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CLUB WHEAT BREEDING PROGRAM

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The Club Wheat Breeding Program is based in Pullman, WA at the USDA-ARS Wheat Genetics, Quality, Physiology, and Disease Research Unit. Kimberly Garland Campbell is head of the club wheat breeding and coordinator of the Western Regional Variety Nurseries. Dr. Campbell replaced Dr. Jim Anderson as USDA-ARS geneticist in July of 1999. In March of 1999, Scott W. McDonald became the coordinator of the breeding efforts in Pendleton, replacing Karen Morrow (who resigned in October 1998) and interim coordinator Lisa Patterson.

In the fall of 1998, the Club Wheat Breeding Program planted materials at four locations (Pendleton, Echo, Lexington, and Moro) in Northeastern Oregon. The Pendleton and Moro sites contained the majority of the yield trials. Additional early generation breeding lines were included in the fall 1999 plantings at the Pendleton station for the purpose of developing cultivars suited for the environmental conditions unique to the lower Columbia Basin.

The crossing program is using the resources available at both Pendleton and Pullman to improve disease resistance, agronomic characteristics, and yield. Crossing and evaluation of growth habit was done in the greenhouse located at the Columbia Basin Agricultural Research Center (CBARC) during the winter of 1999-2000. Two hundred crosses were made to provide F_1 seed for additional crosses that will be done in Pullman during the summer of 2000. Two specific objectives of these crosses are to incorporate a new dwarfing gene into the germplasm which does not adversely affect coleoptile length and to add two leaf rust resistance genes.

A spring club breeding project started by Dr. Pam Zwer, former club wheat breeder at CBARC, was revived in the fall of 1999 with F_1 crosses that were made be Dr. Zwer. F_2 seed will be planted into headrows in the spring of 2000 to determine adapted types and to make selections of promising germplasm.

The absence of a spring club variety limits grower options. In years when winter-kill is a problem, spring clubs could be planted to fill in bare patches in winter club wheat fields. They also could be used in conventional rotations where common spring wheats are planted, or they can be used in direct seeding applications. Additional crosses will be made as these spring club lines are advanced through the breeding program.

In conjunction with the spring clubs, work has been started to determine growth habit (facultative or winter) of the breeding lines presently in the club wheat breeding program. Facultative wheats (winter wheats that do not have a vernalization requirement) may be used in the breeding of either spring or winter club wheats. Facultative types provide growers with alternatives by allowing for early planting in late winter or early spring as conditions in the field become favorable. These greenhouse efforts will provide material and information useful

for the improvement of all wheat types grown in the Pacific Northwest.

Presently, a number of advanced breeding lines have shown promise for future release (Tables 1and 2). Of these lines, WA7853 and WA7855 are of the greatest interest because of their yield potential, disease resistance, and end use quality. Recent club releases (Coda, Temple) have shown good potential for high yield, disease resistance, and milling quality. Breeding lines 93CL0081 and 95CL0156 still need further observation but have good qualities that are desirable for variety release. Also, the common wheat line A96105 has shown some potential for release because of its ability to emerge well from deep seeding.

In the future, the Club Wheat Breeding Program will be doing strawbreaker foot rot (*Pseudocercosporella herpotrichiodes*) disease screenings at Pendleton. These screenings will help ensure that all wheats developed in this program will contain foot rot resistance. Stripe rust resistance continues to be a priority. Breeding of lines that have resistance to diseases associated with direct seeding, such as pythium, also will be initiated. Hessian fly resistance screenings will be conduced on material sent to the USDA lab in Indiana.

The Club Wheat Breeding Program continues its goal to produce cultivars that are productive for the grower and are of superior quality for various end uses. Though many changes have taken place in the past few years, the focus of the program has remained constant. With the infusion of new ideas, it is better prepared to fulfill these goals.

Table 1**.** Club wheat yields for three locations in Oregon, 1999.

Variety or line	Pendleton* bu/acre	Moro* bu/acre	Hermiston* bu/acre	Average yield bu/acre	Test Weight Avg lb/bu
MORO	53.0	46.4	39.0	49.3	58.7
PAHA	61.8	52.3	73.7	66.1	60.4
TRES	70.2	54.1	72.2	68.3	59.7
RELY	76.0	59.5	75.3	74.3	59.9
ROHDE	69.7	63.7	75.0	70.3	61.7
HILLER	88.1	73.4	74.4	81.5	59.1
CODA	86.6	59.9	85.1	84.5	60.8
TEMPLE	71.0	52.1	70.5	70.5	60.2
WA7855	76.4	60.1	85.2	82.2	59.2
A9647	73.5	55.4	72.7	72.6	58.4
A9655	78.3	57.6	67.4	73.3	59.7
A9658	78.6	57.7	86.4	77.5	59.2
92CL0003	79.4	59.3	85.9	78.6	59.4
92CL0007	83.4	62.8	70.6	72.3	61.4
93CL0081	89.5	58.7	78.8	81.8	61.0
95CL0156	74.6	64.3	103.4	86.1	59.6
A96139	88.8	59.7	78.7	81.1	60.7
A96148	78.9	56.1	75.2	75.9	59.0
A96158	84.0	52.4	85.9	81.1	58.8
A96173	85.6	63.3	88.9	84.7	60.0
A96191	81.5	57.0	86.8	80.9	58.7
A96236	85.2	56.9	71.1	76.6	59.4
A96246	83.2	59.9	80.5	84.5	60.4
A97119	67.4	61.9	95.1	81.2	59.2
A97123	80.2	65.1	81.9	79.7	59.0
95CL0054	81.5	64.4	75.5	76.2	58.4
95CL0336	75.9	63.6	84.8	77.1	58.5
96CL0020	82.2	65.1	83.0	79.1	58.2
96CL0025	79.6	70.9	99.6	83.9	59.6
96CL0101	80.9	63.5	108.0	88.8	58.5
96CL0108	74.5	62.2	96.4	81.0	56.0
ELTAN	91.0	62.3	79.2	80.6	60.6
ROD	87.8	59.2	87.3	85.0	59.9
MADSEN	83.0	69.7	73.0	77.4	60.1
STEPHENS	72.0	66.1	75.8	72.2	59.7
A96105	76.4	57.4	83.1	78.7	59.1
WA7853	84.5	61.2	81.1	79.4	61.0
A96277	85.7	65.9	84.1	82.5	61.2
Avg	78.9	60.5	80.8	77.8	59.6
CV	10.1	8.4	8.2		
LSD	13.0	8.2	10.7		
Min	53.0	46.4	39.0	49.3	56.0
Max	91.0	73.4	108.0	88.8	61.7

* Moro and Pendleton are dryland and Hermiston is irrigated.

Table 2. Club Wheat Elite disease and hardiness scores.

Variety or line	Plant Height	Heading Date	% Lodging in strawbreaker screening	White Heads	Physiological Leaf spot 1-5 scale	LT50 - Cold Hardiness*
	Inches	Start Jan. 1	lower = better	low=better	low=better	low=better
MORO	36	159	50	2.0	1.0	-11.65
PAHA	35	162	31	2.0	1.0	
TRES	33	162	49	2.0	1.0	-12.19
RELY	35	161	23	2.0	1.0	-13.17
ROHDE	33	157	15	1.8	1.7	-10.73
HILLER	33	160	26	2.2	1.0	
CODA	34	161	0	2.3	1.0	-11.21
TEMPLE	34	157	0	2.3	1.3	-12.88
WA7855	33	162	0	2.0	1.0	-14.88
A9647	34	160	0	2.2	1.3	-13.31
A9655	32	160	0	2.8	1.7	-12.87
A9658	34	162	1	2.5	1.7	-13.55
92CL0003	34	155	1	2.0	1.3	-12.59
92CL0007	32	157	0	2.2	3.0	-14.04
93CL0081	33	160	6	2.3	1.0	-15.08
95CL0156	33	163	0	1.3	2.0	-15.07
A96139	33	160	0	1.7	1.0	-12.46
A96148	35	159	3	2.0	1.0	-11.17
A96158	34	161	2	2.0	1.0	-14.36
A96173	32	161	1	2.0	3.7	-12.97
A96191	34	161	14	2.2	1.3	-12.51
A96236	35	163	1	2.8	1.0	-11.36
A96246	35	159	32	2.0	1.0	-12.64
A97119	33	163	0	2.7	1.0	-14.85
A97123	35	160	0	2.8	1.0	-13.61
95CL0054	35	161	0	2.3	1.0	-13.41
95CL0336	33	164	1	2.7	1.3	-13.57
96CL0020	28	164	0	3.0	2.0	-9.96
96CL0025	32	161	0	3.2	4.7	-9.54
96CL0101	29	162	1	3.0	2.0	-11.44
96CL0108	27	163	1	3.0	2.0	-9.96
ELTAN	34	164	66	1.0	1.0	-17.92
ROD	31	161	48	2.0	2.3	-11.89
MADSEN	32	159	6	2.0	2.7	-12.14
STEPHENS	32	156	4	2.2	4.0	-11.99
A96105	34	164	0	1.7	3.3	-14.06
WA7853	34	163	0	2.0	1.3	-11.04
A96277	33	157	1	1.8	4.3	-12.31
Avg	33	161		2.2	1.7	-12.7
CV	5				34.0	
LSD	3				1.0	
Min	27	155		1.0	1.0	
Max	37	164		3.2	4.7	

* Hardiness is determined by applying a numerical value to a visual assessment. This results in a value that is somewhat subjective but gives some indication a lines merit in the breeding program.