

CLUB WHEAT BREEDING PROGRAM PROGRESS REPORT

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The goal of the club wheat breeding program is to produce club wheat varieties that have the agronomic performance to make them profitable for growers of the PNW and the quality performance to satisfy market demands. Agronomic characteristics such as yield, disease resistance, emergence, growth habit, and straw strength can make a new variety profitable when present at acceptable levels in a cultivar. Quality characteristics include protein, test weight, flour yield, cookie diameter, and sponge cake volume. These agronomic and quality characteristics must all be present at acceptable levels for an experimental line to be considered for release as a variety.

Two candidates for release, 92CL0049 and 92CL0054, have received preliminary approval from the OSU pre-release committee. They are currently being tested in the Western Regional White Winter Wheat Nursery at locations throughout the PNW to assess agronomic and quality characteristics. Table 1 shows 1995 yield data from three locations, but three years of data from this nursery are necessary before a variety can be considered for release through the Tri-State Wheat Agreement. Purification efforts are ongoing to provide a pure seed source in the event that a release decision is made. The goal is to release a club wheat variety that yields competitively with varieties of soft white winter wheat with disease re-

Table 1. Western Regional White Winter
heatNursery Data

1995 - Pendleton				
Line/Variety	Yield	Rank In	Test	
	bu/acre	Nursery	Weight	
			lbs/bu	
Stephens	102.5	34	61.5	
Tres	86.0	44	61.7	
92CL0049	92.0	42	57.9	
92CL0054	90.3	43	59.5	
90CLO138	111.3	16	54.9	
Hiller	119.9	3	58.1	
Nursery Ave.	103.3		60.6	
1995 - Moro				
Line/Variety	Yield	Rank In	Stand ¹	
	bu/acre	Nursery	%	
Stephens	58.9	11	70	
Tres	59.0	10	60	
92CL0049	57.4	15	70	
92CL0054	59.4	8	70	
90CLO138	47.1	49	40	
Hiller	56.7	16	30	
Nursery Ave.	55.5	-	55	
1995 - Corvallis				
Line Or	Yield	Rank In	Plant	Lodg-
Variety		Nursery	Heigh	ing ²
	bu/ac		t	%
			cm	
Stephens	85.1	21	42	0
Tres	32.1	46	41	99
92CL0049	105.0	1	42	0
92CL0054	65.3	34	41	99
90CLO138	18.6	50	43	99
Hiller	51.6	39	40	70
Nursery	74.8	-	-	37
Ave.				

1. Stand percent based on percentage of full stand.
2. Lodging percent based on portion of plot that lodged.

sistance that will eliminate the need for fungicide applications. This combination will make it possible for growers to take advantage of premiums without suffering a

yield loss or spending more on pesticides. Quality data for the two potential releases and quality checks are shown in Table 2. The check varieties are considered by the milling and baking industry to be standards by which to measure new varieties, and performance inferior to that of the checks is not acceptable. Given the nature of the wheat markets today, a cultivar must at least equal the checks in all areas and exceed them in some, or it should not be released.

As a part of the statewide wheat breeding program, the club wheat program is benefiting from the combined efforts of the two staffs. With both programs under the direction of one person, there have been efficiencies of location, allowing the club program personnel to assist with notetaking, planting, harvesting, and plot maintenance with shared labor and equipment at sites in eastern Oregon. The common wheat program quality lab has tested early generation club wheat lines, allowing the elimination of those that do not meet the most basic quality standards of protein and hardness. The F1 generation is sent to Corvallis, where selected crosses in a greenhouse crossing program improve the chances of obtaining target characteristics.

The club wheat program has gained another environment to test its material, as the two programs now share the Barnett-Rugg site five miles east of the Columbia Basin Agricultural Research Center (CBARC). This location typically receives more rainfall than the CBARC, and has pre-seeding irrigation capabilities, providing the opportunity for improved plant development, even in dry years. The site should allow selections to be made based on yield potential and plant development under improved stand establishment and higher rain-

fall conditions. The CBARC and the Sherman County Experiment Station will remain the primary locations for testing efforts, as those two locations typify the environmental conditions of the majority of the wheat production acreage in Oregon and Washington.

The club wheat program seeded 6.6 acres of early generation headrows, yield trials, and disease screening nurseries at the Columbia Basin Agricultural Research Center, 1.7 acres of yield trials at the Sherman County Experiment Station, and 4.9 acres of early generation headrows and yield trials at the Barnett-Rugg site between September 7, 1995 and October 27, 1995. The early generation headrow nurseries previously seeded at the Sherman County Experiment Station have been discontinued. Growing conditions there often limit growth and mask characteristics that are essential to selecting productive club wheat lines when selection is based solely on plant morphology.

Russian wheat aphid (RWA) seedling screening tests continue at the CBARC. Vicky Correa manages populations of pure Russian wheat aphids and tests material for resistance to aphid feeding damage using a seedling test. Materials are scored using a 1 (resistant) to 3 (susceptible) scoring system. A "1" is characterized by seedlings with flat leaves and little or no chlorosis. A seedling with flat leaves containing small chlorotic areas covering 5 to 10 percent of the leaf is a "2." A "3" indicates a plant with rolled leaves and greater than 80 percent chlorosis and necrosis. A total of 14 common wheat lines were tested for RWA resistance. Two lines scored 1, two lines scored 2, and the remainder scored 3. One hundred and sixty three club elite and ad

vanced lines were tested, with six lines scored 2 and the remainder scored 3. Of the six, two remain in the program for further testing as potential new varieties, while the others will be used as crossing material. A majority of the germplasm with RWA resistance that is available for crossing is hard red, and the plant types do not have the height and straw strength characteristics conducive to performance in the PNW. It is encouraging to find adapted lines with tolerance to aphid infestation.

The club wheat program continues to cooperate in the Statewide Cereal Testing Program by planting, taking notes, and harvesting five locations in cooperation with farm operators and Experiment Station personnel. This relationship directly benefits the club wheat program by increasing the interaction with producers and other people in the industry through field tours. These interactions allow the program to stay abreast of the immediate concerns of area producers and provides guidance for future efforts.

The 1995 crop year was an excellent year for grain production, as spring rains pushed yields in trials as high as 141 bushels per acre for a club line in a non-replicated trial, and Rohde as high as 124 bushels per

acre in a replicated trial. A common line in the Western Regional White Winter Wheat Trial was best in the nursery at 131 bushels per acre. The year was also characterized by significant infestations of cheatgrass at all locations. Erosion at the Sherman Experiment Station damaged and mixed plots to the extent that data accuracy from that location was questionable. Early generation headrows seeded the first week of November 1994, at the CBARC emerged poorly and were so heavily infested with cheatgrass that selections were often based on the fact that plants existed rather than plant morphology.

Trials were seeded into excellent moisture conditions in fall 1995, and stands are good to excellent at all locations. Early generation headrows and yield trials were

seeded closer to the normal time frame for each location than in the 1994-1995 season, which should give the lines an opportunity to make the best use of what nature provides over the next few months. Thanks to the continued support of the wheat growers of Oregon through the Wheat Commission, this program continues to strive to produce club wheat varieties that are profitable for producers and desirable to the milling and baking industry.

Table 2. Club Wheat Quality Data

Line Or Variety	Test Weight ¹		Flour Yield ²		Whole Grain Protein ³		Cookie Diameter ⁴		Cake Volume ⁵	
	----lbs/bu----		----%-----		----%-----		----cm-----		----cc-----	
	1993	1994	1993	1994	1993	1994	1993	1994	1993	1994
Pendleton										
92CL0049	57.4	58.5	74.5	72.2	6.1	9.4	9.21	8.44	1420	1350
Paha ⁶	59.7	58.5	74.1	72.8	6.2	8.5	9.25	8.89	1385	1365
92CL0138	54.9	57.1	74.4	72.2	6.8	9.3	9.09	8.70	1410	1385
Moro										
92CL0049	58.7	56.4	75.3	73.2	6.2	8.1	9.26	8.60	1370	-
Paha	60.1	58.3	72.4	73.1	6.4	8.0	9.44	8.74	1405	-
92CL0138	58.7	54.6	74.7	73.3	7.6	8.1	9.18	8.82	1390	-

Line Or Variety	Test Weight		Flour Yield		Whole Grain Protein		Cookie Diameter		Cake Volume	
	----lbs/bu----		----%-----		----%-----		----cm-----		----cc-----	
	1993	1994	1993	1994	1993	1994	1993	1994	1993	1994
Pendleton										
92CL0054	60.0	61.9	72.4	75.1	7.2	8.4	9.21	8.85	-	1270
Paha	60.1	60.4	71.6	74.1	7.3	8.1	9.36	8.93	-	1365
Tres	60.6	-	68.6	-	7.4	-	9.21	-	-	-
92CL0099	59.9	60.9	72.5	75.2	6.8	8.6	9.49	8.99		1365
Moro										
92CL0054	60.5	58.6	70.7	74.1	7.1	6.9	9.06	8.86	1330	-
Paha	61.1	58.7	70.2	73.8	7.4	7.3	9.71	9.04	1325	-
Tres	62.0	-	71.5	-	7.6	-	9.24	-	1255	-
92CL0099	61.5	57.5	72.3	72.7	7.2	7.2	9.40	9.27	1290	-

1. Test weight should be 58 pounds per bushel or higher.
2. The higher the flour yield the better. Based on percent of flour returned from the amount of wheat milled.
3. The whole grain protein target range is from 6.5 to 8.5.
4. The larger the cookie diameter, the better (units are in centimeters - 1 inch = 2.54 centimeters).
5. The larger the cake volume the better (units are in cubic centimeters).
6. Paha is the quality standard for club wheats, and new varieties must meet or beat its performance.