

Grant Code: AP7067

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)

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Justification/Rationale: Idaho wheat producers need the most recent information and technology to improve production efficiency, increase economic returns, and maintain competitiveness. Extension programs enhance technology transfer to growers and industry personnel through cereal schools, published materials, websites, webinars, cereal variety trials, 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 growers' 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 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.

Objectives:

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

Methods/Plan of work:

The Extension Wheat Nurseries are coordinated through the leadership of the Extension Cereal Specialists. County Extension Educators assist as local coordinators of some of the trials. Fourteen winter nurseries were planted, and 8 spring nurseries are planned for the 2023-2024 growing season. There is 1 Parma winter nursery and 1 spring nursery planned (irrigated); 7 winter nurseries (4 irrigated, 3 dryland) and 5 spring nurseries planned (4 irrigated, 1 dryland) in SE Idaho; 6 winter (all dryland or rainfed) and 2 spring nurseries planned (all rainfed) in north Idaho. The winter and spring nurseries typically include soft white, hard red, and hard white wheat classes and at times club and 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

³⁾ insect pests, yield, test weight, protein, plant height, and lodging. Similar procedures are used in all nurseries. The entries are randomized and replicated (four times) in a randomized complete block design to provide for objective evaluations and statistical analysis.

Wheat quality is always a concern and wheat samples harvested from the Extension Wheat nurseries are submitted to the Wheat Quality Lab in Aberdeen, directed by Sarah Windes, 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 the quality of advanced lines in diverse Idaho environments.

Field tours are conducted at most Extension Wheat Nurseries or variety strip demonstration plots 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 other stakeholders visit the nurseries at times other than the scheduled tours.

Duration: Continuous

Cooperation/Complementation:

Aberdeen Wheat Quality Laboratory: Sarah Windes, Director. County Extension Educators, IWC, IBC, IGPA, Alecia Kiszonas, PNW Wheat Quality lab in Pullman, WA, public and private breeders, and grower cooperators. Julia Piaskowski, Statistician, Moscow, UI. The project is a coordinated effort throughout the state and complements similar trials in Washington and Oregon. Data provides opportunity for additional analyses relating to environmental impacts on variety performance and quality.

Public and private entries are included in the trials, reflecting varieties used by producers. All private breeding companies and seed producers are invited to participate in the trials and are invited to discuss their varieties at all field days. Private industry reps use the trials to view variety performance during the growing season.

Anticipated Benefits/Expected Outcomes: Idaho wheat producers will receive the most recent wheat variety performance information to improve production efficiency, increase economic returns, and maintain their competitiveness. There is significant economic impact associated with determining the varieties that perform best in different environments for producers and end-users.

Transfer of Information/Technology:

Information on variety performance is shared with growers and industry personnel through winter cereal schools, published materials, wheat nurseries, demonstrations, field tours and websites. Data is released as soon as possible after harvest, with an emphasis on distributing data on winter wheat before fall planting.

Literature Review: none.

References:

Li, X., Guo, T., Bai, G., Zhang, Z., Marshall, J.M., Garland-Campbell, K.A., Yu, J. 2022. Genetics-inspired data-driven approaches explain and predict crop performance fluctuations attributed to changing climatic conditions. *Mol Plant*. 2022 Feb 7;15(2):203-206. doi: 10.1016/j.molp.2022.01.001. Epub 2022 Jan 5

Marshall, J.M., Yimer, B., Shelman, T., Jones, L., Hatch, J., and Windes, S.M. 2023. 2022 Small Grains Report, Southcentral and Southeast Idaho Cereals Research and Extension Program. University of Idaho, Idaho Agricultural Experiment Station Bulletin. CIS BUL 206. 161 pp

Marshall, J.M., Yimer, B., Shelman, T., Jones, L., Hatch, J., Moll, M., and Windes, S.M. 2022. 2021 Small Grains Report, Southcentral and Southeast Idaho Cereals Research and Extension Program. University of Idaho, Idaho Agricultural Experiment Station Bulletin. CIS BUL 205. 159 pp

Marshall, J.M., Yimer, B., Shelman, T., Jones, L., Baldwin, S., Hogge, J., Hatch, J., Moll, M., and Windes, S.M. 2021. 2020 Small Grains Report, Southcentral and Southeast Idaho Cereals Research and Extension Program. Idaho Agricultural Experiment Station. UI Research Bulletin 204. 150 pp. University of Idaho, Idaho Agricultural Experiment Station Bulletin. CIS BUL 204. 163 pp.

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FY2025
COMMODITY COMMISSION BUDGET
Principal Investigator: Juliet Marshall

Allocated by <u>Idaho</u> Wheat Commission	during FY2023	\$	83,814
(Commission/Organization)			
Allocated by <u>Idaho</u> Wheat Commission	during FY2024	\$	93,850
(Commission/Organization)			

REQUESTED SUPPORT:		<u>Awarded for FY2024</u>	<u>Requested for FY2025</u>
Budget Categories			
(10) Salary (staff, post-docs, et NOTE: Faculty salary/fringe NOT allowed		\$ 46,440	\$ 47,239
(12) Temporary Help/IH		\$ 11,250	\$ 14,450
(11) Fringe Benefits		\$ 19,910	\$ 20,711
(20) Travel		\$ 8,000	\$ 7,825
(30) Other Expenses		\$ 8,250	\$ 6,750
(40) Capital Outlay >\$5k		\$ -	\$ -
(45) Capital Outlay <\$5k		\$ -	\$ -
(70) Graduate Student Tuition/Fees		\$ -	\$ -
TOTALS		\$ 93,850	\$ 96,975

TOTAL BUDGET REQUESTED FOR FY2025:	\$ 96,975
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BREAKDOWN FOR MULTIPLE INDEXES:						
Budget Categories	Marshall	Schroeder	Parma TBD	(Insert Co-PI Name)		
(10) Salary (staff, post-docs, et	\$ 28,259	\$ 18,980	\$ -	\$ -		
(12) Temporary Help	\$ -	\$ 11,250	\$ 3,200	\$ -		
(11) Fringe Benefits	\$ 11,671	\$ 8,772	\$ 268	\$ -		
(20) Travel	\$ 4,150	\$ 3,675	\$ -	\$ -		
(30) Other Expenses	\$ 2,250	\$ 3,500	\$ 1,000	\$ -		
(40) Capital Outlay >\$5k	\$ -	\$ -	\$ -	\$ -		
(45) Capital Outlay <\$5k	\$ -	\$ -	\$ -	\$ -		
(70) Graduate Student Tuition/Fees	\$ -	\$ -	\$ -	\$ -		
TOTALS	\$ 46,330	\$ 46,177	\$ 4,468	\$ -		
			Total Sub-budgets	\$ 96,975		

ANNUAL REPORT

²⁴ **Grant Code:** AP7067

Title: Education for Idaho Wheat Production: Extension Wheat Nurseries

Personnel: Dr. Juliet M. Marshall, Ext. Cropping Systems Mgmt Specialist, Aberdeen
Dr. Kurtis Schroeder, Ext. Cropping Systems Mgmt Specialist, Moscow
Dr. Olga Walsh, Ext. Cropping Systems Mgmt Specialist, Parma

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Abstract:

Growing conditions were both great and poor. In southern Idaho, higher than average precipitation in October and May significantly improved soil moisture. An unusually cool spring resulted in six-eight day delay in heading dates for winter wheat over that of the previous ten years. However, low test weights resulted from the late season rains on mature grain. Disease pressure overall was low, with low foliar diseases and no stripe rust pressure. All locations were successfully harvested except the irrigated trial at Rupert. In Northern Idaho, drought conditions reduced yields substantially, and plots were harvested 2-3 weeks earlier than usual.

For the spring grains, the low early season temperatures and cool spring rains delayed crop emergence and growth for the second year in a row, especially in the upper elevation areas of southeast Idaho. Yields were above average when compared to the previous ten years, and heading dates were delayed four days. Due to the late season rain, test weights were below average. Foliar disease pressure was low, with a very late appearance of stripe rust resulting in no crop loss. Fusarium head blight was found at low incidence. All spring locations were successfully harvested.

Background / Objectives: The objectives of the Extension Variety Trials are to present unbiased agronomic information to growers and stakeholders on variety performance. This includes end-use quality, disease response and environmental adaptation.

Results / Accomplishments:

Replicated wheat trials were conducted at thirteen winter and ten spring locations for harvest in 2023. All trials were located on grower fields except those at Parma, Genesee (spring only), Kimberly, Aberdeen and Tetonia, 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, with the exception of the hard wheat trials which were topdressed with additional nitrogen to meet protein targets. Six winter and five spring trials were irrigated and nine winter and two 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 and club varieties were included at some locations.

39 Milling and baking of harvest subsamples are currently being processed at the Wheat Quality Lab in Aberdeen, ID. Available agronomic data have been sent to cooperating breeders and county extension offices and are available on University websites. 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. Data are being prepared for presentation at other venues to ensure the information is provided to as wide an audience as possible.

Summer field tours were held at numerous sites in collaboration with county extension educators, providing an excellent opportunity for technology transfer on cereal related topics. Trial sites were located as much as possible on roadways where large signs were placed that acknowledged the support from the Idaho Wheat Commission. University of Idaho Cereal Schools, coordinated by specialists, county educators and industry representatives, were held January and February 2023 and afforded an opportunity to present the variety information as well as other related cereal management and marketing information.

Northern Idaho

North Idaho had a relatively mild winter, although a cold snap without snow cover in January 2023 resulted in some crop injury. The latter part of April, May and June had higher than normal temperatures and below normal precipitation. Despite some winter injury, the moderate spring temperatures provided ideal growing conditions and winter wheat yields were mostly near average. Spring yields were mixed, with near normal yields at Genesee, but below normal yields at Greencreek. The seeding at Greencreek was delayed, which undoubtedly impacted yield at this location. Stripe rust forecasts predicted a moderate risk year, but the below normal precipitation was not conducive to rust development and warmer conditions helped to activate adult plant resistance. Low incidence of rust was observed at some locations (particularly Nezperce winter wheat), but only observed on highly susceptible varieties.

Southwest Idaho

In southwest Idaho, the growing conditions were characterized by adequate soil moisture, cool air and cool soil temperatures in the spring. Irrigation helped with stand establishment in spring nursery and adequate tillering for winter nursery. Disease pressure was low. Parma station farm crew have struggled to maintain weed free fields in 2023; the yields in some plots may have been negatively affected.

Southeastern Idaho

In southeastern Idaho, growing conditions were very good for cool season crops. Soil moisture reserves were improved from previous years. Growing year precipitation during the 2023 season was less than eight inches in Aberdeen but was substantially greater than 2022 and 2021. An unusually cool spring resulted in an eight-day delay in heading dates for winter wheat and high yields. However, low test weights resulted from the late season rain at grain maturity. Disease pressure overall was low, with low foliar diseases and no stripe rust pressure in winter wheat. The usual soil-borne diseases were present and damaging where lack of crop rotation allowed fungal and nematode pathogens to increase. All locations were successfully harvested except the irrigated winter trial at Rupert, where low temperatures damaged the crop, reducing the stand in

⁷ the spring. That location was abandoned. The dryland trial at Rockland was harvested, but low stands resulted in a poor harvest.

For the spring grains, the low temperatures and cool spring rains delayed crop emergence and growth, especially in the upper elevation areas. From the first of the year throughout the growing season, growing degree days were significantly less than previous years until May when a return to more typical temperatures resulted in good crop growth through flowering and grain fill. Yields were above average when compared to the previous ten years, and heading dates were delayed four days. Foliar disease pressure was low, with a very late appearance of stripe rust resulting in no crop loss. Fusarium head blight was found only at low incidence. Soilborne diseases were present, with the severity depending on crop rotation. Cereal cyst nematode continues to reduce yield in many areas. All spring locations were successfully harvested.

Trial results can be found on our website:

<https://www.uidaho.edu/extension/cereals/scseidaho/sgr>

Outreach / Applications / Adoption:

Results of the accomplishments will be published in our Small Grains Reports 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.

Next Steps / Projections: We plan to continue the extension variety trials over multiple years and will continue to work with Dr. Julia Piaskowski to develop an online selection tool for growers to obtain information on specific varieties of interest. In addition, Julia is developing an app to provide the same information in a phone-based format.

Publications / Presentations / Popular articles / News Releases / Variety Releases:

Marshall, J.M., Yimer, B., Shelman, T., Jones, L., Hatch, J., and Windes, S.M. 2023. 2022 Small Grains Report, Southcentral and Southeast Idaho Cereals Research and Extension Program. University of Idaho, Idaho Agricultural Experiment Station Bulletin. CIS BUL 206. 161 pp.

Schroeder, K.L., and Howe, J.C. 2023. 2022 Small Grain and Grain Legume Report, Northern Idaho Small Grain and Grain Legume Research and Extension Program. Idaho Agricultural Experiment Station

In press/preparation:

Marshall, J.M., Yimer, B., Abdullah, S., Shelman, T., Jones, L., Hatch, J., Balfe, C., and Windes, S. 2024. 2023 Small Grains Report, Southcentral and Southeast Idaho Cereals Research and Extension Program. Idaho Agricultural Experiment Station. UI Research Bulletin 209. 145 pp.

Schroeder, K.L., and Howe, J.C. 2024. 2023 Small Grain and Grain Legume Report, Northern Idaho Small Grain and Grain Legume Research and Extension Program. Idaho Agricultural Experiment Station.

Table 1. Wheat nursery locations and site information, 2023 harvest.

Location	District	Winter/ Spring	Irrigated/ Dry	Number of Entries	Average Yield (bu/A)	Yield Range (bu/A)
Bonniers Ferry	N	W	Dry	64	90	67-109
Genesee	N	W	Dry	68	114	88-126
Moscow	N	W	Dry	67	117	91-142
Nezperce	N	W	Dry	68	95	81-109
Tammany	N	W	Dry	69	113	93-130
Tensed	N	W	Dry	67	110	89-124
Genesee	N	S	Dry	35	72	60-81
Greencreek	N	S	Dry	35	47	14-62
				473	4 reps	1,892 plots
Parma	S	W	Irrigated	35	156	145-181
Parma	S	S	Irrigated	No report	---	---
					4 reps	136 plots
Kimberly	S	W	Irrigated	57	147	83-177
Rupert	E	W	Irrigated	56	--	--
Aberdeen	E	W	Irrigated	57	150	88-169
Ririe	E	W	Irrigated	56	125	98-159
Ririe	E	W	Dry	63	36	29-46
Rockland	E	W	Dry	59	--	--
Soda Springs	E	W	Dry	65	30	7-45
Rupert	E	S	Irrigated	56	115	92-135
Aberdeen	E	S	Irrigated	59	134	111-154
Idaho Falls	E	S	Irrigated	58	127	106-143
Tetonia	E	S	Irrigated	58	112	92-141
Soda Springs	E	S	Dry	58	49	36-64
				702	4 reps	2808 plots