PROJECT NO: BJKV34, BJKV35, BJKV36

TITLE: Extension Wheat Nurseries

PERSONNEL: Dr. Juliet Marshall, Ext. Crop Mgmt. Specialist (SC and E Idaho)
Dr. Kurtis Schroeder, Moscow, Ext. Crop Mgmt. Specialist (N Idaho)
Dr. Mike Flowers, Extension Cereal Specialist, Oregon State University, Corvallis, OR
Dr. Olga Walsh, Parma, Ext. Crop Mgmt. (SW Idaho)

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JUSTIFICATION: Idaho wheat producers need the most recent information and technology to improve production efficiency, increase economic returns, and maintain their competitiveness. Cooperative Extension programs enhance technology transfer to growers and industry personnel through cereal schools, published materials, websites, webinars, cereal nurseries, demonstrations and field tours.

Idaho has extremely diverse growing conditions for wheat. Few varieties are widely adapted to all environments. Appropriate variety selection is critical for maximizing grower financial returns. Extension Wheat Nurseries provide an objective, uniform, and statistically sound evaluation of winter and spring wheat varieties and advanced lines (candidates for release) in diverse Idaho environments. Public varieties, especially from Idaho, Oregon, Washington, and Utah, as well as selected private entries are evaluated. The testing program is statewide in scope. Since it is also not feasible to locate wheat breeder nurseries in all geographic areas of Idaho, Extension nurseries provide added performance information critical for the release of varieties for specific areas and management systems.

In addition to providing much needed performance data for the wheat entries, the Extension Wheat Nurseries, which are located mostly in grower fields, serve as excellent demonstration tools for the transfer of wheat technology to growers and agribusiness personnel. Exposure to new varieties and/or advanced lines, and in some cases market classes, can increase the rate at which the new alternatives are evaluated or adopted by the producer. The nurseries also provide increased exposure of the programs and activities of the Idaho Wheat Commission and Idaho Grain Producers Association.

HYPOTHESIS & OBJECTIVES: The hypothesis is that the relative performance of varieties, new releases, and advanced lines differ in the diverse environments in the state. The specific objectives are

- To evaluate the agronomic performance of current varieties, advanced lines, and classes of winter and spring wheat at diverse locations in Idaho.
- To hasten the adoption of improved varieties by increasing their exposure to Extension workers, growers, and agribusiness personnel.
- To inform producers and supporting agribusinesses of new cereal technology.
- To support local county wheat extension programs.

PROCEDURES:

Extension Wheat Nurseries

The Extension Wheat Nurseries are coordinated through the leadership of the Extension Cereal Specialists. County Extension Educators are the local coordinators of the trials. Thirteen winter nurseries were planted and 10 spring nurseries are planned for the 2016 season. There is 1 Parma winter nursery (planted in conjunction with Oregon State University Agronomist Mike Flowers) and 1 spring nursery planned (irrigated), 6 winter nurseries (3 irrigated, 3 dryland) and 5 spring nurseries planned (4 irrigated, 1 dryland) in SE Idaho, 6 winter (all dryland or rainfed) and 4 spring nurseries planned (all dryland) in north Idaho. Whereas most trials are conventionally planted, four nurseries (three in northern Idaho and one in SE Idaho) are direct seeded. The winter and spring nurseries typically include soft white, hard red, and hard white wheat classes and at times durum. The nurseries emphasize the evaluation of new varieties or advanced lines (with excellent potential for release) for which local performance data is lacking. Nursery entries are evaluated for stand establishment, winter survival, disease and insect pests, yield, test weight, protein, plant height, and lodging. Similar procedures are used in all nurseries. The entries are randomized and replicated (three or four times) in a randomized complete block design to provide for objective evaluations and statistical analysis.

Wheat quality is a concern and wheat samples harvested from the Extension Wheat nurseries are submitted to the Wheat Quality Lab in Aberdeen, directed by Katherine O'Brien, for milling and baking tests and the wheat quality information compiled with the agronomic information. The information is critical to breeders and the industry for determination of advanced line performance in diverse Idaho environments.

Field Tours. Field tours are conducted at several Extension Wheat Nurseries or variety strip demonstrations to provide growers and industry personnel the opportunity for viewing the varieties and their differences in agronomic characteristics. The tours are used to present results from previous nurseries, as well as other pertinent wheat research. The information shared invariably goes beyond the question of variety selection. Marketing, pest control (weeds, insects, and diseases), water management, fertilization practices and other topics may be covered as well. Specific concerns of producers are also addressed. Maximum use of the nurseries by County Extension and industry personnel is encouraged. Producers or fieldmen visit the nurseries at times other than the scheduled tour.

DURATION: Continuous

COOPERATION: Aberdeen Wheat Quality Laboratory: Katherine O'Brien, Director
County Extension Educators, IWC, IBC, IGPA, public and private breeders, and grower cooperators.

ANTICIPATED BENEFITS/EXPECTED OUTCOMES/INFORMATION TRANSFER:
Idaho wheat producers will receive the most recent wheat variety performance information to improve production efficiency, increase economic returns, and maintain their competitiveness. Information on variety performance is shared with growers and industry personnel through cereal schools, published materials, wheat nurseries, demonstrations, field tours and the Internet.

LITERATURE REVIEW: none

IDAHO WHEAT COMMISSION - BUDGET FORM

Allocated by	Idaho Wheat Commission	during FY 2015	$	31,437
Allocated by	Idaho Wheat Commission	during FY 2016	$	31,437

REQUESTED FY 2016 SUPPORT:

	Salary	Temporary Help	Fringe	Travel	OE	Graduate Tuition/Fees	TOTALS
Idaho Wheat Commission	$ -	$ 16,310	$ 6,394	$ 5,800	$ 6,265	$ -	$ 34,769

OTHER RESOURCES (not considered cost sharing or match):

TOTAL OTHER RESOURCES	$	90,250

TOTAL PROJECT ESTIMATE FOR FY 2017:	$ 34,769 *(Requested)*	$ 90,250 *(Other)*	$	125,019 *(Total)*

BREAKDOWN FOR MULTIPLE SUB-BUDGETS:

	Marshall	*Schroeder*	*Walsh*	*(PI name)*
Salary	$ -	$ -	$ -	$ -
Temporary Help	$ 8,758	$ 6,961	$ 591	$ -
Fringe Benefits	$ 3,433	$ 2,729	$ 232	$ -
Travel	$ 3,000	$ 2,800	$ -	$ -
Operating Expenses	$ 2,990	$ 2,800	$ 475	$ -
Graduate Student Tuition/Fees	$ -	$ -	$ -	$ -
TOTALS	$ 18,181	$ 15,290	$ 1,298	$ -

Total Sub-budgets	$	34,769

10.7.2015 - Version

ANNUAL REPORT

PROJECT NO: BJKV34, BJKV35, BJKV36

TITLE: Education for Idaho Wheat Production: Extension Wheat Nurseries and Demonstrations

PERSONNEL: Dr. Juliet M. Marshall, Ext. Cropping Systems Mgmt Specialist, Aberdeen
Dr. Mike Flowers, Oregon State University, (Parma cooperator)
Dr. Kurtis Schroeder, Ext. Cropping Systems Mgmt Specialist, Moscow
Dr. Olga Walsh, Parma, Ext. Crop Mgmt. (SW Idaho)

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ACCOMPLISHMENTS: Replicated wheat trials were conducted at thirteen winter and nine spring locations for harvest in 2015. All trials were located on grower fields except those at Parma, Moscow, Kimberly and Aberdeen, which were located on University of Idaho Research and Extension Centers. Trials on producer's fields received the same management as did the surrounding field area. Four winter and four spring trials were irrigated and eight winter and five spring trials were rainfed or dryland. Numbers of entries, average yield, and yield range are given in Table 1. At selected locations data were collected for winter survival, heading date, plant height, and lodging. Grain yield, test weight and agronomic data from all sites were determined and subsamples were taken for laboratory evaluation of grain protein, kernel hardness and milling and baking quality. In addition to the more common market classes, durum varieties were included at some locations.

Milling and baking of harvest subsamples are being processed. Available agronomic data have been sent to cooperating breeders and county extension offices, and are available on University websites. Data are being prepared for presentation at other venues to insure the information is provided to as wide an audience as possible. Refer to the publications below for a complete listing of published results. In addition to the winter reports and presentations, oral presentations are given at cereal schools and other grower meetings.

Field tours were held at many sites in collaboration with county extension educators and these provided excellent opportunities for technology transfer on many cereal related topics. Trial sites were located as much as possible on roadways where large signs could acknowledge the support from the Idaho Wheat Commission. University of Idaho Cereal Schools, coordinated by specialists, county educators and industry representatives, were held at several locations throughout the state and afforded an opportunity to present the variety information as well as other related cereal management and marketing information.

Environmental conditions were highly varied throughout the state. Spring and summer precipitation was below normal for most northern Idaho locations and yields were down. Unusually warm temperatures in late June severely impacted winter wheat yields at some locations and spring wheat yields and test weights at all locations. In southern Idaho, unusually warm conditions in February and March led to early dormancy break of winter grain and early season drought. Spring grain was planted very early. Very high rains in May in the Magic Valley and eastern Idaho helped mitigate severe BYDV infection that occurred throughout the southern region.

In southern Idaho, stripe rust affected susceptible winter varieties (especially Brundage) and spring wheat, with significant stripe rust occurring in Soda Springs and the Upper Valley of the Snake River Plain on susceptible spring wheat varieties. Wheat streak mosaic and barley yellow dwarf was also a problem in

winter wheat in some areas of the Magic Valley and areas near Burley. Wireworm and wheat stem sawfly continue to plague dryland grain production. Barley Mealy bug was not severe in spring grain. In northern Idaho, stripe rust pressure was very low due to the dry, warmer than normal spring conditions. Very low incidence of disease was observed at only a couple of locations.

Winter wheat performance information for 2015: No one variety was dominant across the state as expected given the diversity of Idaho production systems and environments, and due to limited inclusion at all locations. In northern Idaho, the highest yielding soft white wheats were Puma, Bruneau, WB Junction, Rosalyn, LCS Artdeco and UI/WSU Huffman (107, 106, 105, 104, 101 and 101 bu/A, respectively) with an overall average yield of 97 bu/A (including all varieties and locations). Advanced lines being developed by the University of Idaho, Limagrain or dihaploids developed by LCS and Oregon State University were among the top yielding varieties. The highest yielding hard wheats were LCS Jet (NSA10-7208), Keldin, Rimrock and WB-Arrowhead (111, 106, 104 and 103 bu/A, respectively). The overall yield for the hard winter wheat in northern Idaho was 96 bu/A.

In SW Idaho, irrigated winter wheat and spring wheat trials were planted in Parma by Oregon State University (Dr. Mike Flowers). Of the named varieties, the hard winter wheat LCS Jet, LCS Aymeric, Norwest 553, Keldin and LCS Azimut yielded 168, 167, 157, 156 and 155 bu/A, respectively. The soft white winter wheats LCS Artdeco, SY Ovation, WB1529, WB 1604, Rosalyn, and Jasper yielded 158, 156, 154, 149, 146, and 145 bu/A, respectively.

In SC and SE Idaho, yields were lower than in previous years. Soft white winters Rosalyn, Bobtail, SY Ovation. Mary and Kaseberg were the highest yielding varieties (149, 149, 146, 145, and 142 bu/A, respectively) with an irrigated average of 135 bu/A. Soft whites among the highest yielding group under dryland conditions included Bobtail (61 bu/A), UI-WSU Huffman (61 bu/A), Otto (55 bu/A), and Eltan (54 bu/A). Among hard wheats, LCS Jet, Keldin, Promontory, LCS Colonia, WB-Arrowhead and Yellowstone were the highest yielding irrigated varieties (143, 136, 135, 135, 134 and 134 bu/A, respectively). Deloris, Utah 1--, LCS Colonia, Golden Spike, Colter and UI Silver were the highest yielding hard wheats when averaged under Ririe and Rockland dryland conditions. Soda Springs yields were significantly higher, averaging 98 bu/A, and was not included in the average for dryland trials.

Spring wheat performance information for 2015: For the soft white spring wheat location in northern Idaho, Babe, Seahawk, WB6341 and JD were the highest yielding varieties (50, 49, 48 and 47 bu/A). The overall yield was 45 bu/A, which is substantially lower than previous years. In SC and SE Idaho, UI Stone (123 bu/A) and two experimental lines (IDO851 and M12001) were in the high yield group of the irrigated trials. In the Soda Springs dryland location of Eastern District, Diva and Seahawk (WA 8162), advanced line WA 8189, and UI Stone yielded 84, 81, 80 and 70 bu/A, respectively.

In Parma, no data was obtained for the spring wheat trials.

Among hard wheat, LCS Atomo (HW), WB7417 (HW), Dayn (HW) and LCS star (HW) were the highest yielding in northern Idaho (51, 51, 49 and 48, respectively). Three experimental entries (WA8217, IDO1202S and IDO1203S) were also among the highest yielding varieties. In SC and SE Idaho, advanced line SY-10136 (W), Dayn (W), HRS3504 (HRS), and LCS Star (W) (119, 118, 111, and 107 bu/A, respectively) were the superior performers in irrigated trials. The irrigated hard red and white varieties averaged 15.0% grain protein. In the Soda Springs dryland trial, Dayn, WB9411, WB9668, and LCS Star (W) yielded best (84, 66, 63 and 62 bu/A, respectively), with a nursery average of 58 bu/A. The dryland hard spring trial had average proteins of 13.8%, and high disease pressure from stripe rust.

PROJECTIONS: Results of the accomplishments will be published and used by growers, consultants, industry representatives, and public and private breeders. Results will also be presented at cereal schools.

Additional information can be found on the website http://www.extension.uidaho.edu/cereals/, where links to all reports in all districts are available.

PUBLICATIONS:

Marshall, J., Schroeder, K. and Flowers, M. 2015. 2013-14 Idaho winter wheat variety performance tests and 2012-2014 yield summaries. Idaho Grain Producers magazine. Fall 2015. p. 23-25.

Marshall, J., and Schroeder, K. 2015. 2014 Idaho spring wheat variety performance tests and 2012-2014 Yield Summaries. Idaho Grain Producers magazine. Spring 2015. p. 20-21.

BOOK CHAPTER Smiley, R.W. and J.M. Marshall. 2015. Resistance and tolerance of spring wheat and barley to *Heterodera avenae* in the USA. In. A.A. Dababat and R.W. Smiley (eds.). Nematodes of Small Grain Cereals: Current Status and Research. FAO, Rome, Italy. *In Press.*

Rashed, A., F. Etzler, C. Rogers, and J. M. Marshall. 2015. Wireworms in Idaho Cereals: A Guide to Monitor Numbers and Identify Predominant Species in the Intermountain Region. University of Idaho, Idaho Agricultural Experiment Station Current Information Series. CIS Bulletin 898.

Marshall, J.M., Jackson, C.A., Shelman, T., Beck, L., and O'Brien, K. 2015. 2014 Small Grains Report, South central and Southeast Idaho Cereals Research and Extension Program. Idaho Agricultural Experiment Station. UI Research Bulletin 186. 125 pp.

G. Hu, D.E. Obert, C.P. Evans, K. Satterfield, S. Ellberg, J.M. Marshall, A. Budde, and C. Martens. 2014. Registration of 'Merem' Spring Malting Barley. J. of Plant Registrations 8:233-235.

Schroeder, K., and Finkelnburg, D. 2015. 2014 Small Grain and Grain Legume Report, Northern Idaho Small Grain and Grain Legume Research and Extension Program. Idaho Agricultural Experiment Station. Research Bulletin 187. 56 pp.

Abstracts: Arcibal, S.M., Baldwin, T.T., Jackson, C.A., Shelman, T., and Marshall, J.M. 2015. Screening for FHB Susceptibility in Wheat Cultivars in the Western U.S. Contributed presentation (poster) for the USWBSI meeting, St. Louis, MO. Dec 6, 2015.

In addition the tables were sent out specifically to Idaho, Oregon, Washington and Montana seed dealers, and extension personnel, PNW public and private wheat and barley breeders and specialists.

Table 1. Wheat nursery locations and site information, 2015 harvest.						
Location	**District**	**Winter/ Spring**	**Irrigated/ Dry**	**Number of Entries**	**Average Yield**	**Yield Range**
Bonners Ferry	N	W	Dry	60	101	71-125
Genesee	N	W	Dry	60	95	81-111
Moscow	N	W	Dry	60	108	90-128
Nezperce	N	W	Dry	60	58	40-70
Tammany	N	W	Dry	60	113	79-135
Tensed	N	W	Dry	60	106	63-128
Bonners Ferry	N	S	Dry	38	45	29-57
Craigmont	N	S	Dry	38	35	27-42
Genesee	N	S	Dry	38	49	36-67
Moscow	N	S	Dry	38	54	48-61
Parma	S	W	Irrigated	75	140	68-168
Parma	S	S	Irrigated	8	-	-
Kimberly	S	W	Irrigated	72	135	114-161
Rupert	E	W	Irrigated	72	129	93-156
Rupert	E	S	Irrigated	43	105	89-126
Aberdeen	E	W	Irrigated	72	126	90-155
Rockland	E	W	Dry	41	47	35-60
Ririe	E	W	Dry	75	47	37-62
Soda Springs	E	W	Dry	43	106	75-133
Aberdeen	E	S	Irrigated	43	120	99-150
Idaho Falls	E	S	Irrigated	43	98	31-125
Ashton	E	S	Irrigated	43	100	71-120
Soda Springs	E	S	Dry	39	60	36-84