

Wheat Research Progress Report - Final

Project #: 3019-6194

Title: Field Breeding Soft White Winter Wheat

Researchers: SS Jones, SR Lyon, KA Balow, MA Gollnick

Progress Report Year: 2008

Goal: Development of improved varieties of soft white winter wheat. We seek to improve the sustainability of wheat production in the state through the use of increased genetic diversity, utilization of wild wheat germplasm and through changing the wheat plant itself to function better in more sustainable systems. The current team of scientists and technicians are committed to utilizing all appropriate technology encompassing genetics, molecular biology, gene transfer technology, physiology, pathology, agronomy, and breeding to develop superior winter wheat cultivars and germplasm.

Objectives:

- Improve grain yield and yield stability.
- Develop soft white winter wheat with combined disease resistances.
- Place an equal emphasis on standard height lines as on semidwarfs to meet the needs of the lower rainfall areas (e.g. emergence, disease resistance, etc.)
- Improve the end-use quality of our clubs and commons.

Accomplishments:

Xerpha was the highest yielding soft white winter (SWW) entry in the WSU Extension Uniform Variety Testing (VT) Program's Soft White winter wheat trials for 2008. This is the third consecutive year that Xerpha has topped the mean grain yield for Washington, out-yielding 48 other varieties, breeding lines and blends from 10 different breeding programs averaged across 19 locations.

Masami, in just its second year of commercial production, continues to rank as one of the top 10 varieties statewide and has the highest 2, 3 and 5 year average at the Ritzville VT location. Masami also constantly performs extremely well in the Oregon State Winter Elite Yield Trials.

Bruehl, released from this project in 2002, was the top white club variety in the state for the 7th straight year. It was produced on over 72% of the club acres in 2008 (2008 WA Ag Stats) which is nearly 3 times as many acres as all the other clubs in the state combined.

Soft white winter (SWW) wheat experimental breeding lines were field tested at the following breeding trial locations: WSU Lind Experiment Station, Lind, WA; Jim Moore, Kahlotus, WA; Adelbert and Neil Jacobsen, Waterville, WA; Jason Tanneberg, Mansfield, WA; Keith and Owen Jorgensen, St. Andrews, WA; Mark Schoesler, Ritzville, WA; Ross Druffel, Colton, WA; Randy Suess, Steptoe, WA; USDA Central Ferry Research Station, Pomeroy, WA; and Spillman Agronomy Farm, Pullman, WA. In addition, five elite lines (WA008062, WA008063, WA008064, WA008065 and WA008066) were entered into the WSU Extension Uniform Cereal Variety Testing (VT) Program's soft white winter wheat nursery and tested at 19 Variety Testing locations in Washington. We also collaborated with various public and private

breeding programs that tested our most elite breeding lines at multiple sites in Washington, Idaho, Montana, Oregon, and California.

Approximately 200 SWW advanced breeding lines were tested in replicated yield trials and thousands of SWW early generation breeding lines were field tested for general agronomic traits, stand establishment, disease resistance, and adaptability. All advanced breeding lines were tested under severe natural eyespot foot rot at Spillman Agronomy Farm, Pullman, WA. Stripe rust appeared late in the growing season and had minimal, if any effect on grain yield and test weight. Several advanced lines were evaluated by Dr. T.D. Murray at the Palouse Conservation Farm, Albion, WA in inoculated field trials for lines we developed with resistance to *Cephalosporium* stripe and eyespot foot rot. Dr. X. Chen evaluated 88 advanced soft white breeding lines at Pullman and Mt. Vernon under natural infection for stripe rust, leaf rust, powdery mildew and physiological leaf spot. All of the breeding lines planted at the Lind Experiment Station were evaluated for emergence under low soil moisture conditions in the fall of 2007.

Two snow mold nurseries were planted in Douglas County in 2007; both sites received minimal snow mold damage.

Approximately 250 individual SWW advanced breeding lines, some from multiple locations, were submitted to the Western Wheat Quality Lab, Pullman, WA for milling and baking quality analysis.

Table 1. 2007/2008 Soft White Winter Wheat breeding lines planted and harvested.

Nursery	Location	# Entries
Variety Testing Soft	19 VT Soft White Winter Wheat	5
Advanced Soft White 1	Pullman (2), Colton, Steptoe, Kahlotus, Lind, Ritzville, Waterville, Mansfield, C.F., St. Andrews, St. John	25
Advanced Soft White 2	Lind, Pullman, Central Ferry	15
Competition nursery	Pullman, Colton	16
Finch/Eltan SSD	Pullman, Lind, Central Ferry	25
VO96410/WPB470 SSD	Pullman, Lind, Central Ferry	30
Finch/Masami SSD	Pullman	252
Mohler/Finch SSD	Pullman	254
Tubbs/Finch SSD	Pullman	222
WA007917/Lewjain SSD	Pullman	60
Bruehl/Chukar BC1F2	Pullman	146
F2 plots	Pullman	1219
F5 Evolutionary bulk strips	Lind, Pullman, Kahlotus, Central Ferry	10
F3 Head rows	Pullman,Lind	4128
F4 Head rows	Pullman, Lind	2080
F5 plots	Pullman, Lind	199
F6	Pullman, Lind	90

Results:

Xerpha received formal release status in 2008 at the Cereal Variety Release Committee annual meeting.

Xerpha is named in honor of Dr. Xerpha Gaines, WSU botanist and wife of Dr. E. Gaines, former WSU wheat breeder. Xerpha is a SWW wheat with excellent yield stability across all rainfall zones (Table 3) and has excellent disease resistance, winter hardiness, and quality attributes. The Washington State Crop Improvement Association sold all the Foundation seed of Xerpha they produced (nearly 400,000 lbs).

WSU soft white winter (SWW) entries in the WSU Extension Uniform Cereal Variety Testing (VT) Program SWW wheat nursery generally performed extremely well this year. The 2008 VT SWW nursery included 49 entries from 10 different public and private programs. WA8065 and WA8064 topped the Moses Lake VT irrigated nursery at 193 and 192 bu/a, respectively. Xerpha was the #1 yielding variety statewide by 5.9 bu/a, almost 3 LSD's more than the #2 variety. The WSU winter wheat program had the #1 variety at 8 of the 19 VT SWW locations in 2008 and also had from two to four breeding lines in the top ten yielding entries at 17 of the 19 SWW VT locations.

Table 2. 2007/08 planting and harvesting dates.

Location	Date planted 2007	Date harvested 2008
Central Ferry	October 23	July 17
Colton	September 25	August 18
Kahlotus	August 27	July 15
Lind	August 30-31	July 22-25
Mansfield	August 22	August 5
Pullman	Sept.2 - October 25	August 7 – Sept. 2
Ritzville	August 27	July 24
St Andrews	August 22	August 5
Steptoe	September 24	August 18
Waterville	August 22	August 5

Table 3. 2008 mean yield (bu/a) of Xerpha, Tubbs, Madsen and Eltan.

Precip. zones	<12"	12-16"	16-20"	>20"	Irrigated	Statewide Mean
# locations	4	5	5	4	1	19
Xerpha	38.0	84.5	118.9	123.6	188.6	97.4
Tubbs06	33.2	73.2	103.0	108.9	187.0	86.1
Madsen	31.6	73.0	98.3	96.7	174.4	81.3
Eltan	38.0	79.4	98.5	117.3	161.8	88.0

Table 4. 2008 Advanced Soft White breeding lines dryland mean yields.

Variety #	Kahlotus		Ritzville		Lind		Dryland Mean	
	Yield	T wt	Yield	T wt	Yield	T wt	Yield	T wt
J980218-6	52.1	59.3	33.0	57.7	31.0	60.1	38.7	59.0
F/E-37	51.7	60.0	28.9	57.2	30.2	60.6	36.9	59.3
WA8063	52.0	60.8	30.1	59.5	28.0	62.0	36.7	60.8
F/E-35	53.5	60.2	25.4	56.3	31.1	60.3	36.7	58.9
Xerpha	49.2	59.6	31.7	58.5	28.9	59.6	36.6	59.2
V/W-51	56.6	62.6	27.2	60.5	25.5	61.5	36.4	61.5
WA8065	53.8	60.9	30.3	58.6	23.9	61.5	36.0	60.3
V/W-32	53.4	59.7	23.5	56.0	30.7	59.6	35.9	58.4
Finch	51.9	59.6	23.6	56.7	28.7	60.8	34.7	59.0
Bruehl	49.0	58.7	23.8	56.2	31.3	59.0	34.7	58.0
WA8064	52.1	61.2	24.2	59.2	27.2	62.3	34.5	60.9
V/W-46	48.0	62.2	25.8	61.2	29.4	61.7	34.4	61.7
JSDM034	52.3	61.4	23.0	58.0	27.7	60.5	34.3	60.0
WA8066	51.8	60.7	24.9	58.0	24.2	60.4	33.6	59.7
V/W-29	49.6	60.3	26.1	56.9	25.1	61.4	33.6	59.5
Eltan	44.8	59.3	24.8	57.2	31.1	60.7	33.5	59.0
V/W-18	52.3	61.0	24.0	60.6	24.2	61.6	33.5	61.0
Madsen	49.1	60.7	22.8	56.5	27.5	59.4	33.1	58.9
Masami	47.8	59.5	23.2	58.1	27.6	60.0	32.9	59.2
F/E-71	46.8	59.6	21.6	57.0	30.2	61.0	32.9	59.2
F/E-64	47.2	59.7	25.5	56.8	25.9	61.2	32.9	59.2
Tubbs06	44.3	58.4	21.1	55.8	31.5	58.9	32.3	57.7
V/W-16	46.7	61.3	23.4	60.3	26.3	62.1	32.2	61.2
V/W-30	44.4	58.7	24.2	57.3	27.4	60.3	32.0	58.8
F/E-4	51.1	59.1	20.8	57.5	21.9	60.7	31.3	59.1
Mean	50.1	60.2	25.3	57.9	27.9	60.7	34.4	59.6
CV%	12.7	1.3	18.4	1.5	19.7	1.1	37.7	2.7
LSD @.1	8.9	1.1	6.6	1.2	9.0	1.1	11.1	1.3

Table 5. 2007 Advanced Soft White breeding lines high rainfall mean yields.

Variety #	Step toe		Colton		P23.5 foot rot		P18.8		High precip. mean	
	Yield	T wt	Yield	T wt	Yield	T wt	Yield	T wt	Yield	T wt
J980218-6	103.6	58.9	145.3	58.3	113.9	61.4	88.7	60.5	112.9	59.7
V/W-29	115.5	62.3	134.7	61.1	117.9	62.3	79.5	63.3	111.9	62.2
F/E-35	97.8	58.7	130.2	57.3	129.1	62.4	89.6	62.2	111.7	60.2
Finch	102.4	59.4	146.9	58.7	113.4	61.9	82.1	61.0	111.2	60.2
F/E-64	107.7	61.2	134.9	60.1	114.9	62.1	85.5	62.6	110.7	61.5
Xerpha	104.2	60.7	135.3	59.8	118.6	61.1	84.1	61.2	110.5	60.7
V/W-30	102.0	62.2	145.6	62.1	111.5	62.1	81.7	62.8	110.2	62.3
F/E-37	97.1	59.4	135.2	57.6	116.2	61.8	86.0	62.2	108.6	60.2
Bruehl	95.4	58.1	131.5	57.2	125.8	59.8	81.1	60.5	108.4	58.9
V/W-51	95.3	61.9	128.8	61.7	132.1	62.5	76.4	63.0	108.2	62.3
V/W-32	93.8	61.5	133.0	61.8	119.9	62.1	79.9	63.1	106.7	62.1
Tubbs06	99.6	59.6	127.4	58.8	126.4	59.9	72.7	59.5	106.5	59.4
F/E-71	99.6	61.1	140.0	61.0	104.4	62.1	81.3	62.1	106.3	61.5
F/E-4	94.3	60.8	132.0	60.6	125.1	62.9	72.4	62.6	105.9	61.7
V/W-46	92.5	62.6	129.7	62.3	123.5	62.8	70.4	63.0	104.0	62.7
WA8065	105.2	61.7	122.2	61.3	113.4	62.0	72.0	62.0	103.2	61.7
Masami	98.2	60.1	123.6	59.1	118.5	60.2	71.1	60.5	102.8	60.0
WA8066	100.5	61.1	121.5	60.1	111.0	62.6	71.9	62.1	101.2	61.5
V/W-16	89.0	61.4	125.8	60.7	114.8	60.2	73.8	62.3	100.8	61.1
Eltan	91.4	58.5	132.5	59.2	92.4	61.4	85.4	61.7	100.4	60.2
V/W-18	87.4	61.7	126.5	60.8	114.7	60.6	71.8	62.4	100.1	61.4
JSDM034	90.3	60.9	116.8	59.5	111.9	62.0	81.1	62.4	100.0	61.2
Madsen	90.7	59.4	129.3	59.6	99.9	59.1	75.2	59.5	98.8	59.4
WA8063	86.6	61.1	115.7	60.7	100.2	59.5	72.8	61.7	93.8	60.7
WA8064	80.4	61.0	114.7	59.9	108.4	59.8	66.0	61.5	92.4	60.5
Mean	96.8	60.6	130.4	59.2	115.1	61.4	78.1	61.8		
CV%	12.2	1.2	8.1	2.1	11.6	1.6	11.6	1.2		
LSD @.1	16.7	1.0	14.8	1.8	18.8	1.4	12.8	1.1		

The following tables are partial summarized results from preliminary yield trials comparing the top breeding lines to the check varieties.

2007/08 Advanced White Yield 2

	Lind			Pullman		
	Yield	T wt	Rank	Yield	T wt	Rank
Bruehl	28.0	58.8	4	87.7	60.0	1
6J020210-1	30.5	58.2	2	83.0	58.5	3
J010039-1	27.5	60.1	6	84.2	61.1	2
Xerpha	34.4	59.9	1	77.4	61.2	7
Eltan	30.4	60.6	3	78.4	62.1	6
6J020219-4	25.5	59.8	9	80.1	61.4	4
Chukar	27.6	58.5	5	75.5	60.8	9
J010049-2	24.4	59.6	13	78.6	61.9	5
J010049-1	26.5	60.0	7	73.3	62.1	11
6J020187-2	24.5	58.8	12	75.6	60.4	8
J010038-4	25.8	61.2	8	69.9	61.9	13
Madsen	25.1	59.5	11	70.6	59.3	12
6J020219-3	23.5	56.8	14	74.1	60.2	10
3BPL204	25.2	58.7	10	61.8	60.6	15
6J020219-1	20.2	56.9	15	68.1	59.9	14

2007/08 F6 Breeding Nursery

	Lind			Pullman		
	Yield	T wt	Rank	Yield	T wt.	Rank
5J030662-6	28.1	60.1	2	92.8	62.7	1
5J030662-4	17.6	59.5	40	92.6	62.5	3
Eltan	17.3	59.8	41	90.6	61.8	4
5J030587-1	20.8	59.5	24	87.8	62.1	7
Finch	24.9	59.8	9	86.8	61.9	8
5J030648-4	22.9	60.6	16	85.4	61.7	9
5J030570-2	19.0	61.1	34	84.9	62.9	10
Xerpha	22.4	59.6	20	84.4	62.0	11
5J030750-1	34.5	61.0	1	71.6	59.9	29

2007/08 Finch/Eltan SSD

	Lind			P18.10			P23.5		
	Yield	T.Wt	Rank	Yield	T.Wt	Rank	Yield	T.Wt	Rank
WA8066	24.1	60.5	19	88.4	62.6	3	131.4	63.3	1
Finch/Eltan SSD-39	23.8	60.4	21	90.4	62.0	1	129.5	62.9	3
Finch/Eltan SSD-57	28.2	60.7	9	87.5	62.3	4	129.5	62.8	2
Finch/Eltan SSD-111	29.1	60.7	6	82.2	61.9	8	125.4	63.0	5
Finch/Eltan SSD-56	26.4	60.6	15	82.9	62.1	6	121.7	62.2	8
Finch	28.5	59.7	8	79.8	61.8	11	110.5	61.3	13
Finch/Eltan SSD-37	33.8	59.9	1	68.6	62.0	21	117.8	62.4	9
Eltan	30.1	60.3	3	67.7	61.2	23	94.2	61.4	24

2007/08 V96410/WPB470 SSD

	Lind			P18.10			P23.5		
	Yield	T.Wt	Rank	Yield	T.Wt	Rank	Yield	T.Wt	Rank
Xerpha	23.3	58.9	3	83.9	61.8	6	139.1	61.3	1
VO96410 x WPB470SSD-26	16.7	60.8	28	89.3	62.4	3	134.1	62.8	5
VO96410 x WPB470SSD-18	21.5	61.3	8	83.6	62.4	7	135.3	61.1	4
VO96410 x WPB470SSD-29	15.8	59.6	29	96.2	63.3	1	127.7	63.3	10
VO96410 x WPB470SSD-22	15.0	60.1	30	85.7	62.4	5	130.1	62.7	7
VO96410 x WPB470SSD-57	25.9	61.1	1	87.7	61.0	4	126.9	60.9	11
VO96410 x WPB470SSD-5	18.8	60.2	20	81.6	62.4	9	129.2	62.5	8
VO96410 x WPB470SSD-47	21.4	61.7	9	79.5	63.1	13	133.0	63.9	6
VO96410 x WPB470SSD-50	22.6	61.8	4	78.3	62.8	17	135.9	63.0	3
Finch	18.1	59.2	24	73.1	61.9	25	136.1	62.2	2
Eltan	21.3	59.8	10	82.1	61.9	8	115.1	60.8	27

**WA7917 x Lewjain SSD - 60entries, 4 reps
2007/08
Lind**

	Emerge	Yield	T.Wt	Rank
SSD060532	7.5	35.2	60.0	1
SSD060530	8	34.8	60.9	2
SSD060522	5.5	31.7	60.7	3
SSD060536	7	31.6	61.0	4
SSD060537	6.5	29.9	60.6	5
SSD060549	4.5	27.8	60.0	6
SSD060550	5	27.2	60.4	7
Xerpha	3	26.5	58.5	10
Eltan	1	19.9	61.0	24
Finch	1	15.1	59.6	38

emergence 0-9, 9 best

Other 2007/08 SSD's (Pullman and Lind)

	# entries	
	2008 - 2 reps	2009 - 4 reps
Mohler/Finch	180	30
Tubbs/Finch	222	25
Finch/Masami high/low	252	30/30

We currently have six other SSD projects in the field.

Progress:

Xerpha has met most, if not all of the objectives for SWW varietal development. It is interesting to note that in 2006 Xerpha was the top yielding breeding line in all of our advanced breeding nurseries. Today, just three years later, Xerpha seldom tops any of our breeding nurseries. We now have numerous lines with diverse pedigrees that consistently out-yield Xerpha. We are advancing these lines as rapidly as possible towards full release status.

A conservative economic analysis using \$5/bu wheat showed that if Xerpha was available this past year, it could have added an additional \$35M to the farmers in Washington.

Significant progress has also been made in the following projects within our SWW/HRW breeding programs (see Publications and Presentations):

- Increasing wheat productivity through diversity. We proved grain yield can be significantly increased by blending just 5% of a taller variety. We are now testing “designer blends” to determine which varieties work best together in specific precipitation zones. A Ph D candidate has been assigned this project.
- Reduced/ low inputs. We are studying which varieties are best adapted to perform well under low input systems and which phenotypic traits enhance this ability. Weed

suppression ability and harrowing tolerance are examples of two areas we are examining. We are also studying strong gluten wheats to determine if high milling and baking quality attributes can be maintained at lower protein levels.

- Increasing the nutritional value of wheat. We proved many historical varieties have higher mineral nutrient content than our modern ones. Work is being done to recapture this “value-added” component.
- Nitrogen use efficiency (NUE). We are working on making modern wheats more efficient in capturing available nitrogen.
- Developing wheats specifically for emergence from deep planting. We are breeding wheats to eliminate emergence as an issue for growers.
- Designer/participatory wheat. We are working with growers, allowing them to select the plant ideotype they feel will work best for their precise location and then continue to select and advance those lines.

Publications and Presentations:

Publications:

2005

Jones S. and S. Lyon. 2005. Winter Wheat Improvement. p.23. *In* Burns, J. (ed), 2005 Field Day Abstracts: Highlights of research Progress. Extension, Washington State University, Department of Crop and Soil Sciences, Technical Report 05-1.

Jones, S., S. Lyon, K. Balow, M. Gollnick, M. Arterburn, K. Murphy, J. Dawson, J. Piaskowski. 2005. Winter Wheat Breeding, Genetics and Cytology. p. 27. *In* Burns, J. (ed), 2005 Field Day Abstracts: Highlights of research Progress. Extension, Washington State University, Department of Crop and Soil Sciences, Technical Report 05-1.

Jones, S. and T. Murray. 2005. Perennial Wheat as a Sustainable Alternative Cropping System. p.27-28. *In* Burns, J. (ed), 2005 Field Day Abstracts: Highlights of research Progress. Extension, Washington State University, Department of Crop and Soil Sciences, Technical Report 05-1.

Li, H.J., M. Arterburn, S.S. Jones and T.D. Murray. 2005. Resistance to eyespot of wheat, caused by *Tapesia yallundae*, derived from *Thinopyrum intermedium* homoeologous group 4 chromosome. *Theor Appl Genet.* 111: 932-940.

Lyon, S. 2005. 100 Years of Wheat from WSU. p.12-13. *In* Burns, J. (ed), 2005 Field Day Abstracts: Highlights of research Progress. Extension, Washington State University, Department of Crop and Soil Sciences, Technical Report 05-1.

Murphy K., D. Lammer, S. Lyon, B. Carter, S.S. Jones. 2005. Breeding for organic and low-input farming systems: An evolutionary-participatory breeding method for inbred cereal grains. *Renewable Agriculture and Food Systems* 20: 45-55.

Public Presentations and Abstracts:

Jones, S. and K. Murphy, November 2005. “Breeding Wheat for Organic Systems”, CSSA-ASA-SSSA, Salt Lake City, Utah

Jones, S. and K. Murphy, November 2005. “Participatory Breeding Program for Cereals”, CSSA-ASA-SSSA, Salt Lake City, Utah

Jones, S. and K. Murphy, December 2005. "Genetic assessment of the need for organic plant breeding programs in winterwheat (*Triticum aestivum*, L.)", 7th International Wheat Conference, Mar del Plata, Argentina.

Lyon, S. and K. Murphy, December 2005. "WSU Organic Wheat Breeding Program: Objectives and Results", Organic Grain Production Workshop, Spokane, Washington.

Lyon, S., February 2005. "Breeding Winter Wheat for Adams County", 6th Annual Research in the Dryland Cropping Area and Adams Conservation District Meeting. Ritzville, Washington.

2005 Field Day plot tours: Lind Field Day (9 June, 150 attended); St Andrews (8 June, 90 attended); Ritzville (13 June, 18 attended); Reardan (29 June, 55 attended); Connell (2 June, 47 attended); Spillman Field Day (7 July, 330 attended); Colton (13 July, 80 attended).

2006

Publications:

Dawson, J., S. Jones, D. Huggins. 2006. Developing Perennial-based Cropping Systems. P. 19. *In* Burns, J. (ed), 2006 Field Day Abstracts: Highlights of Research Progress. Extension, Washington State University, Department of Crop and Soil Sciences, Technical Report 06-1.

Glenna, L.L., M.A. Gollnick, S.S. Jones. 2006. Eugenic Opportunity Structures: Teaching Genetic Engineering at US Land-Grant Universities Since 1911. *Social Studies of Science*. Vol. 37 (2), pp. 281-296.

Jones, S.S. 2006. Plant Variety Protection (PVP) Certificate for Bauermeister (PV# 200600245).

Jones, S.S. 2006. Plant Variety Protection (PVP) Certificate for Masami (PV# 200600244).

Jones, S.S. 2006. Plant Variety Protection (PVP) Certificate for MDM (PV# 200600246).

Jones, S., S. Lyon, K. Balow, M. Gollnick, M. Arterburn, K. Murphy, J. Dawson, J. Piaskowski. 2006. Winter Wheat Breeding, Genetics and Cytology. p. 20. *In* Burns, J. (ed), 2006 Field Day Abstracts: Highlights of Research Progress. Extension, Washington State University, Department of Crop and Soil Sciences, Technical Report 06-1.

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Presentations:

International Plant Breeding Symposium: Breeding for enhanced mineral nutrient content in wheat. Mexico City, Mexico. August 2006.

Symposium on Sustainable Agriculture, Communities, and Environments in the Pacific Northwest: Participatory Wheat Breeding in the Pacific Northwest. Richland, WA. May 2006.

Symposium on Sustainable Agriculture, Communities, and Environments in the Pacific Northwest: Characterizing nitrogen use efficiency (NUE) in organic systems to improve performance in reduced input conditions. Richland, WA. May 2006.

Participatory Plant Breeding: Relevance for Organic Agriculture?

ECO-PB Conference (European Consortium for Organic Plant Breeding), Camon, France, June 11-13, 2006

Poster: Dawson, Julie, Kevin Murphy, Leland Glenna, Ray Jussame, and Stephen Jones. Evolutionary Participatory Wheat Breeding in Washington State (US).

European cooperation in the field of scientific and technical research Action 860, Sustainable low-input cereal production: Required varietal characteristics and crop diversity (SUSVAR). Workshop on cereal crop diversity: Implications for production and products. SUSVAR (COST860) Conference, Camon, France, June 12-15, 2006.

Poster: Dawson, Julie, Kevin Murphy, Julia Piaskowski, Matt Arterburn Steve Lyon, Kerry Balow, Margaret Gollnick and Stephen Jones. Increasing the diversity of wheat cultivars in Washington State (US).

ASA-CSSA-SSSA International Annual Meetings. Indianapolis, IN, Nov 12-16, 2006.

Poster: Seiter, Stefan, Michelle Wander, Heather Darby, Caron Gala and Julie Dawson. The Needs of Agroecosystem Research.

2006 Field Day plot tours: Lind Field Day (15 June, 130 attended); Horse Heaven (1 June, 15 attended); Ritzville (19 June, 30 attended); Reardan (29 June, 45 attended); Dayton (20 June, 35 attended); Fairfield (27 June, 20 attended).

2005-06 County Roundtable discussions: Franklin Co. (3/4/05, 19 growers attended), Whitman Co. (2/11/05, 7 growers attended), Adams Co. (11/18/05, 12 growers attended), Spokane, Co (5/31/06, 12 growers attended), and Benton Co (6/1/06, 11 growers attended).

2007

Publications:

Murphy, K., K. Balow, S. Lyon, S.S. Jones. 2007. Estimated response to selection, combining ability and heritability of coleoptile length in winter wheat. *Euphytica: The International Journal of Plant Breeding* (*in press*).

Murphy, K., S.S. Jones. . 2007. Relationship among phenotypic growth traits, yield and weed suppression in 63 spring wheat cultivars. *Field Crops Research*. 105 (1), p. 107-115.

Murphy, K., P. Reeves, S.S. Jones. 2007. Relationship between yield and mineral nutrient content in historical and modern U.S. spring wheat cultivars. *Plant Genetic Resources* (*in press*).

Dawson, J.C., K. Murphy, S.S. Jones. 2007. Decentralized selection and participatory approaches in plant breeding for low-input systems. *Euphytica: The International Journal of Plant Breeding*. Vol. 160 no. 2. pp. 143-154.

Murphy, K., A. Carter, R.S. Zemetra, S.S. Jones. 2007. Karyotype and ideogram analyses of four wheatgrass cultivars for use in perennial wheat breeding. *Journal of Sustainable Agriculture*. Vol.31 (1): 137-149. doi: 10.1300/J064v31n01_11.

Murphy, K., S.S. Jones. 2007. Genetic assessment of the role of breeding wheat for organic systems. In *Wheat Production in Stressed Environments: Proceedings of the 7th International Wheat Conference*, H.T. Buck, J.E. Nisi and N. Salomon, eds; Springer; pp. 217-222.

Jones, S.S., S.R. Lyon, K.A. Balow, M.A. Gollnick, T.D. Murray, X.M. Chen, C.R. Morris, K. Garland Campbell, J.W. Burns, W.F. Schillinger, P.E. Reisenauer, B. J. Goates. 2007. Registration of MDM Wheat. *Journal of Plant Registrations*. Vol. 1, No. 2, September - October.

Murphy K., K.G. Campbell, S. Lyon, S.S. Jones. 2007. Evidence for varietal adaptation to organic farming systems. *Field Crops Research*. Vol 102/3 pp 172-177. doi.10.1016/j.fcr.2007.03.011.

Presentations:

2007 Field Day plot tours: Lind Field Day (14 June, 160 attended); Connell (7 June, 50 attended); Ritzville (18 June, 10 attended); Mayview (June 19, 2007, 20 attended); Harrington (19 June, 30 attended); Lamont (9 July, 15 attended) Colton (10 July, 75 attended); Spillman (12 July, 150 attended).

Lyon, S. Moving Forward. 8th Annual Research in Dryland Cropping Area and Adams Conservation District Meeting. Ritzville, WA. "Breeding Wheat for Adams County" (February 6, 2007, 150 attended).

Murphy, K., J. Dawson, P. Reeves, S. Jones (2007). *Heritability and genotype x environment interactions of mineral nutrient concentration in wheat grown in organic systems*. European Association for Plant Breeding Research (EUCARPIA) Symposium. Plant breeding for sustainable, low-input agriculture: dealing with genotype-environment interactions. Wageningen, Netherlands, November 9, 2007.

Dawson, J., K. Murphy, S. Jones (2007). *Plant breeding for organic systems: Wheat in the inland Pacific Northwest*. CSSA-ASA-SSSA Annual Meeting. New Orleans, LA, November 6, 2007.

Jones, S. October 4, 2007. Provender Alliance Conference. Invited talk on Agriculture and wheat breeding. Over 300 Co-ops and health food stores were represented. Vancouver, WA.

Jones, S., K. Murphy (2007). *Long-term breeding strategies for sustainable cropping systems*. American Society of Horticultural Science (ASHS) Annual Conference. Scottsdale, AZ, July 18, 2007.

Jones, S. June 23, 2007. Franklin County Grower Workshop. We were asked to give 25 growers a tour of the lab, greenhouse, and field. Presented a talk on Winter Wheat Breeding.

Murphy, K. (2007). *Perennial wheat breeding and the role of allelopathy in weed suppression ability*. The Land Institute Fellows Workshop. Matfield Green, KS, June 14, 2007.

Jones, S. May 31, 2007. Agriculture, Food and Human Values Conference. Invited talk on Sustainable Agriculture. Victoria, BC.

Hoagland, L., S. Jones. November 12, 2007. WSCIA annual meeting. Invited talk on addressing challenges in low-input wheat and wheat seed production. Pasco, WA.

Murphy, K. (2007). *Breeding wheat for enhanced nutritional value*. WSU Departmental Crop Science Seminar. Pullman, WA, April 12, 2007.

Jones, S. March 19, 2007. University of Vermont. Invited departmental seminar on Public Plant Breeding.

Jones, S. November 10, 2006. WA Tilth Association. Vancouver, Washington. Invited talk on Farming for Food Quality.

Jones, S. November 14, 2006. Crop Improvement. Moscow, Idaho. Invited opening keynote talk on Advances in Wheat Breeding for Washington State.

Jones, S. October 10-15, 2006. Mountain Sky Organic Conference. Emigrant, Montana. International invite only, 25 people including Wendell Berry, Stewart Newman and Leroy Hood. Opening keynote talk on Breeding in Public.

Jones, S. May 11, 2006. Symposium on Sustainable Agriculture, Communities, and Environments in the Pacific Northwest. Richland, Washington. Invited talk on Wheat Breeding in the Pacific Northwest.

Poster Presentations

Murphy, K., J. Dawson, P. Reeves, S. Jones (2007). *Yield, regrowth and winter survival of perennial wheat in the Pacific Northwest*. CSSA-ASA-SSSA Annual Meeting. New Orleans, Louisiana, November 2007.

Dawson, J., Murphy, K., Piaskowski, J., Arterburn, M., Lyon, S., Balow, K., Gollnick, M., and Jones, S., June 12, 2006. Increasing the diversity of wheat cultivars in Washington State (US). Poster presented at: SUSVAR Workshop on cereal crop diversity: Implications for production and products. SUSVAR (COST860) Conference, Camon, France.

Select National Coverage of our Research

2007 Jones, S. *Gourmet Magazine*, July issue. Perennial Wheat.

2007 Jones, S. *The New York Times*. July. Perennial Wheat.