Project #: 139312
Progress Report: Year 2 of 3
Title: EVALUATION OF WHEAT VARIETIES
Researcher: Clark Neely, Variety Testing Program Lead

EXECUTIVE SUMMARY: The WSU Extension Cereal Variety Testing Program (VTP) continues to conduct 102 annual winter and spring soft white and hard red wheat variety trials throughout 42 locations in Eastern Washington. Data were posted in a timely manner following harvest and distributed via list serve, website, popular press articles, and in-person field days and grower meetings. The program increased overall winter wheat plots by 14% in 2023 with the inclusion of new CoAXium entries.

INTRODUCTION: The primary goal of the VTP is to provide growers, the agribusiness industry, university researchers, and other interested clientele with comprehensive, objective, and independent information on the adaptation and performance of winter and spring wheat cultivars across the climatic regions of eastern Washington where wheat is grown. The VTP regularly conducts trials at 24 winter wheat, 18 spring wheat, and three fall planted spring wheat locations annually for a total of 102 individual wheat variety trials.

APPROACH: Replicated VTP field evaluation trials will be conducted for winter and spring wheat across each precipitation zone of the dryland wheat production areas (plus irrigated sites) in eastern Washington. Each location was planted and managed with a grower cooperator using practices typical for that growing area. The trials will include approximately 42 entries for common soft white winter wheat trials and 30 Clearfield® and CoAXium® winter wheat entries planted at 24 locations. The Clearfield® and CoAXium® winter wheat entries were split out into a separate trial beginning in 2023 to accommodate a greater number of requests without shrinking the available slots to test common winter wheat varieties. This led to a 14% increase in winter wheat plots from 84 entries in 2022 up to 96 entries in 2023. Another 30-36 entries are routinely planted at 16 locations for the hard red winter trials. Breeding programs can submit entries for planting at: 1) all locations; 2) locations receiving <12" precipitation; 3) locations receiving 12-16" precipitation; 3) locations receiving >16" precipitation; or 4) irrigated locations. Spring wheat trials consisted of 24 entries planted at 18 locations and breeding programs may choose to have entries planted at: 1) all locations; 2) rainfed locations; or 3) irrigated locations. Additional fall-planted HRS trials will be planted at both irrigated locations as well as one dryland location. Fertilizer rates for hard wheat trials will be adjusted according to yield goal, historical precipitation, soil test results, and cropping history.

RESULTS: The vast majority of trial yield data was available within 48 hours of harvest. This data was initially emailed out to the 'prelimdata' list serve which currently stands at 424 subscribers, up 29 from 2022. Once harvested, samples were brought to the lab, cleaned and analyzed for grain protein and test weight, and then data was compiled into tables and posted on our website (http://smallgrains.wsu.edu/variety). All individual winter wheat location yield data were posted by August 28 and regional summaries posted September 1. All spring wheat

individual location tables (including test weight and grain protein) were completed by September 15. The final technical report was completed and posted at the end of December.

The VTP continues to share entry seed with a multitude of other programs inside and outside of WSU to screen varieties for agronomic traits including stripe rust, Hessian fly, cold tolerance, snow mold, aluminum tolerance, end use quality and falling numbers. The VTP also makes a concerted effort to collect additional ratings on emergence and lodging when possible. These ratings are then posted on our website and variety selection tool. The variety selection tool mobile app continues to garner interest reaching a total of 478 downloads since its launch in May of 2021. In coordination with growers, seed dealers, extension and other allied industry, the VTP held/attended 18 field days in the month of June and reached approximately 505 attendees at these events. In collaboration with the WSU Division of Academic Outreach and Innovation, "virtual" field days were again recorded at Lind (low rainfall varieties) and Pullman (high rainfall varieties) and posted on July 3 and July 19, respectively, on the CAHNRS YouTube Channel and have received a combined 307 views.

IMPACT: The economic value (impact) of the WSU VTP is measured by providing information to growers and seed industry personnel leading to variety selections that maximize profitability and minimize risk. In 2023, 2.3 million total acres of wheat were planted. When comparing the yield from the top five winter wheat varieties and top four spring wheat varieties to the trial average, there is approximately a 5 and 3 bushel per acre advantage, respectively. When multiplied across 1.8 million winter wheat and 500,000 spring wheat planted acres using an average price of $6.50 per bushel, the VTP had the potential to generate an additional $68 million dollars in 2023. Both the variety testing website and the variety selection tool average over 8,000 page views each on an annual basis. Another 500+ contacts are made through field days and grower meetings each year. While yield is important, there are multiple traits that growers look for in a variety, which vary in importance from region to region. While more difficult to assess economic impact, traits such as falling numbers, winter survival, rust resistance, hessian fly resistance, aluminum tolerance, emergence, and snow mold resistance unquestionably have the potential to greatly improve yield or decrease inputs for some growers and in certain environments. The data generated by the Western Wheat Quality Lab using samples from the VTP helps also ensure released varieties maintain superior grain quality, thereby maintaining overseas markets for PNW wheat which supports prices. An additional impact of the VTP comes through the evaluation of breeding lines, providing valuable information to aid breeders in variety release decisions, leading to new and improved wheat varieties available to growers in Washington.

Year		Harvested Wheat Acres	AVG Yield Gain for Top Varieties in Trials	Averaged Price of Wheat	Additional Income Generated
		# acres	bu/acre	$/bu	$
2022	Winter Wheat	2,300,000	9.6	$9.43	$208,214,400
	Spring Wheat	475,000	2.9	$9.43	$12,989,825
2023	Winter Wheat	1,800,000	5.3	$6.50	$58,500,000
	Spring Wheat	500,000	3.0	$6.50	$9,750,000
Total					**$289,454,225**

WGC project number: 139312				
WGC project title: Evaluation of Wheat Varieties				
Project PI(s): Clark Neely				
Project initiation date: 07-01-2022				
Project year (X of 3-yr cycle): 2 of 3				
Objective	**Deliverable**	**Progress**	**Timeline**	**Communication**
1. Conduct representative and objective wheat variety field trial evaluations at locations that represent major production areas of Washington.	a) 24 soft white winter wheat trials; 36-54 entries/trial	i.) All 2022 trials harvested and posted ii.) All 2023 trials harvested and data posted by September 1 iii.) All 2024 winter trials planted iv. Collaborative trials are continuing with OSU at Eureka and Walla Walla.	Each year trials are planted in the spring or fall. Plots are maintained throughout the year and heading dates/plant heights are collected before harvest. Data results are available to growers at the end of the harvest season, which runs from mid-late July through September.	Results from the variety trials are communicated via Extension programming and are detailed under Objective #4.
	b) 16 hard winter wheat trials: 24-36 entries/trial	i.) All 2022 trials harvested and posted ii.) All 2023 trials harvested and data posted by September 1 iii.) All 2024 winter trials planted iv. Collaborative trials are continuing with OSU at Eureka and Walla Walla.		
	c) 24 Clearfield/CoAXium winter wheat trials; 12-30 entries/trial	ii.) All 2023 trials harvested and data posted by September 1; first year for these trials iii.) All 2024 winter trials planted iv. Collaborative trials are continuing with OSU at Eureka and Walla Walla.		
	c) 18 soft spring wheat trials; 24 entries/trial	i.) All 2022 trials harvested and posted ii.) All 2023 trials harvested and data posted by mid-September iii.) 2024 call for entries to be sent out in mid-January		
	d) 18 hard spring wheat trials; 24 entries/trial	i.) All 2022 trials harvested and posted ii.) All 2023 trials harvested and data posted by mid-September iii.) 2024 call for entries to be sent out in mid-January		
	e) 3 hard red spring fall-planted trials; 18 entries/trial	i.) All 2022 trials harvested and posted ii.) 2023 trials harvested and data posted; Dayton planting prevented due to early cold snap in October/November iii.) All 2024 trials planted		
2. Include commercially relevant entries in trials including currently grown varieties and advanced breeding lines from major public and private breeding programs in the region.	All widely grown, commercially available varieties and promising experimental lines are included in trials.	i.) 2022 winter trials 53% public, 47% private; spring trials 71% public, 29% private. Every major breeding program in the PNW is actively participating in the VTP. ii.) 2023 winter trials 59% public, 41% private; spring trials 75% public, 25% private. Every major breeding program in the PNW is actively participating in the VTP. iii.) All 2023 entries, locations, and maps are posted on the variety testing website. 2024 winter entries and maps are posted online as well. iii.) Hard paper copies of field maps are available in PVC tubing on-site as well following spring field work.	i.) Deadline for winter entry requests is August 8 and seed is due by August 12 (low rainfall) and 22 (high rainfall). ii.) Deadline for spring entry requests are February 1 and seed is due February 11.	i.) Send out 'call for entries' letter by mid-July requesting winter entries. ii.) Send out 'call for entries' letter by mid-January requesting spring entries. iii.) Maintain positive relationship with breeding programs to ensure future participation.
3. Provide access to entry seed, variety trials and harvested grain enabling other researchers and supporting projects to gather information from the trials/entries.	Participation and ratings of variety characteristics from other projects/ programs.	Cooperation with breeders, pathologists, entomologists, quality lab, FGIS, seed dealers, WSCIA, other universities, and Extension. Data gathered and summarized to produce ratings for falling numbers susceptibility, end use quality, stripe rust resistance, hessian fly resistance, snow mold resistance, aluminum tolerance, emergence, and winter	Ongoing cooperation and collaboration that fit with timelines and other listed objectives.	Quality results in preferred variety pamphlet, falling number results presented by corresponding project, disease ratings presented in seed buyers guide, VTP data used for variety release and PVP applications. All data/ratings included in variety selection tool.

		survival. Ratings are updated annually and incorporated into the final technical report each year. They are also available via the variety selection tool/mobile app and in variety characteristics tables posted on the WSU small grains website.		
4. Deliver an Extension education program to make the results and interpretation of the variety trials available to growers, the seed industry, and other clientele.	a.) Grower meetings	2022: Provided slides for Ritzville and Davenport grower meetings in January (unable to present in person). Presented at WSU Wheat Academy in December. 2023: Presented at Ritzville and Davenport grower meetings in January. 2024: Scheduled to present at Ritzville and Davenport grower meetings in January 2024.	Will attend meetings when invited.	Attend in person and present results through powerpoint presentation and handouts when appropriate.
	b.) Field Tours	i.) 2022: 20 in-person field days (605 attendance); 2 virtual field days (232 views to date). i.) 2023: 18 in-person field days (505 attendance); 2 virtual field days (307 views to date).	June-July; actual dates posted on website	*List of Field Days provided below; provided paper handouts of data; List of dates posted on website and emailed through prelimdata list serve
	c.) Email List Serve	1.) 2022 data and trial updates delivered; total of 37 emails sent to subscribers in 2022 ii.) 2023 data and trial updates delivered; total of 53 emails sent to subscribers in 2023	Data emailed out August through December; trial updates/observations posted throughout year.	i.) 2022 data and trial updates delivered to 395 subscribers; list serve membership increased 11% in 2022 ii.) 2023 data and trial updates delivered to 424 subscribers; list serve membership increased 7% in 2023
	d.) Website	i.) 2022 data and VT field maps posted ii.) 2023 data and VT field maps posted iii.) 2024 winter VT field maps posted	August through December	10,255 pageview for 2022 VT website TBD pageview for 2023 VT website
	e.) Annual Report	i.) 2022 final report posted in January ii.) 2023 final report posted in December	December-January	The annual report is published as a WSU technical report online and in hard copy upon request.
	f.) WSCIA Seed Buyers Guides	2022 Guide completed 2023 Guide completed	February	Seed Buyers Guide published in February
	g.) Wheat Life	2022: winter and spring VT articles completed 2023: winter and spring VT articles completed 2024: winter VT article to be submitted in April using 2023 data	Spring VT article: January Winter VT article: May	Articles published in Wheat Life in January and May each year.
	h.) Variety Selection Tool (smallgrains.wsu.edu)	Selection tool is updated once the final technical report is completed.	January	2022: 3,337 page views; 177 new mobile app downloads 2023: TBD page views; 96 new mobile app downloads
*2022 in-person Wheat Field Days included: Horse Heaven, Connell, Ritzville, St. Andrews, Moses Lake, Harrington, Lind, Fairfield, Mayview, Anatone, Reardan, Almira, St. John, Lamont, Eureka, Walla Walla, Dayton, Farmington, Pullman/Spillman, Bickleton. *2023 in-person Wheat Field Days included: Horse Heaven, Connell, Ritzville, Douglas, Moses Lake, Harrington, Lind, Fairfield, Mayview, Reardan, Almira, St. John, Eureka, Walla Walla, Dayton, Farmington, Pullman, Bickleton.				