

**Progress Report to the Agricultural Research Foundation  
Oregon Wheat Commission**

**PROJECT:** Development of wheat varieties adapted to Oregon production with enhanced disease resistance, stress tolerance, and superior end-use qualities

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<b>FUNDING HISTORY:</b>	2003-2004	200,816
	2004-2005	208,098
	2005-2006	200,000

**ABSTRACT:**

The goal of the OSU Wheat Breeding program is to develop varieties that can increase economic returns to Oregon growers through improved grain yield, disease resistance, and enhanced end-use qualities for marketing. The OSU CLEARFIELD soft white winter variety 'ORCF-101' and 'ORCF-102' were released to the seed industry in 2003 and 2004 through an innovative non-exclusive licensing agreement. Twenty seed companies have now been licensed to produce and sell seed of these varieties in the Pacific Northwest. Combined acreage of ORCF-101 and ORCF-102 in the PNW are estimated at nearly 333,000 acres for 2005-06. The 'super-soft' white winter wheat variety ORSS-1757 was released in 2005 through an exclusive licensing agreement with Mid-Columbia Producers. The exclusive license will promote identity preserved production and marketing of the variety and provide a mechanism for growers to capture value from its superior milling and baking quality. 'Tubbs 06', a reselection of the variety Tubbs to improve its resistance to stripe rust, is scheduled for open release this fall. Experimental lines on Breeder seed increase include ORH010920, a short-stature, high-yielding SWW selection from the HybriTech germplasm. ORH010920 is targeted for irrigated and higher rainfall conditions and the Willamette Valley and would be recommended for open-release. Four hard white winter selections were each advanced to ¼ acre breeder seed increase. These lines have shown good protein quality and low PPO activity. Two promising hard red winter selections from the Nickerson breeding program also were advanced to Breeder seed increase. The Oregon Winter Elite Yield Trial (OWEYT) was grown at 13 locations in 2005. Data were obtained from 10 locations, with average grain yields ranging from 41 to 136 bu/a. Data also were collected from 5 locations of the Oregon Spring Elite Yield Trial (OSEYT). These variety trials support breeding efforts, end-use quality testing, variety release decisions, variety quality recommendations, and provide important information on variety performance to Oregon wheat growers.

## **OBJECTIVES:**

1. Develop and release new wheat varieties with superior disease resistance and enhanced tolerance to abiotic stresses that minimize production risks and increase economic returns to growers.
2. Provide growers with up-to-date information on near-release and newly released varieties in comparison with current leading varieties through field days and print and web media.
3. Increase demand and marketability of PNW wheat through development of soft and hard wheat varieties with superior end-use qualities. Identify germplasm, genes, and traits that contribute value-added or product-specific qualities and provide new marketing opportunities for wheat growers.
4. Identify germplasm, genes, and traits that will contribute to superior varietal performance and enhanced yield stability under diverse production conditions. Incorporate these new genetic resources and products of biotechnology into adapted varieties through efficient use of field and laboratory evaluation methods.
5. Identify and incorporate important genes for disease resistance, adaptation, and end-use quality using molecular marker technologies and biochemical analyses.

## **PROCEDURES:**

Varieties and breeding materials must be evaluated under a wide array of environmental and management practices to characterize performance and adaptation. Early generation breeding materials (F1 through F5) are evaluated through a shuttle between Hyslop and Pendleton (Ruggs) to identify broadly adapted, disease resistant selections. Mid-late generation materials, (preliminary and advanced lines of F6 through F9) are evaluated in replicated trials at our core nursery sites at Pendleton (Rugg-Barnett), Moro (Sherman County Experiment Station), and Corvallis (Hyslop Research Farm). In addition, six 'satellite' testing nurseries are used to more rapidly characterize performance of our breeding lines. Each site includes three replications of the OWEYT, one or two replications of Advanced SW and HW nurseries, and unreplicated plots or observation rows of lines in preliminary and advanced yield trials (F6 through F8 generations). In fall 2005, the nurseries were planted at sites near Moro (Chris Kaseberg), Condon (Jeff Nelson), Arlington (Eric Anderson), Lexington (Chris Rauch), Hermiston (Kent Madison), and Coulee City, WA (Brian Isaak, for winterhardiness testing). These sites were chosen to represent a very diverse array of production conditions; from very low rainfall to full irrigation, shallow to deep soils, and low residue to high residue management practices. With these diverse experimental locations we expect to more rapidly characterize performance of our breeding lines and parent stocks for adaptation, yield potential, stress tolerance, and disease resistance.

Since fall of 2003, the state-wide variety testing program has been incorporated into our breeding trials. The Oregon Winter Elite Yield Trial (OWEYT) and Oregon Spring Elite Yield Trial (OSEYT) were established to collect important performance data needed for breeding, variety release and co-release decisions, and reports to the seed industry and Oregon growers. New varieties and variety candidates, both public and private, from

throughout the region are evaluated in the trials. In addition to 9 locations of winter wheat breeding trials, the OWEYT was evaluated at Madras, La Grande, Ontario, and Klamath Falls in cooperation with researchers at the OSU Ag Research Centers. The OSEYT was evaluated at a limited number of sites, including Corvallis, Pendleton, and Klamath Falls. Grain samples from the OWEYT and OSEYT are used for end-use quality analyses to support wheat quality improvement efforts, release decisions, variety recommendations, and information for future marketing activities. Results from the OWEYT and OSEYT are posted on our project web site and distributed electronically throughout the region. For 2006, due to increasing interest in hard wheats, we have reorganized our Hard White Elite Yield Trial (HWEYT) to include hard red and hard white varieties and experimental lines from across the region. This trial is being grown at 9 locations in 2006. Data from the HWEYT will be summarized, posted, and distributed at the same time as that for the OWEYT and OSEYT.

As an indication of project activities and scope, a summary of winter wheat plantings for 2006 is attached (addendum 1). The spreadsheet indicates number of entries, replications, and test sites for each breeding trial. The list does not include F1's, headrows (approx. 40,000 rows in F2-F5 generations), thesis research trials, or crossing blocks.

Germplasm collaborations and exchange are continuing priority. Ninety lines from Nickerson that were screened in 2001 through 2005 have been advanced to multilocation replicated yield trials for more detailed characterization of adaptation, yield potential, and disease resistance. Over 100 winter wheat lines were imported from CIMMYT-Turkey as candidates for the Eastern European Regional Yield Trial and FAWWON. Quarantine increase, evaluation and characterization of new spring wheat germplasms from CIMMYT continues, including those selected on-site in Obregon in 2005.

## **REPORT OF ACCOMPLISHMENTS:**

### **New varieties and performance updates:**

**'Tubbs 06'**, a reselection of the variety Tubbs to improve its resistance to stripe rust, is scheduled for open release this fall. Approximately 1/3 of 1,500 Tubbs headrows under Breeder seed increase in 2005 were eliminated as susceptible, or moderately susceptible to stripe rust. The remaining headrows were bulked and planted for seed increase of 'Tubbs 06'. A 50 acre field was established, which could produce over 5,000 bushel of Foundation seed. WSCIA has received year-in-advance sales requests of over 200,000 pounds (3,300 bushel) for 'Tubbs 06'.

**'ORCF-101' and 'ORCF-102'** are CLEARFIELD\* varieties, developed in collaboration with BASF, released primarily for their utility in control of grassy weeds with application of Beyond™ herbicide. ORCF-101 was released to the seed industry in fall, 2003, through an innovative non-exclusive licensing agreement. This was followed by the release of ORCF-102 in fall of 2004. ORCF-102 has 'Madsen' and 'Weatherford' parentage and is noted for its superior tolerance to root diseases, particularly

Cephalosporium stripe and Strawbreaker footrot. After initial concerns regarding its early season susceptibility to stripe rust in the Valley, ORCF-102 showed good adult plant resistance in eastern Oregon and Washington trials and performed very well in regional yield trials. Twenty seed companies have now been licensed to produce and sell seed of OSU CLEARFIELD varieties in the Pacific Northwest. ORCF-101 also performed well in 2005 and was grown on approximately 200,000 acres. Acreage of ORCF-101 and ORCF-102 in the PNW are estimated at 313,000 and 23,000 acres (seed sales of 333,000 and 26,000 bu), respectively for 2005-06. Approximately ½ of this acreage is in Oregon, ½ in Washington.

**‘ORSS-1757’** is a soft white winter wheat released in 2005 through an innovative exclusive licensing agreement with Mid-Columbia Producers (MCP). ORSS-1757 has exceptional quality for the soft white market class. The exclusive license will promote identity preserved production and marketing of the variety and provide a mechanism for growers to capture value from its superior milling and baking quality. MCP has approximately 5,000 acres of production for 2006, distributed throughout NC and NE Oregon in a series of 50 to 100 acre fields. These fields will produce grain for market development activities, serve as demonstration plots for growers, and give us an opportunity to learn more about the variety and its adaptation.

### **Oregon Variety Testing:**

The Oregon Winter Elite Yield Trial (OWEYT) was grown at 13 locations in 2005. Yield data were obtained from 10 of the sites. Three sites (Hermiston, La Grande, and Moses Lake) were abandoned due to weather and/or mechanical damage. Yield data from Moro, Moro (Kaseberg), and Arlington were significantly affected by wind damage and differential shattering among varieties. Stripe rust pressure was severe at Corvallis in the early spring. Stripe rust also was significant on susceptible and moderately susceptible varieties in the Pendleton trials. Average grain yields for the OWEYT ranged from a low of 44.1 bu/a at Lexington to 136.0 bu/a under irrigation at Ontario. Leading varieties over locations were Gene, Westbred 528, Tubbs, and IDO587CL. Yields of these varieties were exceeded by the top experimental lines, ORH010920, ORH010918, and ORH010085.

Data were collected from 5 locations of the Oregon Spring Elite Yield Trial (OSEYT). Stripe rust was again a major factor in performance of spring wheat varieties. The top spring varieties were hard whites from private companies, including Blanca Grande (General Mills), and BZ998-447W (Westbred). OSU hard white spring selections OR4201262 and OR4201261 showed superior stripe rust resistance and were among the top six varieties for average grain yield over locations.

Data from the 2005 OWEYT, OSEYT, and Hard Wheat Trials (HWEYT) are posted at: [http://cropandsoil.oregonstate.edu/wheat/state\\_performance\\_data.htm](http://cropandsoil.oregonstate.edu/wheat/state_performance_data.htm). These variety trials support breeding efforts, end-use quality testing, variety release decisions, variety quality recommendations, and provide important information on variety performance to Oregon wheat growers.

### Soft White Winter Wheat Improvement:

**ORH010920** is a high-yielding SWW selection with the pedigree 6720-11//MDA38//WRN/3//E81FR. ORH010920 is significantly shorter than Tubbs and is initially being targeted for irrigated and higher rainfall conditions. It was the top yielding variety in the 2005 OWEYT and USDA-ARS Regional Soft Wheat Nursery and ranked 4<sup>th</sup> of 40 varieties and selections tested in 2004. It has performed particularly well in the Willamette Valley, with good resistance to Septoria and stripe rust. ORH010920 does not have Madsen as a parent and it appears to carry a different source of footrot resistance as compared with Tubbs. ORH010920 is a selection from the HybriTech germplasm which was donated to OSU in 2001. A one-acre breeder seed block was established last fall. It was entered in WA and ID state variety trials for 2006. ORH010920 is intended for open release.

**OR2010239** is broadly adapted SWW wheat with excellent end-use quality. It has the pedigree Cashup//5//VPM/Mos-951//Hill/3//SPN/4//SPN. OR2010239 appears to have good overall disease resistance. Because of its superior quality, it was being considered as a back-up to ORSS-1757. However kernel texture and milling yields appear to be intermediate of Stephens and ORSS-1757, rather than identical to ORSS-1757. Advancement will now depend mostly on its agronomic performance. A ½ acre breeder seed block was established last fall.

**ORH010083 and ORH010085** are SWW selections from a Hybritech cross (Dusty/ZGP-4074//Unknown). These are moderately short, moderate maturity, higher tillering types with very good end-use quality. The lines yielded very well in 2005 OWEYT, particularly in Sherman County. Chris Mundt's trials in 2005 suggest these lines are highly resistant to Cephalosporium stripe. We expect one of these lines to be advanced to Breeder Seed increase in fall of 2006. These are intended for open release, possibly as soon as fall of 2008.

SWW lines advanced to USDA-Regional Nursery testing for 2006:

New	<b>ORH010083</b>	<b>DUSTY/ZGP-4074// (UNKNOWN)</b>
	<b>ORH010085</b>	<b>DUSTY/ZGP-4074// (UNKNOWN)</b>
Retained	<b>OR9901619</b>	<b>YMH/JAR//YMH/3//ND/P101//7C/4//SPN//AU/YMH/5//OR7946/Hill//Hill/6//OR7946/Hill//Hill</b>
	<b>ORH010918</b>	<b>6720-11//MDA38//WRN/3//E81FR</b>
	<b>ORH010920</b>	<b>6720-11//MDA38//WRN/3//E81FR</b>
	<b>OR2010239</b>	<b>Cashup//5//VPM/Mos-951//Hill/3//SPN/4//SPN</b>
	<b>OR2010241</b>	<b>Cashup//5//VPM/Mos-951//Hill/3//SPN/4//SPN</b>

### **Hard White Winter Wheat Improvement:**

Four HWW selections were each advanced to ¼ acre breeder seed increase. These are the first elite selections from our efforts to ‘revamp’ our HWW germplasm base using HRW and HWW parents from the Great Plains. The lines are designated OR2052055H, OR 2052082H, OR2052046H and OR2040075H. Built around the OSU HWW selection OR943576, the first three are single or backcross derivatives from a sister of the Nebraska HWW ‘Antelope’. The last selection is from a single cross with an AgriPro HRW. These lines have shown good protein quality and low PPO activity, which are key indicators for bread and noodle applications. More extensive field and quality testing will be needed, however, before they can be recommended for release.

HWW lines advanced to USDA-Regional Nursery testing for 2006:

<b>OR2052055H</b>	<b>OR943576//OR943576/N97S277</b>
<b>OR2052082H</b>	<b>OR943576//OR943576/N97S277</b>
<b>OR2052046H</b>	<b>OR850513-8/N97S277</b>
<b>OR2040075H</b>	<b>WI88-052-13/Tomahawk//OR943576</b>

### **Hard red winter wheat improvement:**

Breeding hard red winter wheat varieties has not been a priority in our program. Red-seeded segregates are regularly discarded from red x white crosses. However, grower interest in production and marketing of HRW has continued to increase in the PNW. This past year we advanced two HRW selections to ½ acre Breeder seed blocks. They are direct selections from the Nickerson breeding program and are designated as ORN00B507 and ORN00B553. These are short, high-yielding, disease resistant selections from their French breeding program. Most important, these lines appear to have good mixing and baking quality and should be a good fit for the US HRW class. Both selections were entered in the 2006 hard wheat variety trials for Washington. As these were accessed through our cooperative agreement with Nickerson, we anticipate a semi-exclusive release will be necessary.

### **CLEARFIELD\* Soft White Winter:**

One SWW CLEARFIELD\* selection is in state trials and Pre-breeder seed increase. The line is designated ORI2042037, developed from a cross of ‘Eltan/3/FS-4//SPN/Madsen’. The line has similar phenotype to Eltan and could be extremely valuable for OSU CLEARFIELD\* Seed Associates in NC Washington. The line was entered in the WSU State Variety Trials at a limited number of sites in the Hiway 2 area of Washington. This line is not intended for general production in Oregon, but may have fit in small areas where Eltan has been used. Disposition depends on whether the line carries adequate winterhardiness and resistance to snow mold as needed for NC Washington production.

### **Early Generations and Crossing:**

Over 800 soft and hard wheat crosses were made in the field and greenhouse in 2005. A larger proportion of topcrosses were again made to facilitate introgression of quality traits and disease resistance from red-seeded or unadapted parent lines. Priority parents include French lines that have shown superior yield potential and disease resistance, Plains hard wheats with superior protein quality; synthetic wheats from CIMMYT, and crosses for development of 2-gene CLEARFIELD\* selections. In total, 38,000+ F2-F5 headrows, 220 space plant F2 populations, and 450+ bulk F2 and F3 populations were evaluated.

### **End-use Quality:**

End-use quality research and development efforts involve extensive collaborations with Dr. Andrew Ross, the OSU Quality Lab, the Wheat Marketing Center, USDA-ARS-Western Wheat Quality Lab, USDA-GIPSA-FGIS, and commercial companies. Resulting data and information are distributed in various forms and are too numerous to summarize here. Reports from major programs, such as the APC, OVA, USWRN, or WQC are distributed directly to cooperators and others in the wheat industry. Support from Craig Morris and the USDA-ARS Western Wheat Quality Lab in evaluating our preliminary and advanced breeding lines is gratefully acknowledged. Quality data for varieties and experimental lines in the 2004 OWEYT are posted at: [http://cropansoil.oregonstate.edu/wheat/state\\_performance\\_data.htm](http://cropansoil.oregonstate.edu/wheat/state_performance_data.htm). These data also were used in developing the OSU Preferred Variety Lists.

Prior to planting this fall, with support of Drs. Andrew Ross and Jae-Bom Ohm, 1534 lines selected from the F3, F4 and F5 segregating populations were prescreened for hardness and polyphenol oxidase activity. Eighteen percent of the soft white selections were eliminated based on high grain hardness using the SKCS machine. A small number of soft white selections also were eliminated due to very high levels of polyphenol oxidase (PPO) activity. Out of the 1,142 soft white selections selected, 942 were advanced into a preliminary yield trial for 2005.

Of the 312 hard white selections that were harvested in 2005, 22% were discarded based on high PPO activity or soft grain. The assay for PPO is a rapid and inexpensive indicator of noodle color. By quickly eliminating early lines with questionable quality the overall efficiency of the breeding program is greatly improved.

### **Basic research, collaborations, and student theses:**

**Influence of moisture stress and N on end-use functionality of hard white winter wheat.** Carolina St. Pierre, PhD, in collaboration with Andrew Ross. This research investigated the combined influences and interactions of moisture deficit and N management on rheological properties, protein quality, and protein molecular weight distributions of HWW. As expected, N and irrigation treatments had a large influence on

protein content. However, these main effects had relatively little direct impact on protein composition or PPO activity. Changes in protein composition were related to general increases in protein concentration, regardless if the result of reducing irrigation or increasing fertilization rate. Significant interactions of cultivar with N and irrigation were observed for protein quality, protein composition, and dough mixing properties. Cultivars of similar protein quality and composition responded similarly to the N and stress treatments. This reinforces the importance of crop management strategies to reach desired marketing targets for flour quality and end-product performance.

Carolina St. Pierre presented a summary of results from her dissertation at the 7<sup>th</sup> International Wheat Conference. A manuscript also was submitted and is being published in the Conference Proceedings. An advance copy is available on request.

**Relationship of Protein Composition to End-product Functionality of Hard White Wheat.** Sarah Gehlhar, PhD, in collaboration with Andrew Ross. Progeny from a series of OSU x NE hard white wheat populations have shown large variations in grain quality, protein composition, and protein quality. A significant amount of variation in protein quality and dough mixing properties was related to High Molecular Weight (HMW) and Low Molecular Weight (LMW) glutenin protein composition. Enhanced dough strength and processing tolerance of lines possessing HMW alleles 5+10 was confirmed over those with the 2+12 alleles. More interesting was the significant variation in end-use quality that could be attributed to presence / absence of individual LMW glutenin alleles. Relative contributions of LMW alleles varied depending on whether they were in 5+10 or 2+12 background. The research provides means to select for optimal combinations of HMW and LMW glutenin alleles for application to breads and Asian noodle products.

**Improving genetic resistance to Cephalosporium Stripe of wheat through field screening and molecular mapping with novel genetic stocks.** M.S. research project for Martin Quincke, in collaboration with Oscar Riera-Lizarazu and Chris Mundt (funded in part by STEEP). Over the past two years we have evaluated populations of progeny resulting from four different crosses of a resistance source from Europe with PNW varieties. These populations were found to segregate as expected for a quantitatively-inherited trait, and indicate that it should be possible to select genotypes with higher levels of resistance to Cephalosporium stripe than is present in currently available PNW varieties. Results show that populations derived from some crosses may be better sources of resistance than others. Additional trials included two evaluations of alternative sources of resistance, two elite yield trials, and a barley trial. Five highly promising lines from among the four cross populations have been advanced to multi-location yield trials for 2005-06, and another 15 lines have been placed in preliminary yield trials. Two lines identified from the Oregon Winter Elite Yield Trial show high levels of resistance to Cephalosporium stripe and are being considered for production of Breeder's Seed. The third year of field plots has been established. These studies include 11 trials and encompass over 1400 plots. Marker-based studies will receive intense emphasis in the final year of the project so as to determine the inheritance of resistance and to evaluate the potential for marker-assisted selection.

**Application of Molecular Marker Technology.** This past fall, we initiated several projects to facilitate discovery and implementation of molecular markers. The first is to characterize genetic diversity of 48 select varieties and parent lines using 500-600 publicly available markers. The forty-eight lines were chosen to represent the core germplasm base of our program and high priority parent stocks, such as the Nickerson germplasm. This will identify key areas of the wheat genome that are polymorphic and candidates for more extensive mapping. Simultaneously, we are developing several mapping populations to facilitate marker discovery for traits which are critical for Oregon growers. These populations, based on crosses of OSU x Nickerson selections, are now in our greenhouse with the intent to advance the material to the F6 generation by fall, 2007, using single-seed descent. This will be a very unique contribution to marker development, and directly applicable to our program, as the parent lines have high yield potential, good to excellent disease resistance, are very well adapted to the PNW, but genetically diverse. The populations also will provide research opportunities for graduate students in the coming years.

**CLEARFIELD\* production system research.** In collaboration with Dan Ball. We are continuing to evaluate tolerance of new CLEARFIELD\* wheat varieties to Beyond herbicide. The research has contributed to release of ORCF-101, ORCF-102, and provided important information for growers and seed industry regarding herbicide response and potential crop damage. For 2006 efficacy trials, we have included two CLEARFIELD lines developed by Bob Zemetra at the University of Idaho and six new experimental lines from our program.

Dan Ball presented a summary of results from four years of our CLEARFIELD\* efficacy research at the 7<sup>th</sup> International Wheat Conference. A manuscript also was submitted and is being published in the Conference Proceedings. An advance copy is available on request.

## **IMPACTS:**

The soft white winter wheat 'Tubbs' was released to growers in 2002. We anticipate over 400,000 acres of production in Oregon and Washington for 2006. Tubbs represents a significant improvement in grain yield (8 to 10% higher than Stephens) and provides direct economic returns to Oregon wheat growers through increased productivity and production efficiency. ORCF-101 and ORCF-102, broadly adapted CLEARFIELD\* herbicide resistant varieties, are planted on over 330,000 acres in 2006. These reduce economic losses from grassy weeds, increase management options, and further increase production efficiency. Varieties with enhanced end-use quality, such as ORSS-1757, are expected to increase market demand for Oregon wheat and may provide the basis for identity preserved marketing. Investments in wheat breeding continue to contribute to the state agricultural economy through increased grain yield, enhanced yield stability, increased production efficiency, superior end-use quality for marketing and novel quality for market development.

## **RELATION TO OTHER RESEARCH:**

OSU wheat breeding and genetics research is conducted in collaboration with many researchers throughout Oregon, the PNW, and the world. Samples from the OWEYT, OSEYT, HWEYT and breeding trials are the basis for the OWC grant-funded end-use quality research of Andrew Ross, the USDA-WWQL and Wheat Marketing Center. Numerous crosses and populations are being developed for collaborative genetic studies on molecular marker development, end-use quality, disease resistance, adaptation, and stress tolerance. These studies involve collaborations with Ross on biochemical bases of end-use quality; with Oscar Riera-Lizarazu on development and applications of molecular markers; with Chris Mundt on laboratory and field evaluations of Cephalosporium stripe and Pseudocercospora footrot resistance; with Dick Smiley on evaluations of Fusarium crown rot. Herbicide resistant wheat cultivar development and stewardship continues with Dan Ball and BASF. New studies on variety x management interactions and N management for hard white and hard red wheat varieties are being pursued in Mike Flowers and Stephen Machado. Germplasm development efforts involve collaborations with Nickerson, CIMMYT, Agripro and many others.

## **ACKNOWLEDGEMENTS:**

Our appreciation is extended to the Oregon Wheat Commission and the OWGL for their ongoing support and commitment to the wheat breeding and variety development effort. We also wish to thank Larry Williams, Chris Kaseberg, Jeff Nelson, Eric Anderson, Kent Madison, Chris Rauch, and Brian Isaak for providing land and support for our field trials. Special accolades go out to Mary Verhoeven, Bruce Hoefer, Mark Larson, and Jari von Zitzewitz for their efforts and contributions, particularly in managing and integrating the state-wide variety testing program into the breeding effort.

## **RELATED PUBLICATIONS AND PRESENTATIONS:**

### **Refereed journal articles**

Ohm, J.-B., A.S. Ross, Y.-L. Ong, and C.J. Peterson. 2006. Using multivariate techniques to predict wheat flour dough and noodle characteristics from Size Exclusion HP-LC and RVA data. *Cereal Chem.* 83(1) 1-9.

### **Proceedings**

Ball, D.A., and C.J. Peterson. Herbicide tolerance in imidazolinone-resistant wheat for weed management in the Pacific Northwest U.S.A. *Proceedings of the 7<sup>th</sup> International Wheat Conference, November 27 to December 3, 2005, Mar del Plata, Argentina.* In Press.

Saint Pierre C., C.J. Peterson, A.S. Ross, J. Ohm, M.C. Verhoeven, M. Larson, and B. Hoefer. Changes in grain protein composition of winter wheat cultivars under different levels of N and water stress. *Proceedings of the 7<sup>th</sup> International Wheat Conference, November 27 to December 3, 2005, Mar del Plata, Argentina.* In Press.

Castro, M., C. J. Peterson, M. Dalla Rizza, P. Díaz Dellavalle, D. Vázquez, V. Ibáñez, and A. Ross. Influence of heat stress on wheat grain characteristics and protein molecular weight distribution. Proceedings of the 7<sup>th</sup> International Wheat Conference, November 27 to December 3, 2005, Mar del Plata, Argentina. In Press.

### **Progress reports and Popular Articles**

A. Ross and C. J. Peterson. Wheat quality team to Asia - January 2005 trip report. US Wheat Associates. April, 2005.

Peterson, C.J. 2005. Capturing value from quality: Licensing of the soft white winter wheat variety 'OR9801757'. Oregon Wheat. June, pgs 11-13.

### **Web sites**

OSU Wheat Breeding and Variety Performance  
<http://cropandsoil.oregonstate.edu/wheat/>

OSU CLEARFIELD Wheat Varieties - Release, Licensing, Stewardship  
<http://cropandsoil.oregonstate.edu/wheat/orcf-101/>

National Wheat Improvement Committee  
<http://cropandsoil.oregonstate.edu/wheat/reports/NWIC/>

### **Variety releases and PVP**

'ORSS-1757' Soft White Winter Wheat. C.J. Peterson, M. Verhoeven, M. Larson, B. Hoefler, W. Kronstad, R. Karow, J. Bassinette, A. Ross, J. Ohm, C. Morris, D. Engle, R. Smiley, C. Mundt, X. Chen, G. Vollmer and J. Robinson. Released March, 2005.

Application for PVP of 'ORSS-1757' Soft White Winter Wheat. C.J. Peterson, M. Verhoeven, M. Larson, B. Hoefler, W. Kronstad, R. Karow, J. Bassinette, A. Ross, J. Ohm, C. Morris, D. Engle, R. Smiley, C. Mundt, X. Chen, G. Vollmer and J. Robinson. Submitted August, 2005.

Application for PVP of 'ORCF-102', a CLEARFIELD soft white winter wheat. C.J. Peterson, M. Verhoeven, M. Larson, B. Hoefler, W.E. Kronstad, R. Karow, J. Bassinette, C. Morris, D. Engle, A. Ross, J. Ohm, D. Ball, C. Mundt, R. Smiley, Z. Chen, and G. Vollmer. Submitted August, 2005.

### **Presentations – Invited**

Proposal for release and semi-exclusive licensing of OR9801757. Hosted by OWGL and OWC. Jan 11, 2005, Boardman, OR.

OSU wheat breeding and CLEARFIELD\* variety development. Grant County Wheat Association. May 10, 2005, Moses Lake, WA.

OSU CLEARFIELD\* Varieties. Western Farm Service and BASF. August 17, 2005, Walla Walla, WA.

Development and licensing of ORSS-1757. Mid-Columbia Producers. September 13 and 14, 2005. The Dalles and Moro, OR

Status of HybriTech germplasm, variety development, and licensing at OSU. Monsanto and NAWG representatives. October 1, 2005, Corvallis, OR.

What's next in OSU wheat varieties. Washington State Crop Improvement Annual Meeting. November 15, 2005. Spokane, WA

US Wheat Quality Team to Asia. Presentations to milling and baking industry representatives in South Korea, Taiwan, China, Thailand, and Philippines; Jan 21-Feb 5, 2005

Wheat breeding in Oregon and the PNW. OSU-Nickerson Wheat Research Meeting. April 6-8, 2005, Portland, OR.

#### **Service as Chair of National Wheat Improvement Committee**

Research Priorities for Fiscal Year 2007. National Association of Wheat Growers and National Wheat Improvement Committee. March 2006. 58 pgs.

Informational meetings with ARS administrators, legislative aides to US Senators and Representatives. March 17-18, 2005; March 7-9, 2006. Washington DC

External Review of CIMMYT Wheat Research Program. October 6, 2005. CIMMYT Headquarters, El Batan, Mexico. Invited by CIMMYT Deputy Director General for Research.

#### **Meetings - sponsored and organized**

US Wheat Breeders trip to CIMMYT, Obregon, Mexico. March 30-April 3, 2005. Attended by 25 US researchers. Organized by J. Peterson and K. Ammar.

OSU-Nickerson Wheat Research Meeting. April 6-8, Portland, OR. Attended by 20 staff from Nickerson programs in UK, France, Germany, Spain and select wheat researchers from PNW. Organized program, location arrangements, and regional participants.

Pre-Conference Workshop: International Wheat Improvement at the CGIAR Centers and Global Initiatives on Rust. Sponsored by USAID, NWIC, and USDA-ARS. 7<sup>th</sup> International Wheat Conference, November 27, 2005, Mar del Plata, Argentina. Co-Chair and Co-Organizer with Cal Qualset, UC-Davis; invited by USAID.