OREGON WHEAT COMMISSION

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Annual Research Reports

2024-2025

Final Reports

Oregon Wheat Commission Project Report

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Project Overview

Title of Project: Improving Weed Management in Oregon Wheat Production Systems (Year 3)

Commission Funding Amount: $ 57,939

Funding Year: 2024-2025

Final Report or Progress Report Final

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

The major change occurred under Objective 3. Unfortunately, it was not possible to purchase a WeedChipper from the University of Western Australia (UWA). After several meetings and discussions, attorneys from both Oregon State University (OSU) and UWA were unable to reach an agreement due to liability issues that were not covered under existing insurance policies. As a result, instead of conducting the originally proposed comparison between the

Describe the outcomes of the research project. What was learned from the research work?

Objective 1. Identify best management practices (BMPs) to control weeds in CoAXium wheat.
In the trial where we used different Aggressor AX rates in spring combined with different adjuvants (Tables 1), weed control did not show significant differences among sprayed treatments for any of the studied weed species. Nine weeks after treatments, feral rye control ranged from 90-95%, downy brome control ranged from 98-100%, and jointed goatgrass control ranged from 53-98%.
In a separate trial, soft white CoAXium wheat was stressed using low nitrogen and/or the presence of downy brome to evaluate situations in which Aggressor might be more likely to

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

Implications for growers of Objective 1: Aggressor AX is safer on soft white CoAXium wheat than the original Aggressor formulation. Growers using Aggressor (rather than Aggressor AX, the newer product), are advised to limit its use to hard red CoAXium wheat varieties. In contrast, Aggressor AX can be safely applied to both soft white and hard red CoAXium wheat varieties.
Under moderate weed infestations, fall applications of Aggressor AX may provide greater yield protection than spring applications. For effective control of jointed goatgrass with Aggressor AX, the use of crop oil concentrate (COC) or methylated seed oil (MSO) adjuvant is recommended over nonionic surfactant (NIS).

Implications for growers of Objective 2: Based on the findings of this study, narrow inter-row spacing was the most effective factor for suppressing downy brome and overall weed pressure in the wheat crop. The lack of significant differences in competitive ability between the Bobtail and Dagger cultivars, despite their contrasting plant morphologies, suggests that varietal plant architecture alone is unlikely to be a key trait for enhancing weed suppressive capacity. Building on these results, a regional effort has been initiated to identify wheat traits that contribute to weed suppression and to determine which Oregon varieties exhibit the

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Improving Weed Management in Oregon Wheat Production Systems (Year 3)
Commission Funding Amount: $57,939
Scientist: Judit Barroso

Table 1. Average control of feral rye (Rye; *Secale cereale*), downy brome (DB; *Bromus tectorum*), and jointed goatgrass (JGG; *Aegilops cylindrica*) after being treated with Aggressor AX at CBARC, Adams, Oregon, in the spring of 2025. Analyses to find significant differences were conducted according to Tukey test.

Treatment	Rate	Rye Control (%)	DB control (%)	JGG control (%)
Untreated Check	-	0b	0b	0b
Zidua SC + Aggressor AX + NIS	3.2 oz/A + 10 fl oz/A + 0.25 % v/v	90a	98a	64a
Aggressor AX + NIS	12 fl oz/A + 0.25% v/v	91a	100a	85a
Aggressor AX + MSO	12 fl oz/A + 1% v/v	93a	99a	97a
Aggressor AX + COC	12 fl oz/A + 1% v/v	94a	100a	96a
Aggressor AX + NIS	16 fl oz/A + 0.25% v/v	95a	100a	65a
Aggressor AX + MSO	16 fl oz/A + 1% v/v	93a	100a	98a
Aggressor AX + COC	16 fl oz/A + 1% v/v	93a	99a	94a
Aggressor AX + COC + NIS	16 fl oz/A + 1% v/v + 0.5%	95a	100a	97a

Table 2. Alternative herbicides to control horseweed and hairy fleabane in a growth chamber study.

Hercibides (a.i.) (Group #)	Trade name	Rate (fl oz/ac)	Weed species*
Glufosinate (10)	Forfeit® 280	29	Marestail
Clopyralid (4)	Stinger®	5	Horseweed
Haluxifen (4) + florasulam (2)	Quelex®	0.75	Horseweed
Metribuzin (5)	Metribuzin 75	6	Not listed
Pyraflufen (14)	Vida®	1	Marestail (suppression)
Bromoxynil (6) + pyrasulfotole (27)	Huskie	14	Not listed
Saflufenacil (14)	Sharpen	1	Not listed
Dicamba (4)	Dicamba DMA salt	12	Not listed

*This column indicates whether the weed species were listed on the herbicide label. Hairy fleabane was never listed on the label of any product evaluated.

Figure 1. Downy brome biomass (g/m2) per treatment in the experiment in 2024 and 2025. The treatments were Fallow, False seeding with a no-till drill (False_GP), False seeding with a conventional drill (False_IH), Winter wheat var. Bobtail seeded with a no-till drill (Bob_GP), Winter wheat var. Dagger seeded with a no-till drill (WW_GP), Winter wheat var. Dagger seeded with a no-till drill at high rate (WW_GP+), Winter wheat var. Dagger seeded with a conventional drill (WW_IH), and winter peas seeded with a no-till drill (Peas_GP). The black solid line inside the colored boxes indicates the median of the data, and the dashed line indicates the mean. Different letters on top of the boxes indicate significant differences according to the Tukey test (p-value < 0.05).

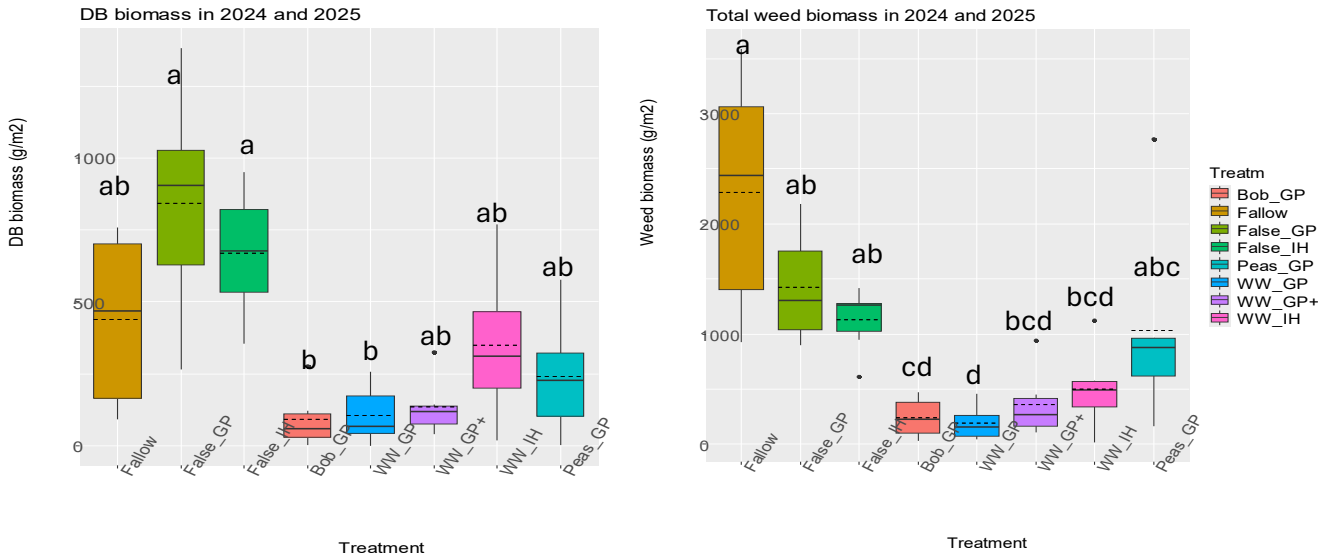


Figure 2. Winter wheat yield (bu/ac) in the trial at CBARC, Adams, OR in 2024 and 2025. Winter wheat (WW) var. Bobtail seeded with a no-till drill (Bob_GP), WW var. Dagger seeded with a no-till drill (Dag_GP), WW var. Dagger seeded with a no-till drill at high rate (Dag_GP+), WW var. Dagger seeded with a conventional drill (Dag_IH).

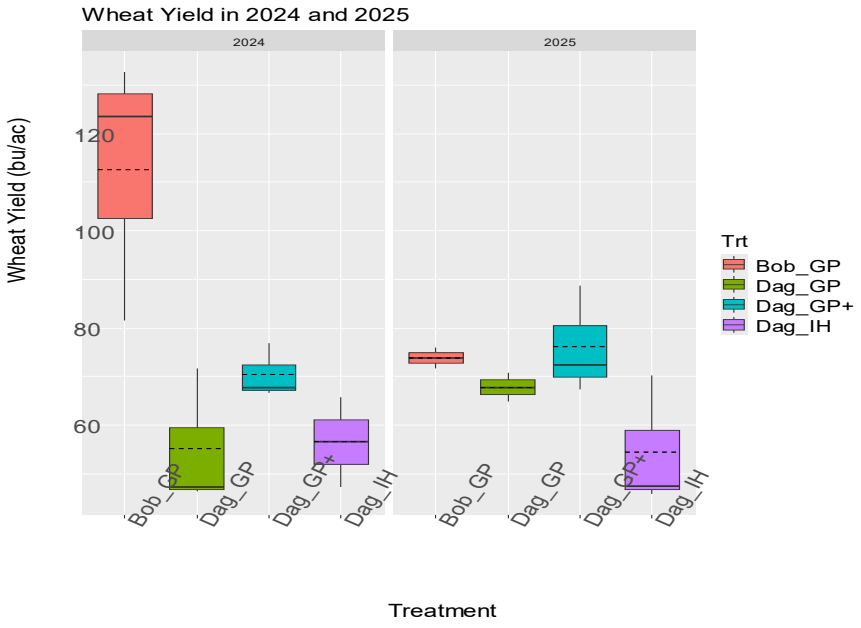


Figure 3. a) Weed control (%) on pea stubble using a broadcast application and a WeedIT spraying at high (WeedIT-HS) and low (WeedIT-LS) sensitivity settings in August of 2024 in Athena, OR. The tank-mix used was Saflufenacil + glyphosate (Sharpen 2 fl oz/A + Gly Star Xtra 48 fl oz/A) and b) Photo of one of the prickly lettuce plants marked with water-sensitive papers.

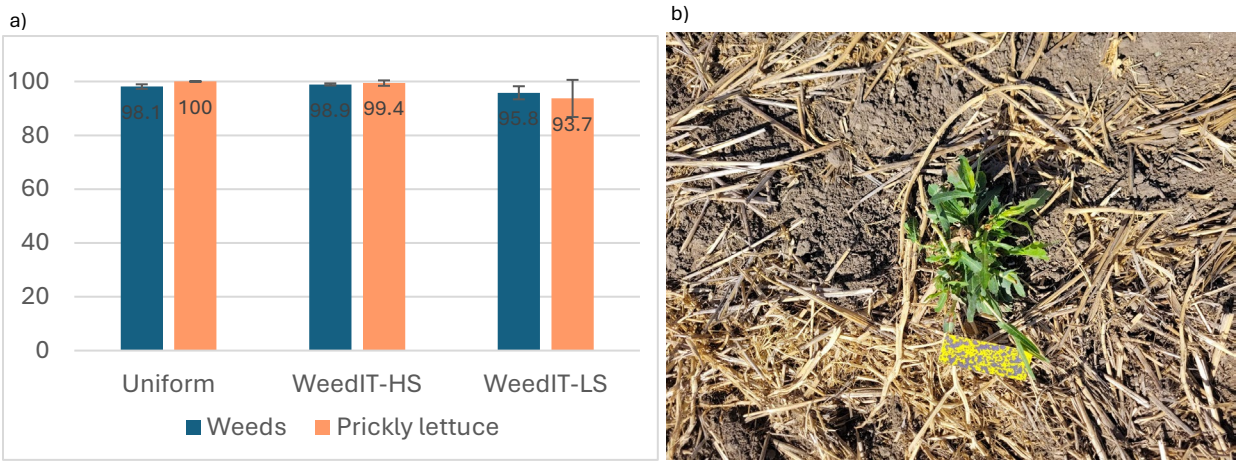
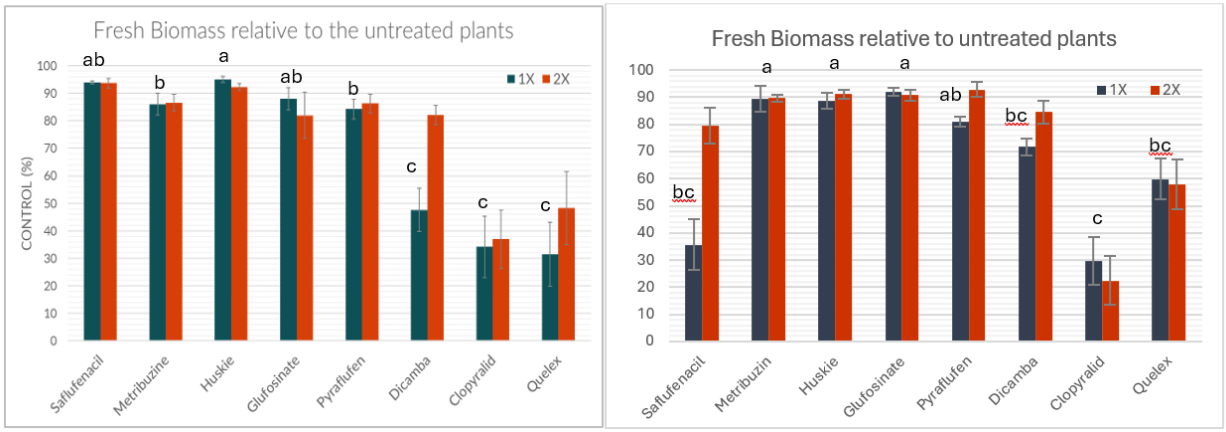


Figure 4. Control of horseweed (a) and hairy fleabane (b) with alternative herbicides to glyphosate applied at 1X and 2X rates at the seedling stage in a growth chamber study. Different letters on top of the 1X bars indicate significant differences according to the Tukey test (p-value < 0.05).



Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Improving Control of Wheat Stripe Rust

Commission Funding Amount: $ 12,000

Funding Year: 2024-2025

Final Report or Progress Report Final

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

There were no any changes or adaptations to the project from the objectives and procedures described in the initial proposal. We accomplished all objectives for the funding year 2024-2025.

Describe the outcomes of the research project. What was learned from the research work?

1) During the 2024 wheat growth season, we identified 2 races (PSTv-35 and PSTv-37) of the wheat stripe rust pathogen from 21 samples collected from Oregon with PSTv-37 as the most common race.
2) In 2024, we evaluated 196 breeding lines from Margaret Krause's wheat breeding program, 199 entries in the PNW winter and spring wheat variety trial nurseries, and 73 entries in the west uniform regional winter and spring wheat nurseries in 6 field locations and in the greenhouse with 5 races, and identified breeding lines with resistance to stripe rust.
3) We made accurate forecasts for stripe rust using our prediction models, conducted field

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

The results of stripe rust virulence races in Oregon, the PNW, and the country are used by the breeding programs to select germplasms carrying effective genes for developing wheat varieties for resistance to stripe rust. Based on the virulence data, we have selected predominant races, especially PSTv-37, and those representing different virulence and genetic groups to use in screening wheat germplasm for resistance to stripe rust in the greenhouse.

The results of screening wheat breeding lines for stripe rust resistance are used by the breeding programs to release new varieties with adeqaute resistance to stripe rust for growers to plant to aviod stripe rust and reduce fungicide cost.

The stripe rust forecasts, updates, and recommendations made during the 2024 crop season helped reduce unnecessary use of fungicides, saving growers millions of dollars. The data of screening wheat germplasm, testing fungicides for efficacy on control of stripe rust, and testing commercial varieties for yield loss and fungicide response are used to update Seed-Buying Guide for growers to select stripe rust resistant varieties to grow, which should reduce stripe rust damage and reduce cost of fungicide application. The fungicide testing data also allow growers to select more effective fungicides to use and determine when to use fungicides to maximize profit.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Breeding Hard Red Spring Wheat for Oregon

Commission Funding Amount: $ 2,000

Funding Year: 2024-2025

Final Report or Progress Report Final

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

No major changes were made to the proposal.

Describe the outcomes of the research project. What was learned from the research work?

This research developed 70 fixed hard spring wheat experimental lines, then identified nine of them with agronomic, disease resistance, and quality characteristics that may make them suitable for a variety release.

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

No recommendations were made from this research.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Wheat and Barley Variety Testing for Oregon

Commission Funding Amount: $ 170,400

Funding Year: 2024-2025

Final Report or Progress Report Final

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

Of the trials originally proposed for the 2024-2025 growing season, reports were released for all trials except the Ontario trial, the Merrill trial, and the Klamath Falls spring trial. The Ontario trial was accidentally harvested by the person harvesting bulk wheat around the plots, while the Merrill and Klamath Falls trials had higher-than-acceptable variability.

Describe the outcomes of the research project. What was learned from the research work?

This research gave us a comprehensive understanding of cereal variety performance for the 2025 growing season.

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

65 research reports from this work detailing variety performance were posted on our website following harvest. In addition, I have shared variety recommendations with growers at grower meetings across the state, and updated data on our mobile app, "OSU Cereals". Specific recommendations from this work are highly dependent on a grower's specific growing conditions.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Disease Notes 2025 and RDFA Graduate Student Support

Commission Funding Amount: 30,000

Funding Year: 2

Final Report or Progress Report Progress

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

No

Describe the outcomes of the research project. What was learned from the research work?

Rachael Plunkett maintains a high GPA and also “self funded” conference travel to APS in summer 2025 through receiving three highly competitive travel grants.

Disaese notes are ongoing. We are evaluating soilborne wheat mosaic virus in Irrigon, Fusarium crown rot in Moro, and stripe rust at Ruggs (Krause trial) and CBARC (Graebner trial). Other diseases will be screened this spring, opportunistically.

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

Rachael Plunkett’s thesis will result in approximately 3 applied papers that will assist growers in understanding risk of cover cropping when nematode population suppression is of interest.

We communicate disease note results with Graebner and Krause. Regarding stripe rust: growers have been alerted to the first occourance of stripe rust in the region. These disease notes will assist Krause in making selections and Graebner for making variety recomendations in the presence of specific disease.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Seed Care Evaluation

Commission Funding Amount: 25,000

Funding Year: 2 of 2

Final Report or Progress Report Progress

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

No

Describe the outcomes of the research project. What was learned from the research work?

Over two years and three locations, we learned that two common expensive add ons: thiabendazole and zinc, when applied with seed care, did not impact yield, protein, or test weight of winter wheat.

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

Yes, we are communicating that growers can use basic seed care treatments for stand establishment and yield loss avoidance in most cases. A peer-reviewed manuscript is in preparation. Zinc additions can be profitable when DTPA extractable zinc is below 0.5ppm in the top 12 inches of soil.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Oregon barley variety development and deployment

Commission Funding Amount: $ 35,000

Funding Year: 2024–2025

Final Report or Progress Report Final

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

There were no major changes or adaptations to the project from what was described in the initial proposal.

Describe the outcomes of the research project. What was learned from the research work?

Objective 1 – Develop and deploy Beyond-tolerant spring-planted varieties adapted to Oregon's dryland environments.

A total of 573 F4 headrows were planted at Hyslop farm in Corvallis. These were derived from the following crosses:

Oregon Promise/Successor (45 headrows)
DH160733/Successor (45 headrows)

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

Foundation seed of Beyond-tolerant spring feed barley variety 'Successor' is available with the Washington State Crop Improvement Association. Successor (Reg. no. CV-377, PI 702593), experimental designation DH190481, is a two-row spring barley released by Oregon Agricultural Experiment Station in 2023. It is well suited to dryland and conservation/no-tillage agricultural systems in eastern Oregon and Washington.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Developing improved winter wheat cultivars for Oregon

Commission Funding Amount: $ 262,163

Funding Year: 2025–2026

Final Report or Progress Report Final

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

After Dr. Margaret Krause took over the project from Dr. Bob Zemetra, the decision was made to scale back the hard white winter breeding program. No hard white winter crosses were made during the winters of 2024 or 2025. All hard white winter yield plots that had been planted in the fall of 2024 were harvested for grain yield in the summer of 2025, but other data collection on these lines was reduced. Seed samples from hard white winter headrows were

Describe the outcomes of the research project. What was learned from the research work?

Objective 1 – To develop new SWW, HRW, HWW, and winter club wheat cultivars adapted to high/low rainfall regions that have superior biotic/abiotic stress resistance/tolerance.

Marketing of new SWW variety releases 'Gale' and 'Mallory CL+' continued throughout the 2024–2025 funding cycle. The breeding program presented on these releases at the Hermiston Farm Fair in December of 2024, and at the Morrow Co. Dryland Crop Tour, the Hyslop Field Day, the Sheman Co. Crop Tour, the North Willamette Wheat Tour, the Hermiston Irrigated Wheat Field Day, the Pendleton State Field Day, the Sherman Station

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

Our recommendations are:

Growers in the Willamette Valley should consider trying out SWW variety 'Gale', available from Tualatin Valley Seeds, Ioka Marketing, and South Valley Feed and Seed. Gale won first prize in the Winter Wheat-Dryland category of the 2025 National Wheat Yield Contest with a yield of 186 bu/ac in Marion County. Gale ranks third in the Dr. Ryan Graebner's 2020–2025 high rainfall summary, with an average yield of 134.1 bu/ac, just behind 'AP Olympia' with 134.2 bu/ac and 'LCS Shine' with 139.1 bu/ac. Gale was ranked "Most Desirable" for end-use quality. Gale has shown strong resistance to stripe rust and improved resistance to Septoria compared with LCS Shine and 'Rosalyn'.

Growers in eastern OR who are interested in growing a SWW Clearfield variety should keep an eye out for Mallory CL+, which will be available to commercial growers soon. Mallory CL+ is the highest yielding and earliest heading Clearfield variety in Dr. Ryan Graebner's 2020–2025 low rainfall summary. Mallory CL+ has good stripe rust and Fusarium crown rot resistance as well as "Desirable" end-use quality.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Gene introgression and trait prediction for developing new and improved

Commission Funding Amount: $ 65,517

Funding Year: 2024–2025

Final Report or Progress Report Final

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

After Dr. Margaret Krause took over the project from Dr. Bob Zemetra, the decision was made to scale back the hard white winter breeding program. No hard white winter crosses were made during the winters of 2024 or 2025. All hard white winter yield plots that had been planted in the fall of 2024 were harvested for grain yield in the summer of 2025, but other data collection on these lines was reduced. Seed samples from hard white winter headrows were

Describe the outcomes of the research project. What was learned from the research work?

Objective 1 – To develop wheat breeding lines of SWW, HRW, HWW, and winter club wheat carrying genes for improved disease resistance and PPO reaction.

To support the wheat breeding efforts, molecular marker genotyping technician Hilary Gunn ran the following markers in the fall of 2024:

On 128 SWW experimental lines: Pch1 and Pch2 (strawbreaker foot rot/eyespot), sbm1 and sbm2 (soil-borne wheat mosaic virus), Glu-D1 and Glu-A1 (glutenins), and PPO-A1 (PPO

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

As the research described supports the OSU winter wheat breeding program, our recommendations would be the same as those listed in the final report for the project "Developing improved winter wheat cultivars for Oregon", which are as follows:

Growers in the Willamette Valley should consider trying out SWW variety 'Gale', available from Tualatin Valley Seeds, Ioka Marketing, and South Valley Feed and Seed. Gale won first prize in the Winter Wheat-Dryland category of the 2025 National Wheat Yield Contest with a yield of 186 bu/ac in Marion County. Gale ranks third in the Dr. Ryan Graebner's 2020–2025 high rainfall summary, with an average yield of 134.1 bu/ac, just behind 'AP Olympia' with 134.2 bu/ac and 'LCS Shine' with 139.1 bu/ac. Gale was ranked "Most Desirable" for end-use quality. Gale has shown strong resistance to stripe rust and improved resistance to Septoria compared with LCS Shine and 'Rosalyn'.

Growers in eastern OR who are interested in growing a SWW Clearfield variety should keep an eye out for Mallory CL+, which will be available to commercial growers soon. Mallory CL+ is the highest yielding and earliest heading Clearfield variety in Dr. Ryan Graebner's 2020–2025 low rainfall summary. Mallory CL+ has good stripe rust and Fusarium crown rot

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Foliar and Seed Applied Nitrogen fixing biofertilizers in wheat

Commission Funding Amount: $ 4,300

Funding Year: 2024-2025

Final Report or Progress Report Final

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

The original plan was to examine the biofertilizer product Mycogold and Envita. Unfortunately due to changes with state registration, I was not able to acquire Envita to apply as it is no longer registered for use in Oregon. Instead I was able to apply another similarly acting foliar product, Utrisha, which I have also tested in previous years of research.

Describe the outcomes of the research project. What was learned from the research work?

Both a seed (Mycogold) and foliar (Utrisha) applied biofertilizer product were examined in winter wheat under an unfertilized and fertilized treatment. Yield was significantly increased with the addition of fertilizer, increasing by about 20 bushels. There was also a significant yield response from using Utrisha and MycoGold with 57 lbs of nitrogen fertilizer with an increase of 6 to 7 bushels/acre. Utrisha applied with 57 lbs of nitrogen fertilizer provided the highest return on investment, generating $28.98 more per acre than the control treatment. Mycogold generated a return on investment of $20 more than the control. Fertilizer significantly increased soil and wheat tissue nutrients, but there was no significant responses

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

This study suggests that applying the recommended fertilizer rate with a biofertilizer product can increase return on investment. However, while these products gave a significant yield response and return on investment during this year, the last two prior years of research did not find any significant responses. The extra wet winter and early spring may have made these products more effective. Rainfall across Sherman County during this study ranged from 98% to 118% of the thirty year average. The past three years of research suggests that these products can be quite variable in their crop response. Producers should be cautious applying these products across entire fields and should test on smaller strips first. This study also supports that farmers should be careful not to under fertilize their fields expecting a stronger response from biofertilizer products. Often companies will state that fertilizer needs to be reduced to see a biofertilizer response. This study found that the lower fertilizer rate resulted in significantly lower yield that biofertilizers were not able to compensate for. When this trial was seeded there was 68 lbs per acre of residual nitrogen. For a total of 125 lbs of nitrogen where 57 lbs of nitrogen was added at seeding. In addition, the low nutrient levels in the unfertilized areas resulted in undesirable increases in soft white wheat protein. Overall, more research is needed by manufacturers of biofertilizers to minimize variability in expected crop performance

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Nitrogen Fixing Biofertilizers in Winter and Spring Wheat

Commission Funding Amount: $ 13,848

Funding Year: 2024-2025

Final Report or Progress Report Final

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

A spring wheat trial with MycoGold had been planned to be seeded at the Sherman Experiment Station in the spring of 2024, but was seeded at the Pendleton Experiment Station instead. The experimental design also changed for the spring wheat trial with two different rates of MycoGold tested under three different rates of starter fertilizer (16-20, ammonium phosphate). Drone imagery was taken at soft dough stage to determine NDVI.

Describe the outcomes of the research project. What was learned from the research work?

Utrisha N did not significantly increase yield, protein, or test weight, though fertilizer rate significantly increased grain yield and quality. The only soil variable that showed a significant response was potassium, which increased with fertilizer rate. The only nutrients in wheat tissue that showed a significant response was sulfur and calcium. Sulfur levels increased significantly with fertilizer rate and calcium was significantly lowered by utrisha. MycoGold did not cause any significant response to grain yield and quality, though both were influenced by fertilizer rate in spring wheat. MycoGold significantly increased soil phosphorus levels in both winter and spring wheat. In spring wheat soil phosphorus, soil potassium, and soil organic

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

Some of the examined biological fertilizers increased yield by a few bushels under reduced nitrogen compared to controls at the same fertilizer rate, but wasn't consistent or statistically significant and failed to provide a positive return on investment. Biofertilizers failed to significantly increase wheat tissue nutrients or significantly provide more nitrogen to wheat under reduced fertilizer rates. The results of this research aligns with other wheat research on these same products in Canada where most studies did not find a positive return on investment. Producers should not use biofertilizers and expect to see an economical return on investment. If producers are interested in using these products they should do test strips first before using on large areas as crop impacts will likely not be economical or may be highly variable. Nitrogen fertilizer across all trials provided a significant increase in yield and positive return on investment. These trials indicate that in Moro about 2 lbs of total available nitrogen (from fertilizer and residual soil nitrogen) were required per bushel of wheat yield. Additional nitrogen beyond this amount did not generate a positive return on investment. Drone imagery captured over these trials found that there is a correlation between NDVI and fertilizer rates, suggesting that in the future producers may be able to use drone technology to detect areas of the field with nitrogen deficiencies that can be corrected with spot fertilizer applications. NDVI was not correlated with biofertilizers, supporting the lack of response in

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: How significant of a pest is cereal leaf beetle?

Commission Funding Amount: $ 3,052

Funding Year: FY2025

Final Report or Progress Report Final

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

No, the trial was completed in accordance with the methods outlined in the proposal.

Describe the outcomes of the research project. What was learned from the research work?

No, the trial was completed in accordance with the methods outlined in the proposal.

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

Appropriate timing of insecticide applications is critical. Applications at the pre-boot stage are more effective than later.

Based on these results, a reexamination of the economic thresholds should be considered as yields improved with insecticide applications although cereal leaf beetle populations did not reach the current economic threshold.

HOW SIGNIFICANT IS THE CEREAL LEAF BEETLE AT PRESENT?

Stuart Reitz, Kyle Wieland, Hannah Rose, and Ian Trenkel, Malheur Experiment Station, Oregon State University, Ontario, OR

Abstract

Although cereal leaf beetle is not always a major pest of winter wheat, growers still routinely make insecticide applications for control of it. Our project is intended to inform growers whether those insecticide applications are justifiable and the best timing for insecticide applications if they are warranted. We evaluated the effectiveness of five insecticides (Dimilin, Lannate, Mustang Maxx, Radiant, and Warrior II) applied either at the pre-boot stage or at the boot stage. We also monitored beetle populations in relation to currently established economic thresholds. Although there was significant beetle damage in the trial, populations did not exceed economic thresholds. In the treatments where insecticides were applied, the insecticides reduced beetle populations and damage compared with the untreated controls. The insecticides tended to be more effective when applied at the pre-boot stage than later at the boot stage, indicating the importance of timing applications appropriately. Warrior II was the best overall insecticide in terms of lowering beetle populations and damage, and in increasing yields. Based on these results, a reexamination of the economic thresholds may be warranted.

Introduction

Although cereal leaf beetle (CLB) is not always a major pest of winter wheat, growers still routinely make insecticide applications for control of it. This project is intended to inform growers whether those insecticide applications are justifiable and the best timing for insecticide applications if they are warranted.

The invasive cereal leaf beetle is a key insect pest of small grains and grass seed crops across most of Oregon. Adults (Figure 1) emerge in the spring. They are good flyers, enabling them to easily disperse throughout fields. The immature larval stage (Figure 2) does most of the feeding damage.

Pest pressure from the beetle varies over different growing seasons, with some years seeing greater beetle populations and damage than other years. It is also important to bear in mind that pest pressure also varies from field to field within the same growing season. Therefore, monitoring beetle populations can help determine whether insecticide treatments would be justified or not.

Economic thresholds have been developed for wheat to determine if insecticide treatments are warranted for leaf beetles. Before the boot stage, the economic threshold would be an average of three larvae or eggs total per tiller. After the boot stage, the economic threshold would be one larva per flag leaf (Roberts & Walenta, 2012). This change in threshold as the crop matures is

because feeding damage on the flag leaf is a greater concern for yield loss than feeding damage on other leaves. The flag leaf provides the majority of nutrients needed for the grain to develop.

Methods and Materials

As part of this project, we conducted a field trial at the Malheur Experiment Station. Insecticides were applied either at the pre-boot stage, or at the boot stage, or if the economic thresholds described above were exceeded. Only one insecticide application was made in plots receiving the pre-boot or boot insecticide treatments.

The trial was planted in November 2023 with the soft white winter wheat 'Ovation'. The crop was managed according to standard practices for furrow-irrigated winter wheat in the Treasure Valley. The plots were 30 feet long and 10 feet wide.

CLB adults emerge in the Treasure Valley in late April to May and lay eggs in wheat and grass hay fields from mid-May through early June. Therefore, we monitored populations weekly through the spring by counting eggs and larvae on 20 individual tillers and flag leaves per plot once they emerged. After heading, we rated feeding damage on a 0-5 scale for 25 flag leaves per plot (Figure 3).

In addition to the insecticide timing treatment, we included five insecticide treatments and a control. These were:

1. Untreated control
2. Warrior II (lambda-cyhalothrin, a synthetic pyrethroid), 1.92 fl oz/acre.
3. Mustang Maxx (zeta-cypermethrin, a synthetic pyrethroid), 4 fl oz/acre.
4. Dimilin (diflubenzuron, an insect growth regulator), 4 fl oz/acre.
5. Lannate (methomyl, a carbamate), 24 fl oz/acre.
6. Radiant (spinetoram, a synthetic spinosyn), 6 fl oz/acre.

Warrior II, Mustang Maxx and Dimilin are three commonly used insecticides in the Treasure Valley. Lannate and Radiant are two different modes of action insecticides that may have greater efficacy against CLB. Radiant is a reduced-risk insecticide that may have a lower impact on natural enemies, like the CLB parasitoid *Tetrastichus julis*. Radiant and Lannate are also higher priced products. Their effectiveness would need to be greater to justify their use.

Insecticides were applied with a CO_2 powered backpack sprayer equipped with flat fan nozzles and delivering 20 gallons per acre to assure thorough coverage.

Results and Conclusions

CLB eggs were first detected at the experiment station at the beginning of May. Larvae were first detected approximately two weeks later (mid-May). However, CLB counts never exceeded the economic thresholds (Figure 4). Consequently, no insecticides were applied in the "threshold treatment" programs. Insecticides were applied on May 27 for the pre-boot stage treatments and June 3 for the boot stage treatments.

Insecticide treatments were more effective in reducing beetle populations when made at the pre-boot stage rather than at the boot stage. Warrior II provided the best overall control of CLB (Figure 5). All the insecticides reduced CLB feeding damage on the flag leaf (Figure 6). Again, Warrior II provided the greatest reduction in damage levels. Although damage ratings for Dimilin were relatively high, larval populations on the flag leaf were low.

Yield was significantly improved with the insecticide treatments compared with the untreated control. When applied at the pre-boot stage, yields were 29% to 45% greater compared with the no insecticide control (Figure 7 and Table 1). Yield improvements were not as great if the insecticides were applied at the boot stage. The yield with Mustang Maxx was 17% lower than in the control. The other insecticides improved yield from 8% to 52%.

Given the results, a reexamination of the economic thresholds may be warranted.

Acknowledgments

We appreciate the excellent technical support from Matison Youngblood, Amber Lovitt, Michelle Grove, Colton, Newman, Leo Rico Reyes, and Leah Carter. Funding for this project came from the Oregon Wheat Commission, Oregon State University, and the Malheur County Education Service District and supported by Formula Grant nos. 2024-31100-06041 and 2024-31200-06041 from the USDA National Institute of Food and Agriculture. We appreciate the support of Corteva Agriscience, FMC, Syngenta, and Vive Crop Protection in making this project possible.

Figure 1. Adult cereal leaf beetle. The head is black; the neck area is a dark orange, and the wing covers at the back of the body are a dark metallic blue green.

Figure 1. The immature larval stage of the cereal leaf beetle (left and right). The larvae are grubs (right) that cover their body with a layer of their own excrement to deter predators (and make a mess of your pants when walking through an infested field). The larvae move along the length of a leaf. They scour the upper surface of the leaf, which results in characteristic strips of dead tissue.

Figure 2. Varying degrees of cereal leaf beetle (CLB) feeding damage on wheat flag leaf from no damage (0) to severe damage (5).

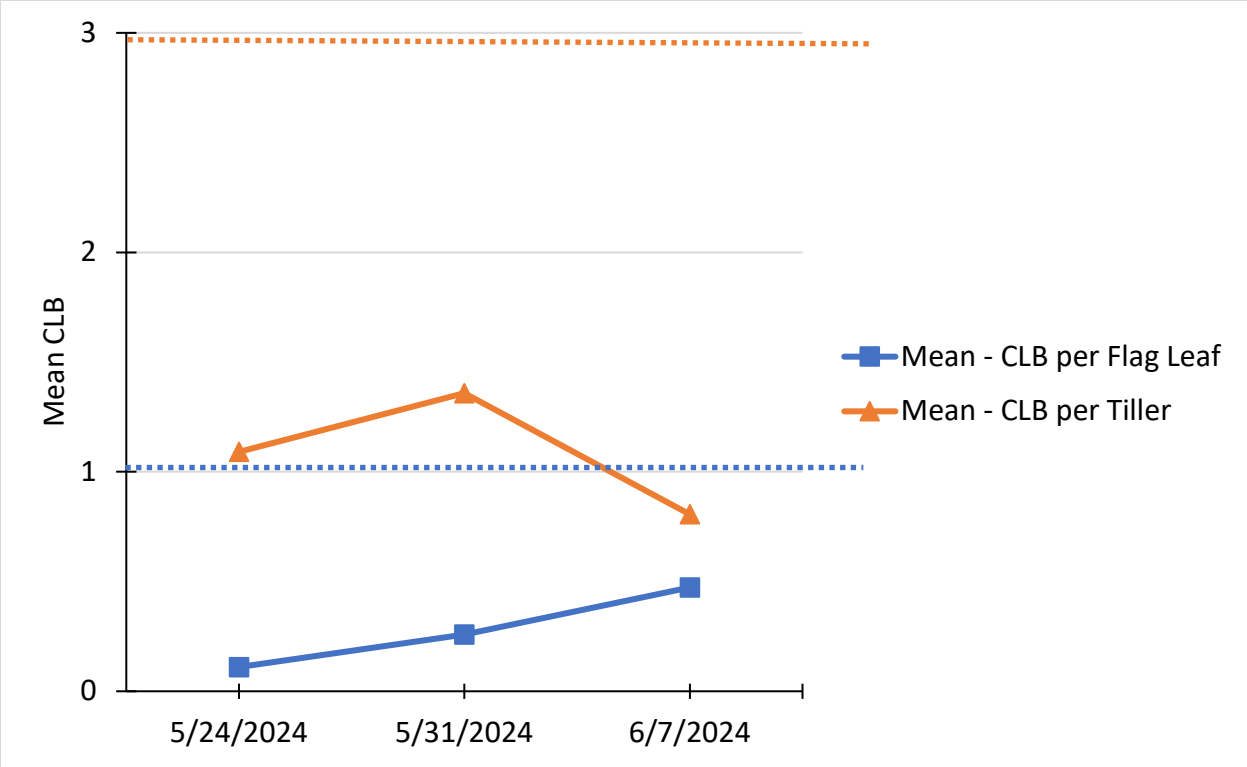


Figure 3. Average number of cereal leaf beetles (CLB) per tiller (solid orange line) or per flag leaf (solid blue line) over time. The dashed lines indicate the economic threshold levels (3 larvae and/or eggs per tiller; 1 larva per flag leaf). An insecticide application would be recommended if populations exceeded either threshold.

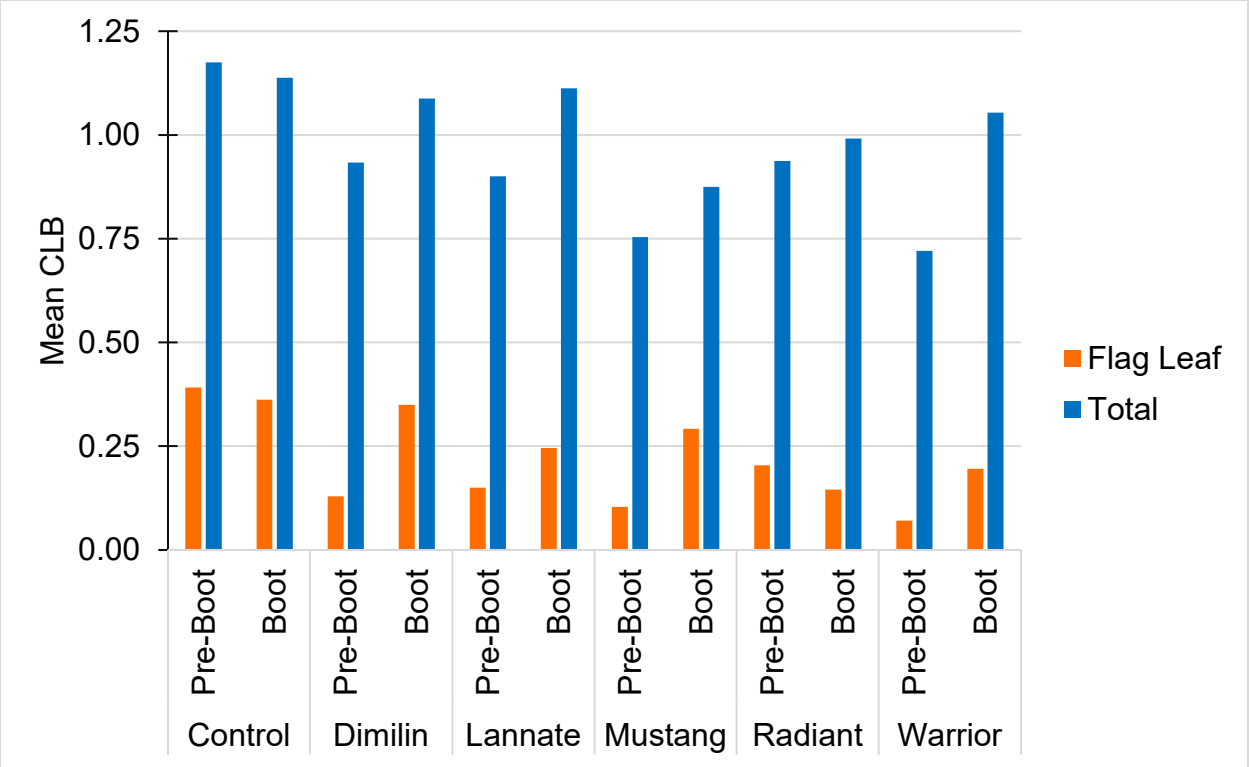


Figure 4. Seasonal averages of cereal leaf beetle (CLB) on the flag leaf (orange bars) and on the entire flag stem (blue bars).

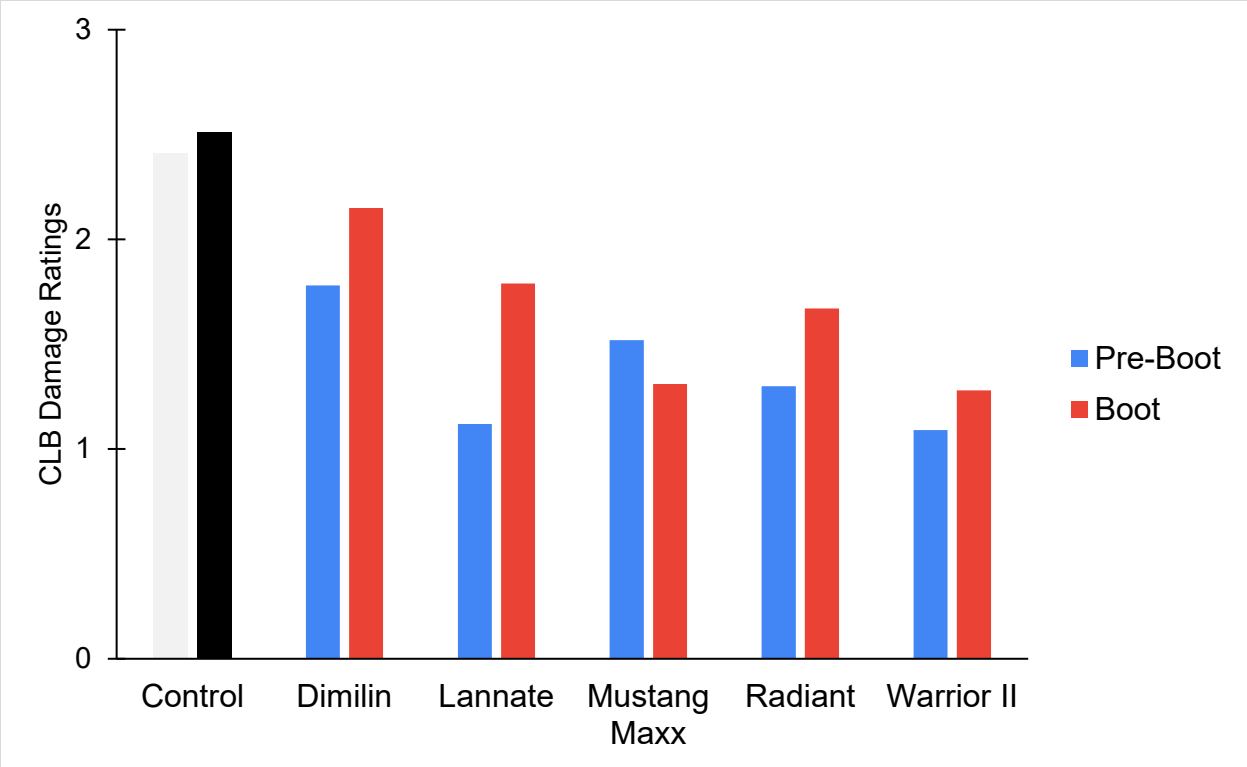


Figure 5. Average cereal leaf beetle (CLB) damage ratings on the flag leaf in different insecticide and timing treatments. Applications were made at the pre-boot stage (blue bars) or at the boot stage (red bars). The control did not receive any insecticide application.

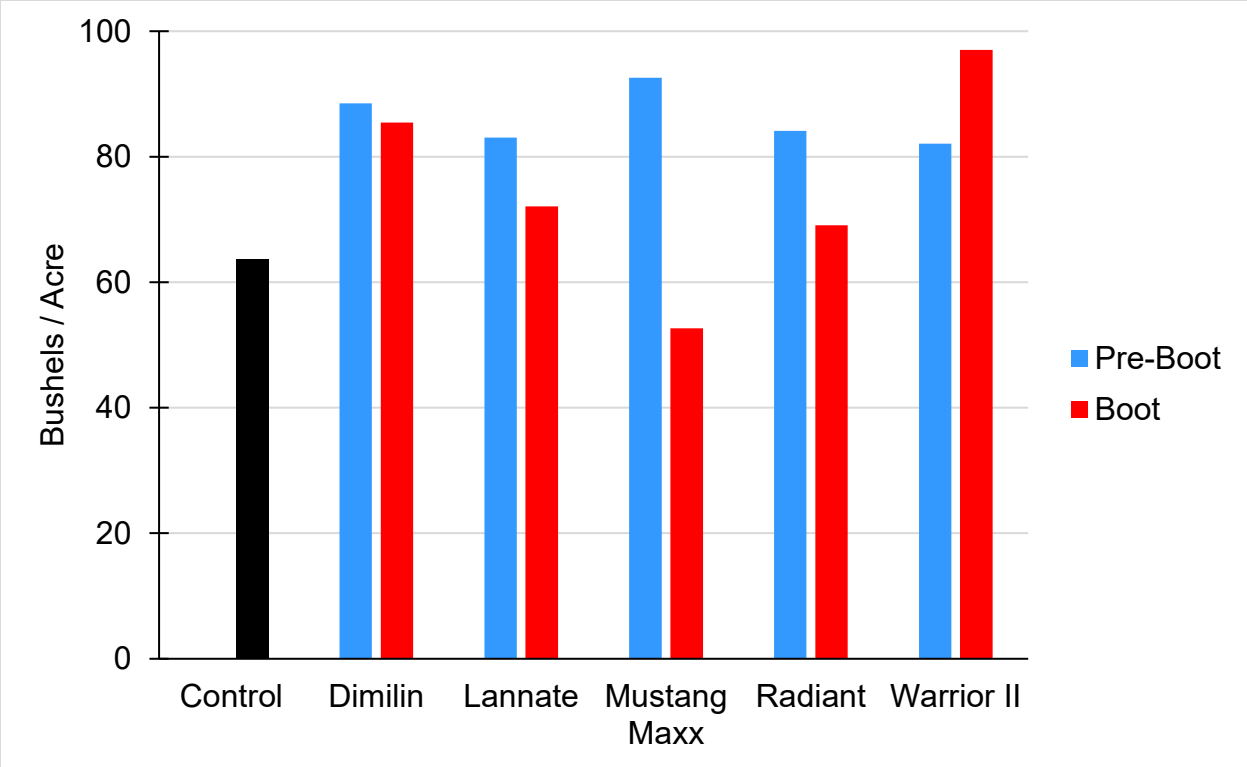


Figure 6. Yield in bushels per acre in relation to insecticide treatment and timing. Applications were made at the pre-boot stage (blue bars) or at the boot stage (red bars). The control did not receive any insecticide application.

Table 1. Yield for the insecticide treatments when applied at the pre-boot or boot stage compared with the untreated control.

Insecticide	Preboot	Boot
Dimilin	139%	134%
Lannate	130%	113%
Mustang Maxx	145%	83%
Radiant	132%	108%
Warrior II	129%	152%

Oregon Wheat Commission Project Report

Title of Project: OSU Cereal Quality Laboratory

Commission Funding Amount: $82,000

Funding Year: 2025

Progress report for grant cycle 2025-26 and final report for grant cycle 2024-25.

Research Results

1) Were there any major changes or adaptations to the project from what was described in the initial proposal?

No

2) Describe the outcomes of the research project and what was learned from the research work?

Through late 2025 we worked with Dr Krause to select SW lines to submit to the 2025-harvest iteration of the Pacific Northwest Wheat Quality Council (PNW WQC). Of the three lines selected OR2300026_AX and OR2190671 are tracking for Most Desirable ratings in the SW preferred list. OR2200083_CL+ is tracking at the high end of the Desirable category. If released OR2300026_AX would be among the best quality CoAxium-traited varieties released so far. Currently it is placed below Scorpion_AX and above Nova_AX on the list. All three lines were well received by the cooperators in the 2025 harvest PNW Wheat Quality Council testing. From a *quality perspective only* we support the advancement of these lines to release.

We again emphasize the value of the functionality screening we perform at early generations. We maintain that this allows the breeder more latitude for finding lines that combine good field performance with market class appropriate or better processing functionality and end-product quality. In CY2025 approximately 6500 tests related to the wheat project were performed, of which about 3500 were directly related to early generation screening.

The lab has been also working to support work of other researchers from OSU and the University of Idaho. We continue to work with USDA and WSU Pullman on issues related to preharvest sprouting (PHS) and late-maturity amylase (LMA) and have found a biochemical marker that appears to distinguish PHS from LMA. Validation work on this element of the project stalled during CY2025 because of staffing shortages related to us not being able to attract enough temporary workers, not a funding issue. The work recommenced at the end of CY2025.

A collaboration begun in CY2024 with Pullman-based scientists, Drs Amber Hauvermale and Alison Thompson, on anomalously low Falling Numbers (FNs) from wheat in the *absence* of increased amylase enzymatic activity continues. We previously identified a flour functionality marker that distinguishes the non-enzymatically from enzymatically

driven low FNs and in the CY2025 cycle sought peer review of our findings. This last initiative may be key to understanding occasional, but too frequent, anomalous low FN events. These low FN wheats without increased amylase activity suffered a hard freeze at the soft dough stage of grain filling. Dr Thompson is seeking USDA funds for a key piece of equipment to validate our hypotheses i) that this phenomenon is related to truncated starch synthesis during the freeze and ii) that, as it is not enzyme driven, it should not diminish crop quality although the phenomenon shows up as low FN.

Under the methods development objective, Dr. TK has continued to collaborate with the PNW WQC cooperators and with technical experts within OSU to bring automated, machine-learning (AI) driven scoring, firstly of cookie top grain, secondly for scoring bread crumb grain, and thirdly for assessing loaf volumes. This work is proceeding.

Under the communication objective, Dr TK continues to integrate himself into the PNW Wheat Quality Council operations: continuing to edit and proofread the annual meeting book and edit, curate, and proofread the spreadsheets that are used for the preferred list rankings. Drs TK and Ross also contribute to the scrutineering of the rankings in the preferred lists on an annual basis, including CY2025. Dr TK also is a member of the Cereals and Grains Assoc. Soft Wheat Methods Technical committee and will likely move into a leadership role in CY2026.

Publications

-Wallace R., Baenziger P.S., Ibba I., Frels K., Bock J., Krause M., Ross A.S., et al. 2026. Towards a New Public Health Paradigm: Agriculture and Food Production for Health. Foods 15(3), 527; https://doi.org/10.3390/foods15030527.

-Gabriely M. Soncin Alfaro, Alecia M. Kiszonas, Sean Finnie, Xiaorong Wu, Liman Liu, Jayne Bock, Andrew S. Ross, Amber L. Hauvermale, Alison L. Thompson. 2026. Characterizing low falling number in the absence of elevated alpha-amylase activity in soft white wheat and the impact on Japanese sponge cakes. Cereal Chemistry. **In 2nd review**

Reports

-Ross A.S., Kongraksawech T. 2025. Selecting for Quality 2025: Routine, innovation, and history… Oregon Wheat. October 2025:

Presentations

-Vishal Singh, Mark Larson, Adam Heesacker, Nathalia Moretti, Hilary Gunn, Vivien Hansen, Christopher Mundt, Andrew Ross, Teepakorn Kongraksawech, Margaret R. Krause. Estimating realized genetic gain during three decades of soft white winter wheat breeding in Oregon. CANVAS 2025 Salt Lake City, UT, Nov 2025

-Ross A.S., 2025. Flour milling and cookie quality demonstrations. Pendleton Field Day. June 2025.

-Ross A.S., 2025. Cookie production with OSU SW wheats. Hyslop Farm Field Day. May 2025.

-Finnie S, Ross A.S., 2025. Update on Coalition for Grain Fiber. Pacific Northwest Wheat Quality Council Meeting, Portland OR, January 2025.

Reviews

-A. Ross. Book review: 2025 Analytical methods for the characterisation of fermented grain-based raw materials and food. A Book of Methods from the HealthFerm project. Wouters, De Bondt, Katina & Courtin. Eds. University of Leuven, Belgium.

-A. Ross. USDA Reviewer 2025: USDA Office of Scientific Quality Reviews: review panel NP 306 Panel 7. 2025, for the four national USDA Wheat Quality Labs.

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission because of this research project?

We continue to recommend, as the Preferred Variety Lists assert, "*When making decisions between varieties with similar agronomic characteristics and grain yield potential, choose the variety with the higher quality ranking. This will help to increase the overall quality and desirability of Pacific Northwest (PNW) wheat*".

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Quality of varieties & pre-release lines: Genotype & Environment 'G&E' study

Commission Funding Amount: $ 38,418

Funding Year: 2024-2025

Final Report or Progress Report Final

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

None

Describe the outcomes of the research project. What was learned from the research work?

These samples from Variety Testing were fully processed and the data analyzed. The region's cereal specialists met in conjunction with the PNW-WQC in late January and reviewed new entries for the "2025 Preferred Wheat Varieties Based on End-Use Quality" brochure. Nine new entries were added to the published list for 2025, nearly all with very high quality.

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

The recommendation is that if growers know of two or three varieties that might do best on their farm based on agronomics, to please choose the variety higher up on the Preferred Variety brochure to ensure that we continue to maintain and improve the quality of PNW wheat for the export market. The export market has very high quality standards that we have met because growers, breeders, Commissions, seed dealers, scientists have prioritized high quality along with good agronomics. It is vital to the PNW wheat industry that we continue to emphasize that high quality.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: One-third the cost of the Miag pilot flour milling of PNW-WQC samples

Commission Funding Amount: $ 5,250

Funding Year: 2024-2025

Final Report or Progress Report Final

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

None

Describe the outcomes of the research project. What was learned from the research work?

The PNW-WQC samples were milled and analyzed by ~25 cooperators. The Council met in January and discussed the advantages and disadvantages of all samples based on quality labs, milling, and baking companies. New, up-and-coming lines were evaluated by end-users to get familiar with new releases and provide feedback to the breeder.

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

The recommendation is to use the comments from the Quality Council members for future breeding considerations. The lines submitted by OSU had high quality and had positive feedback from the Council.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Advancing wheat grain quality in Oregon state

Commission Funding Amount: $ 23,000

Funding Year: 2024-2025

Final Report or Progress Report Final

Research Results

Were there any major changes or adaptations to the project from what was described in the initial proposal? (describe if so)

None

Describe the outcomes of the research project. What was learned from the research work?

Samples from the 2024 harvest were received and organized into 41 nurseries. The samples totaled 1041. All samples were milled, underwent flour and bake testing, and data were returned to Drs. Krause, Ross, and Kongraksawech. The flour tests included protein, moisture, ash, and Solvent Retention Capacity tests. The bake tests included Mixograph, Sugar Snap Cookies, Japanese Sponge Cakes, and Pup Loaves of Bread.

Are there any recommendations for Oregon Wheat producers/ the Oregon Wheat Commission as a result of this research project? (describe if so)

The recommendation is to continue supporting the OSU Quality Lab and the WWQL to help Dr. Krause continue to make good selections for high quality varieties. OSU has a great reputation of releasing high quality varieties and with ongoing support of the quality labs and the breeding program, that will continue.