

**2012 Crop
Advanced Milling and Baking Evaluation
Set 2012 A07**

2012 USSRWWN

Entries #: 1250941 - 1250969

A total of 29 samples were grown in a composite of nursery locations and submitted to the laboratory for milling and baking quality evaluations. The standard quality data 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	
1250941	1	AGS 2000	74.18	B	59.66	D	74.63	B	72.87	B	51.48	D	62.13	C
1250942	2	Pioneer Brand 26R61	61.64	C	45.08	E	60.33	C	56.68	D	49.84	E	52.14	D
1250943	3	USG 3555	58.30	D	34.04	F	59.28	D	52.69	D	40.45	E	55.21	D
1250944	4	Jamestown	61.05	C	50.13	D	67.28	C	55.71	D	42.72	E	60.47	C
		Average	63.79		47.23		65.38		59.49		46.12		57.49	
		Adjustment Bias for Trial	4.31		1.11		7.89							
		Diagnostics - Correlations	1.0		0.7		0.9							

The adjusted average values of the provided checks are predicted to have decreased milling, 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 $r=1.0$, $r>0.7$, and $r>0.9$, 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

The grain condition for this sample set contained sparse Fusarium Head Blight, weathering, and black point grain. Sprouting was observed in LA04110D-7, leading to a probability of high alpha-amylase activity as well as increased starch damage. Flour analysis of this nursery specifies that the quality trait averages of milling yield, flour protein, and sucrose SRC were within the expected target range for soft wheat characteristics. Softness equivalence and the solvent retention capacities of lactic acid, water, and sodium carbonate were above normal for these cultivars.

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 69.8%, which is right on target for flour yield as it is typically 70% and greater. The largest yield concentration occurred in test line G95407 at 72.5%, followed by TN1202 and GA04570-10E46. At 67.3%, test line NC08-23323 had the smallest yield.

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 57% with G95407 recording the largest softness equivalent value at 62.2%. Along with G95407, entries GA031086-10E26 and VA08W-176 all scored an "A" for softness equivalence. All the lines in the set were genetically soft, but NC08-23324 and NC08-23323 had small softness equivalent scores and would likely be poorly suited for products like cakes.

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. These 29 samples produced an average near the 95% target with a value of 92.7%. The highest baking score belongs to TN1202 at 86. This is due to the combination of low sucrose SRC and flour protein which TN1202 embraces. The cookie diameter of NC08-23323 was one of the smallest at 17.6 cm, reflecting the poor baking quality score of 28.8.

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. The average for this trial was 110.2% with 20 entries that extend from 105.5% to 121.1% which exhibit “strong” characteristics of gluten strength (above 105%) and may be of value for the manufacturing of crackers or other products requiring gluten strength. The largest lactic acid SRC goes to LA04110D-7, whereas TN1202 received the smallest value.

High sodium carbonate SRC absorption values point towards a potential of damaged starch. Normal values for good milling soft varieties are 68% or less, but this nursery provided an average of 70.8% with only 4 samples being below 68%. These samples consist of TN1202, GA04570-10E46, VA10W-28, and NC08-23090. Sample NC08-23324 had the highest sodium carbonate SRC absorption at 76.7%.

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 54.2%. Out of the provided checks, AGS 2000 had the lowest value. However, there were still 3 samples that were better than AGS 2000. They include TN1202, TN1201, and GA04570-10E46. The sample with the highest value goes to NC08-23324 at 57.7%.

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 and then repeated the operation for softness equivalent. Knowing that soft wheat products such as cookies and crackers require flours with low water absorption, the sort procedure was continued upon 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, 6 samples were left. They consist of LA04041D-63, LA04041D-117, G95407, GA04570-10E46, TN1202, and MD03W151-10-12

Please contact me if you have questions concerning this trial.

Best regards,
Tony Karcher