

**2012 Crop
Advanced Milling and Baking Evaluation
Set 2012 A01**

**2012 SWQL Quality Plots
Entries #: 1250501 - 1250651**

A total of 151 samples were grown in as an advanced sample set and were submitted to the laboratory for milling and baking quality evaluations. However, for analytical purposes, only 119 samples were compared to the average for the cultivar checks given for this nursery and quality scores for all entries are adjusted to the check average. A table of observed and historical quality scores is given below.

Lab Number	Entry Number	ENTRY	From Advanced Milling Database Scoring						Predicted from Measured Data					
			Milling Quality Score		Baking Quality Score		Softness Equivalent Score		Milling Quality Score		Baking Quality Score		Softness Equivalent Score	
1250510	1010	Ambassador	73.72	B	81.94	A	71.84	B	81.98	A	76.98	B	72.81	B
1250515	1015	Beck 113	53.22	D	55.89	D	79.15	B	51.38	D	41.46	E	63.02	C
1250522	1022	Branson	68.26	C	72.03	B	81.31	A	65.94	C	54.58	D	74.63	B
1250525	1025	Caledonia	70.95	B	88.58	A	79.24	B	77.16	B	66.36	C	69.55	C
1250578	1078	Jamestown	61.05	C	50.13	D	67.28	C	63.46	C	41.53	E	61.31	C
1250579	1079	Jensen	65.30	C	70.20	B	76.24	B	66.00	C	52.70	D	54.04	D
1250581	1081	Jordan	59.84	D	53.95	D	58.01	D	58.91	D	34.57	F	36.01	F
1250583	1083	Kenton	62.29	C	55.29	D	60.43	C	68.54	C	55.14	D	54.69	D
1250586	1086	Malabar	63.08	C	72.49	B	70.15	B	67.75	C	57.83	D	59.31	D
1250589	1089	Merl	68.63	C	68.59	C	73.31	B	65.67	C	55.75	D	57.12	D
1250632	1132	Shirley	67.58	C	67.51	C	66.95	C	65.90	C	52.63	D	59.73	D

		Average	64.90		66.96		71.27		66.61		53.59		60.20
		Adjustment Bias for Trial	-1.71		13.37		11.06						
		Diagnostics - Correlations	0.9		0.9		0.7						

The adjusted average values of the provided checks are predicted to have increased milling scores, but decreased baking and softness equivalent scores when compared to the historical average. The observed scores for the checks correlated to the historical scores for milling, baking, and softness equivalence at a level of $r > 0.9$, $r > 0.9$, and $r > 0.7$, respectively. The rankings and correlations for the quality measures among the checks were consistent with expectations from previous evaluations. Therefore, we expect the outcome of the evaluations to be predictive of future performance of these breeding lines.

Changes in 2012 Evaluations

After many years of use and buildup, our bake sheets have been replaced with newer ones. These new sheets produce a cookie with an average difference of 0.6 cm when compared to the old bake sheets. The cookie diameter was 96.8% (3.2% smaller) of the size of a cookie baked on the old sheets. This value was based on cookies made with 22 flour samples at the beginning of the evaluation process and resulted in a standard deviation of 1.36 and standard error of 0.29. We will be reporting the diameters using the new sheets for this year's samples, so you may need to adjust the baking quality score if comparing with test lines from previous years.

Additional Information on Analysis

In general, grain condition for this nursery indicated sparse weathering and black point before cleaning. There was no observable evidence of FHB or sprouting within this group. Flour analysis of this nursery specifies that the quality trait averages of milling yield, softness equivalence, and flour protein, were within the expected target range for soft wheat characteristics. The solvent retention capacities of lactic acid, water, and sodium carbonate exceeded the expected target range for soft wheat characteristics. Sucrose SRC was below average for this quality trait.

Of the characteristics of quality we measure at the Soft Wheat Quality Laboratory, milling yield is the most reproducible and perhaps most important because it is genetically and environmentally associated with good soft wheat flour quality. This nursery produced an average milling yield of 70.4%, which is right on target for flour yield as it is typically 70% and greater.

The highest yield belonged to Ambassador at 73.2%, which was the only entry that registered a score of an “A” for milling quality. Others that had good yield include IL 00-8530, Hunker, and GA031238-7E34. Entry INW1131 had the least yield at 65.5%.

After milling yield, the second trait that we recommend for use in selection is softness equivalent. It tends to have high heritability and is an important predictor of break flour yield. Larger values are preferred for most soft wheat manufactured goods, particularly cakes and other high sugar baked products. The average for this sample set was 56.6% with Geary recording the largest softness equivalent value at 64.5%. A total of 8 entries acquired a softness equivalent below 50%. They would likely be poor for a wide range of soft wheat products and are particularly poor for cakes. The entries should be considered for discarding unless they have some redeeming factor in field performance. Also in this set, Glosa had a softness equivalent below 40% and is likely to contain true hard wheat traits.

Generally, sucrose SRC is related to the levels of pentosan components. Lactic acid SRC is associated with gluten protein characteristics and sodium carbonate SRC coincides with damaged starch. Water SRC is influenced by all water absorbing components in flour. The combined pattern of these flour SRC results establishes a practical flour quality and functionality profile that is useful in predicting baking performance.

Sucrose SRC is probably the best predictor of cookie quality and is a measure of arabinoxylan content, which can strongly affect water absorption in baked products. Sucrose SRC typically increases in wheat samples with lower flour yield and lower softness equivalent. The cross hydration of gliadins by sucrose also causes sucrose SRC values to be correlated to flour protein and lactic acid SRC. Soft wheat flours for cookies typically also have a target of 95% or less for sucrose SRC. Entry B05*0154 may have had the lowest sucrose SRC absorption (81.2%) and the highest baking score (96.4), but Terral TV 8861 generated the largest cookie at 19.3 cm.

Gluten strength is measured by the lactic acid SRC. The lactic acid SRC also correlates to flour protein concentration, but the effect is dependent on genotypes and growing conditions. This nursery’s average of 111.1% displays “strong” gluten strength (lactic acid above 105%) and these entries may be of value for the manufacturing of crackers or other products requiring gluten strength. Entries MH07-7474, Glosa, IL 07-20743, and G19209 represent a handful of entries that have the strong lactic acid SRC values but demonstrate less than average quality for milling yield and softness equivalence. They would likely have limited use as a cultivar directly but could have value as a breeding parent for the strong gluten characteristic. Pioneer 25R56 had the smallest gluten value at 88.1%.

High sodium carbonate SRC absorption values have a tendency to have an increase in damaged starch. Normal values for good milling soft varieties are 68% or less. There were 19 samples below 68%. The lowest value belonged to Pioneer 25R34 at 65.6%, while Pioneer 25R32 had the highest value at 94.3%.

Lower water values are desired for cookies, cakes, and crackers with target values below 51% on small experimental mills, such as our Quadrumat Junior Flour Mill. The average water SRC of the entries was on the high end with 55% as only Hunker, IL 00-8633, IL 00-8061, and IL 00-8109 fell below 51%. With a value of 67.2%, Pioneer 25R32 had the highest water SRC absorption.

Soft wheat products such as cookies and crackers require flours with low water absorption. To select the best lines for milling and baking quality, we sequentially sorted for flour yield and selected all lines with greater flour yield than the nursery average. We then repeated the operation for softness equivalent and the solvent retention capacities of sucrose, sodium carbonate, and water selecting the lines that were better than average in each case. Next we discarded the weakest gluten lines to present a more accurate evaluation of the cookies. After the sort, 10 samples fit these criteria. A few notable entries with the most balanced milling and baking qualities include IL 00-8061, G19227, D8006W, and Hunker. Ambassador was the only line to score an "A" for all three quality scores.

Please contact me if you have questions concerning this trial.

Best regards,
Tony Karcher