.8	7.19	48.8	143	60.5	213	30	10
1908	ND20049	2	35.1	73.4	35	78.6	2.3	1	13.6	5.59	41.2	186	56.4	218	20	23
1909	ND20109	2	34.9	74.6	47	78.5	2.4	1	14.8	6.02	43.4	156	61.0	298	25	19
1910	ND20121	2	36.7	78.5	45	79.5	2.1	1	13.9	5.51	40.8	142	49.9	145	33	6
1911	ND20127	2	40.7	83.7	36	79.3	2.3	1	14.3	5.57	41.7	154	44.6	370	28	15
1912	ND20135	2	37.0	77.3	41	78.6	2.2	1	14.0	5.64	42.6	155	55.3	156	31	9
1898	HARRINGTON MALT CHECK	2	39.9	94.3	73	81.8	1.6	1	11.8	5.28	49.1	134	57.9	51	53	
Minima			28.6	52.3	33	77.6	1.8		12.3	5.02	37.1	118	44.6	95	12	
Maxima			40.8	87.9	49	81.2	2.8		15.0	7.19	49.3	234	107.0	405	45	
Means			36.5	75.9	42	79.4	2.2		13.9	5.82	43.4	160	63.3	234	29	
Standard Deviations			2.8	8.9	5	1.1	0.2		0.8	0.57	3.6	29	14.7	75	8	
Coefficients of Variation			7.8	11.8	11	1.4	10.0		5.4	9.85	8.3	18	23.2	32	27	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 WI FALLOW 13, INTERMEDIATE YIELD TRIAL - WILLISTON, ND
Table 56

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1913	LACEY	6	29.4	68.7	59	77.9	2.7	1	16.8	7.14	44.8	281	68.8	71	23	4
1914	CONLON	2	33.2	73.3	62	76.0	1.8	1	16.1	4.94	32.0	165	50.7	361	20	12
1915	DRUMMOND	6	28.2	54.8	61	76.9	2.1	1	16.6	5.94	37.6	266	59.5	95	21	11
1916	ND16461-1	2	33.9	62.0	57	76.1	1.7	1	15.9	4.62	29.8	155	43.3	524	16	17
1917	ND16092-2	2	33.5	57.0	60	77.3	1.9	1	17.3	5.56	33.0	208	60.4	327	16	17
1918	ND18365	2	32.4	57.5	62	77.5	2.2	1	16.8	6.48	39.9	187	66.5	233	9	23
1920	ND19836	2	33.2	50.0	65	77.0	1.7	1	15.6	5.45	35.8	166	49.4	443	20	12
1921	ND19848	2	36.0	64.6	59	76.2	2.0	1	17.7	6.59	38.4	197	65.2	384	9	23
1922	ND19852	2	34.1	66.3	61	78.7	1.7	1	14.6	5.26	37.0	144	66.7	304	27	2
1923	ND19855	2	32.6	49.7	63	76.6	1.6	1	15.7	4.77	31.3	125	58.2	466	19	15
1924	ND19858	2	33.1	64.4	55	75.9	1.9	1	17.0	6.12	37.0	141	69.6	179	19	15
1925	ND19869	2	35.5	89.8	48	78.3	2.2	1	16.6	6.85	42.5	158	76.7	183	31	1
1926	ND19873	2	33.5	62.1	60	76.8	1.6	1	15.4	5.62	36.6	118	55.9	334	16	17
1927	ND19879	2	33.3	63.6	65	76.8	1.6	1	14.4	5.31	38.1	141	63.1	595	23	4
1928	ND19888	2	34.8	66.3	57	77.1	1.5	1	17.0	5.46	32.7	79	58.0	446	16	17
1929	ND19922	2	32.6	57.4	64	77.1	1.5	1	15.1	5.24	35.5	110	66.6	409	20	12
1930	ND19957	2	32.2	61.5	63	75.9	1.6	1	17.2	5.53	32.5	144	69.5	359	23	4
1931	ND19991	2	33.0	54.7	64	77.8	1.9	1	16.5	6.55	40.0	121	93.5	373	9	23
1932	ND20033	2	33.9	73.0	64	75.9	1.7	1	15.4	5.45	36.5	158	71.7	233	23	4
1933	ND20040	2	33.9	65.3	60	78.4	1.9	1	15.5	6.30	42.3	134	88.5	205	22	10
1934	ND20047	2	38.7	86.2	57	77.3	2.7	1	17.4	7.49	43.3	139	82.8	197	26	3
1935	ND20049	2	36.7	84.6	52	77.0	1.7	1	15.9	5.73	36.2	168	74.1	504	16	17
1936	ND20109	2	33.2	66.2	61	76.1	1.9	1	16.4	6.31	39.5	141	94.3	283	9	23
1937	ND20121	2	33.1	65.4	65	76.4	1.6	1	16.5	5.60	35.8	127	62.4	258	23	4
1938	ND20127	2	33.5	57.3	67	76.4	1.8	1	16.4	5.40	33.9	135	66.3	559	23	4
1939	ND20135	2	34.7	82.8	57	77.2	1.8	1	16.5	6.11	37.5	129	77.8	334	16	17
1919	HARRINGTON MALT CHECK	2	40.0	93.9	76	81.7	1.7	1	11.8	5.67	51.7	135	55.8	47	51	
Minima			28.2	49.7	48	75.9	1.5		14.4	4.62	29.8	79	43.3	71	9	
Maxima			38.7	89.8	67	78.7	2.7		17.7	7.49	44.8	281	94.3	595	31	
Means			33.5	65.6	60	76.9	1.8		16.2	5.84	36.9	155	67.7	333	19	
Standard Deviations			2.0	10.7	4	0.8	0.3		0.9	0.72	3.8	44	12.7	138	6	
Coefficients of Variation			6.0	16.3	7	1.0	17.2		5.3	12.29	10.3	28	18.7	41	30	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 EXPERIMENT LA11, LANGDON VARIETY YIELD TRIAL - LANGDON, ND
Table 57

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1941	CONLON	2	46.2	97.5	41	81.4	2.1	1	14.0	6.15	45.8	114	75.6	318	38	4
1942	DRUMMOND	6	34.5	88.3	45	79.0	1.8	1	14.4	6.12	43.9	172	66.3	209	38	4
1943	FOSTER	6	37.4	95.5	39	78.8	2.2	1	14.5	6.57	48.1	162	68.9	328	33	8
1944	HARRINGTON	2	39.9	85.6	43	79.8	2.3	1	14.1	6.17	44.5	98	61.8	292	26	10
1945	LACEY	6	37.0	94.0	42	79.3	2.0	1	15.1	6.49	44.5	165	68.5	169	44	1
1946	LOGAN	2	45.1	96.1	37	80.5	1.5	1	13.9	5.68	43.2	146	62.1	375	41	3
1947	MERIT	2	38.9	85.4	45	81.5	2.9	1	13.4	6.77	52.2	130	84.5	186	36	7
1948	STARK	2	48.8	96.2	42	80.1	1.5	1	13.8	5.29	39.1	115	58.0	299	37	6
1949	ND16461-1	2	45.8	96.1	43	80.4	1.7	1	12.5	5.04	40.8	83	62.1	510	43	2
1950	ND18365	2	45.0	94.4	46	82.4	4.1	1	13.6	7.82	58.7	85	77.4	157	32	9
1940	HARRINGTON MALT CHECK	2	39.6	94.7	77	81.6	1.8	1	11.3	5.91	53.1	97	74.6	56	37	
Minima			34.5	85.4	37	78.8	1.5		12.5	5.04	39.1	83	58.0	157	26	
Maxima			48.8	97.5	46	82.4	4.1		15.1	7.82	58.7	172	84.5	510	44	
Means			41.9	92.9	42	80.3	2.2		13.9	6.21	46.1	127	68.5	284	37	
Standard Deviations			4.9	4.6	3	1.2	0.8		0.7	0.79	5.7	33	8.4	109	5	
Coefficients of Variation			11.6	5.0	7	1.5	35.1		5.0	12.71	12.4	26	12.2	38	15	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 EXPERIMENT CR11, CARRINGTON VARIETY YIELD TRIAL - CARRINGTON, ND
Table 58

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1951	CONLON	2	36.5	77.9	43	77.9	2.0	1	15.4	6.33	42.9	142	75.0	273	21	5
1952	DRUMMOND	6	29.2	57.4	46	78.5	2.0	1	14.8	6.52	46.3	230	68.9	147	26	2
1953	FOSTER	6	30.0	59.4	40	76.7	2.2	1	15.1	6.55	45.4	208	72.1	213	16	8
1954	HARRINGTON	2	32.9	50.3	45	77.4	2.9	1	16.4	7.03	43.5	144	65.9	226	21	5
1955	LACEY	6	29.1	48.9	46	77.3	2.1	1	15.8	6.74	43.2	218	67.7	173	19	7
1956	LOGAN	2	37.0	72.0	40	79.2	1.9	1	14.7	6.13	43.4	176	59.1	246	22	4
1957	MERIT	2	35.5	65.9	43	79.3	3.3	1	15.9	7.44	48.3	165	92.3	229	10	10
1958	STARK	2	38.0	73.7	44	78.0	1.9	1	15.5	5.73	37.3	154	58.6	274	23	3
1959	ND16461-1	2	36.0	68.5	37	78.9	2.1	1	13.1	5.68	44.8	104	69.7	323	30	1
1960	ND18365	2	35.7	68.4	48	80.4	2.7	1	15.2	7.38	49.5	106	93.5	258	13	9
1961	HARRINGTON MALT CHECK	2	40.2	95.1	75	82.4	1.7	1	11.5	5.74	50.1	101	69.2	49	48	
Minima			29.1	48.9	37	76.7	1.9		13.1	5.68	37.3	104	58.6	147	10	
Maxima			38.0	77.9	48	80.4	3.3		16.4	7.44	49.5	230	93.5	323	30	
Means			34.0	64.2	43	78.4	2.3		15.2	6.55	44.5	165	72.3	236	20	
Standard Deviations			3.4	9.9	3	1.1	0.5		0.9	0.62	3.4	44	12.0	51	6	
Coefficients of Variation			10.0	15.3	8	1.4	20.9		5.9	9.39	7.6	27	16.6	22	30	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2002 BARLEY SUBMISSIONS - BLACKSBURG, VA
Table 59

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
24	94AB1274	6	35.6	90.4	49	81.6	1.9	1	11.9	5.60	49.4	114	75.5	109	53	2
25	NOVOSADSKI	6	40.1	96.1	50	78.6	1.5	1	11.9	4.38	36.9	66	41.0	287	33	18
26	94AB1347	6	37.3	94.3	51	80.8	1.5	1	10.8	4.11	39.5	104	46.4	262	34	17
27	92AB1841	6	31.3	74.9	59	80.4	1.6	1	11.6	5.00	44.3	147	50.6	128	58	1
28	94AB1261	6	33.4	76.8	52	80.9	1.6	1	10.7	4.94	47.9	106	62.2	166	38	12
29	VA97-B-388	6	33.9	91.2	56	79.7	1.3	1	10.0	3.46	35.2	109	34.2	262	27	23
30	NOVOSADSKI-293	6	45.7	97.9	61	79.2	1.3	1	11.8	4.18	37.9	93	36.6	335	36	15
31	95AB2299	6	39.8	93.9	51	82.6	2.0	1	10.8	5.51	54.7	116	74.5	114	48	3
32	94AB1347	6	37.7	92.8	59	81.0	1.4	1	10.2	3.95	41.4	104	42.7	204	31	19
33	NOVOSADSKI	6	45.2	98.4	65	79.1	1.2	1	11.5	4.10	37.1	95	36.3	322	31	19
34	VA97-B-388	6	35.2	91.6	56	79.6	1.2	1	10.2	3.58	35.5	116	36.2	267	31	19
35	94AB1261	6	35.0	82.0	56	80.7	1.4	1	11.2	4.86	46.4	105	57.9	214	42	7
36	94AB1274	6	38.5	93.7	54	81.9	1.6	1	11.3	5.03	47.4	102	65.0	182	40	8
37	95AB2299	6	37.7	93.0	49	82.6	2.0	1	11.0	5.40	53.1	106	70.1	191	44	5
38	NOVOSADSKI 183	6	41.3	97.1	59	79.1	1.5	2	11.6	4.10	36.5	66	39.8	222	35	16
39	92AB1841	6	31.2	73.5	56	79.5	1.8	2	11.2	5.02	45.5	145	48.6	142	48	3
40	94AB1347	6	37.4	91.4	49	80.8	1.6	2	10.1	4.14	44.5	109	47.5	280	38	12
41	NOVOSADSKI-293	6	45.2	98.2	62	78.3	1.7	2	11.7	4.03	35.3	82	32.2	*487	28	22
42	92AB1841	6	30.5	70.3	57	79.0	1.6	1	11.1	5.00	45.1	154	50.9	170	43	6
43	94AB1261	6	35.2	82.3	52	81.0	1.4	1	10.9	4.79	47.3	102	62.4	173	37	14
44	VA97-B-388	6	35.4	90.7	51	79.1	1.7	2	10.4	3.66	36.3	105	34.6	303	26	24
45	95AB2299	6	39.4	94.3	59	82.2	1.7	1	9.8	5.09	56.7	106	69.2	180	40	8
46	94AB1274	6	39.2	92.7	54	83.2	1.5	1	10.4	4.96	52.0	97	68.8	152	40	8
47	NOVOSADSKI 183	6	41.6	96.5	61	79.3	1.4	1	10.7	4.37	44.9	67	41.1	192	39	11
48	MOREX MALT CHECK	6	29.7	66.7	75	78.9	1.9	1	12.2	6.08	51.3	119	73.3	30	28	
Minima			30.5	70.3	49	78.3	1.2		9.8	3.46	35.2	66	32.2	109	26	
Maxima			45.7	98.4	65	83.2	2.0		11.9	5.60	56.7	154	75.5	335	58	
Means			37.6	89.8	55	80.4	1.6		10.9	4.55	43.8	105	51.0	211	38	
Standard Deviations			4.3	8.4	5	1.4	0.2		0.6	0.62	6.6	22	14.2	67	8	
Coefficients of Variation			11.3	9.3	8	1.7	13.6		5.9	13.64	15.1	21	27.9	32	21	

Malt Check Data are Excluded from Rank Sorting and Statistics
Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics
For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by C. Griffey, Virginia Polytechnic Institute and State University - Blacksburg

Appendix A: METHODS

Cleaning All samples were cleaned on a Carter Dockage Tester and any material not retained on a 5/64" screen was discarded.

Barley Mill Ground barley was prepared with a Labconco Burr mill that was adjusted so that only 35% of the grist remained on a 525 µm sieve after 3 min of shaking and tapping.

Kernel Weight The number of kernels in a 20 g aliquot of each sample was counted electronically and the '1000 kernel weight' was calculated.

Plumpness Samples were sized on a Eureka-Niagra Barley Grader and the percentage of the seeds retained on a 6/64" screen was determined.

Barley Color The brightness of the grains was measured using an Agtron M45-D analyzer.

Barley Moisture Content Five g of ground sample was dried for 3 h at 106°C. The percentage of weight loss that occurred during this drying was calculated.

Barley Protein Content Total nitrogen values were obtained using an automated Dumas combustion procedure with a LECO FP-528 analyzer. Nitrogen values were converted to protein percentages by multiplication by 6.25.

Malting Conditions 170 g (db) barley samples were steeped at 16°C for 32-48 h, to 45% moisture, by alternating 4 h of wet steep with 4 h of air rest. The steeped samples were placed in a chamber for 5 d at 17°C and near 100% R.H., in cans that were rotated for 3.0 min every 30 min. The germinated grain (green malt) was kilned for 24 h as follows: 0.5 h from 25°C to 49°C, 9.5 h at 49°C, 0.5 h from 49°C to 54°C, 4.0 h at 54°C, 0.5 h from 54°C to 60°C, 3.0 h at 60°C, 0.5 h from 60°C to 68°C, 2.0 h at 68°C, 0.5h from 68°C to 85°C, and 3.0 h at 85°C.

Malt Mill Fine-grind malts were prepared with a Miag laboratory cone mill that was adjusted so that 10% of the grist remained on a 525 µm sieve after 3 min of shaking, with tapping. Coarse-grind malts were prepared with a corrugated roll mill that was adjusted so that 75% of the grist remained on a 525 µm sieve. Ground malts for moisture, protein and amylolytic activity analyses were ground in a Labconco Burr mill (see Barley Mill).

Malt Moisture Content See Barley Moisture Content.

Malt Protein Content See Barley Protein Content.

Malt Extract Samples were extracted using the Malt-4 procedure (Methods of Analysis of the ASBC, 8th ed, 1992), except that all weights and volumes specified for the method were halved. The specific gravity of the filtrate was measured with an Anton/Parr DMA5000 density meter. The density data were used to calculate the amount of soluble material present in the filtrate, and thus the percentage that was extracted from the malt. **F-C** represents the difference in extract % between the finely ground malts and the coarsely ground malts.

Wort Color was determined on a Skalar SAN plus analyzer by subtracting the absorbance at 700 nm from that at 430nm and dividing by a factor that was determined by comparison with values obtained in a collaborative test.

Wort Clarity was assessed by visual inspection.

β-Glucan Levels were determined on a Skalar SAN plus analyzer by using the Wort-18 fluorescence flow injection analysis method with calcofluor as the fluorescent agent (Methods of Analysis of the ASBC, 8th ed, 1992).

Free Amino Nitrogen Levels were determined on a Skalar SAN plus analyzer using an automated version of the Wort-12 protocol (Methods of Analysis of the ASBC, 8th ed, 1992).

Soluble (Wort) Protein Levels were determined on a Skalar SAN plus analyzer using the Wort-17 UV-spectrophotometric method (Methods of Analysis of the ASBC, 8th ed, 1992).

S/T Ratio was calculated as Soluble Protein / Total Malt Protein

Diastatic Power Values were determined on a Skalar SAN plus analyzer by the automated ferricyanide procedure Malt-6A (Methods of Analysis of the ASBC, 8th ed, 1992).

α-Amylase activities were measured on a Skalar SAN plus analyzer by heating the extract to 73°C to inactivate any β-amylase present. The remaining (α-amylase) activity was measured as described for Diastatic Power Values.

Turbidities were determined in Nephelometric Turbidity Units (NTU) on a Hach Model 18900 Ratio Turbidimeter.

Quality Scores were calculated by using a modification of the method of Clancy and Ullrich (Cereal Chem. 65:428-430, 1988). The criteria used to quantify individual quality factors are listed in Table A1.

Overall Rank Values were ordered from low to high based on their Quality Scores. A rank of '1' was assigned to the sample with the best quality score.

Appendix B 2002 Crop Year

Quality Score Parameters for 2- and 6-rowed barleys

	2-rowed		6-rowed	
Quality parameter	condition	score	condition	score
Kernel Weight	> 42.0	5	> 32.0	5
(mg)	40.1–42.0	4	30.1–32.0	4
	38.1–40.0	2	28.1–30.0	2
	≤ 38.0	0	≤ 28.0	0
on 6/64 "	≥ 90.0	5	≥ 80.0	5
(%)	85.0–89.9	3	73.0–79.9	3
	< 85.0	0	< 73.0	0
Malt Extract	≥ 81.0	10	≥ 79.0	10
(% db)	79.4–81.0	7	78.2–78.9	7
	78.0–79.4	4	77.7–78.2	4
	<78.0	0	< 77.7	0
Wort Clarity	= 3	0	= 3	0
3=hazy	= 2	1	= 2	1
2=slightly hazy	= 1	2	= 1	2
1=clear				
Barley Protein	≥ 13.5	0	≥ 14.0	0
(% db)	13.0–13.5	5	13.5–13.9	5
	11.5–13.0	10	11.5–13.5	10
	≤ 11.5	5	≤ 11.5	5
Wort Protein	> 6.0	0	> 6.0	0
(% db)	5.6–6.0	3	5.7–6.0	3
	4.9–5.6	7	5.2–5.7	7
	4.5–4.9	3	4.8–5.2	3
	< 4.5	0	< 4.8	0
S/T (Soluble/Total	>47	0	>47	0
Protein, % db)	42–47	5	42–47	5
	< 42	0	< 42	0
DP (Diastatic	> 180	0	> 200	0
Power, ° ASBC)	160–180	4	180–200	4
	120–160	7	140–180	7
	100–120	4	120–140	4
	< 100	0	< 120	0
Alpha-amylase	> 90	0	> 90	0
(20° DU)	80–90	4	80–90	4
	45–80	7	45–80	7
	35–45	4	35–40	4
	< 35	0	< 35	0
Beta-glucan	< 40	0	< 40	0
(ppm)	40 –60	3	40 –80	3
	60 – 115	7	80 – 140	7
	115–200	3	140 – 200	3
	> 200	0	> 200	0