OWC

OREGON WHEAT COMMISSION

Since 1947

Annual Research Reports

2023-2024 Final Reports

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Improving Weed Management in Oregon Wheat Production Systems (Year 2)

Commission Funding Amount: $ 59,855

Funding Year: 2023-2024

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 was not major changes or adaptations. However, the trial established in Moro under Objective 1 had problems. The CoAXium wheat did not develop correctly and unfortunately, we cannot trust the data from that trial. We suspected that the damage could have been caused by the presence of Beyond in the soil, so we took some soil samples from areas with crop damage and from areas where the crop looked fine. Even though the lab results

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

Objective 1. Identify best management practices to control weeds with Aggressor in CoAXium wheat.
From the trial in Pendleton, we learned that Aggressor AX is a safe herbicide to spray on soft white CoAXium wheat. We only observed a light crop injury when it was sprayed with an MSO adjuvant in the fall that was overcome because there was not yield differences (see Table 1 in the Appendix). The herbicide label already recommends, based on previous results, the use of NIS adjuvant instead of MSO adjuvant for a fall application. This year the percentage of downy brome control in the study was lower than in previous years, although

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

Results from Objective 1 indicate that the CoAXium wheat technology can help Oregon wheat growers selectively control winter annual grasses such as downy brome, feral rye (Secale cereal), and jointed goatgrass (Aegilops cylindrica). However, prudent use and implementation of sound best management and stewardship practices of CoAXium wheat are critically important for preserving the efficacy and longevity of this new technology. The use of Aggressor AX (quizalofop) in combination with a pre-emergence herbicide (e.g. Zidua or Anthem Flex) would be a good strategy to reduce the weed infestation to be treated with quizalofop and consequently the probabilities of selecting for resistant plants to this group 1 herbicide.
The original Aggressor has been removed from the market and it is not safe in soft white CoAXium wheat. Only Aggressor AX should be used in soft white CoAXium wheat.

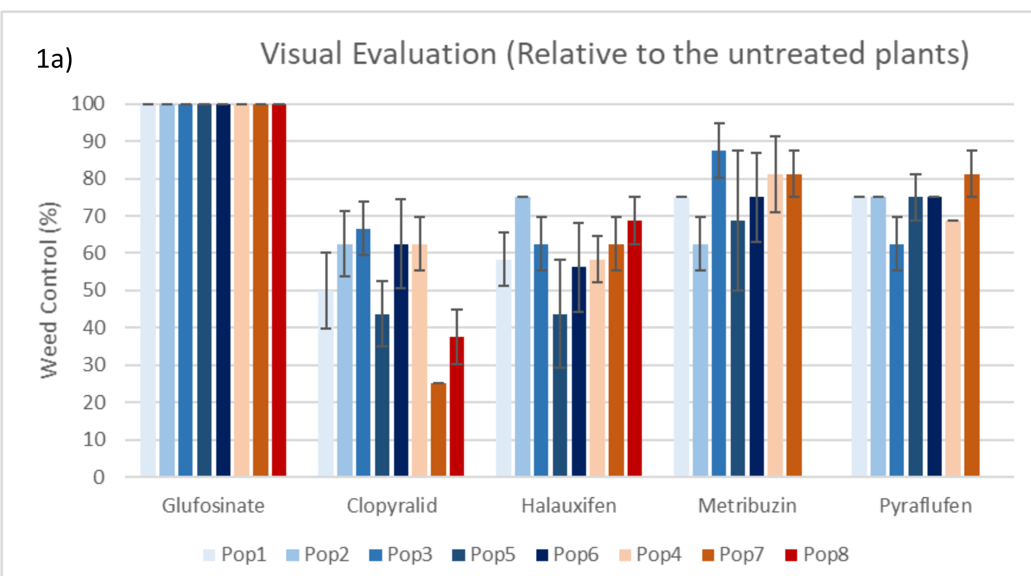
Results from objective 3 indicate that the undercutter sweep in late summer to control broadleaf weeds in fallow does not do a lot of damage to soil, and it might be a sustainable practice for combating herbicide-resistant weeds.

Appendix of final project report FY 2023-2024

Table 1. Different herbicide treatments applied to the trial of objective 1, average crop injury (%) at 28 days after treatment, control (%) of downy brome (DB), and average wheat yield (bu/ac) for the different treatments. Note: Different letters in the columns indicate significant differences according to the Tukey test (α < 0.05).

Treatments*	**Trt ID**	**Herbicide rate (fl oz/ac)**	**Crop injury (%)**	**DB control (%)**	**Yield (bu/ac)**
Untreated Check	1	-	0b	0c	83a
Zidua SC **(PPPE)**	2	3.2	0b	36b	96a
Zidua SC + Aggressor AX + MSO* **(Spring)**	5	3.2 + 10	0b	85a	105a
Aggressor AX + MSO **(Fall)** + Aggressor AX + MSO **(Spring)**	8	8 8	5.5a	85a	104a
Aggressor AX + NIS **(Fall)** + Aggressor AX + MSO **(Spring)**	9	8 + 0.25% v/v 8	0.8b	86a	106a
Aggressor AX + MSO **(Spring)** + Aggressor AX + MSO **(Spring 14 DAT)**	10	8 8	0.3b	92a	102a
Aggressor AX + MSO **(Spring)**	11	10	0.9b	92a	99a
Aggressor AX + MSO **(Spring)**	12	12	0b	91a	104a
Aggressor AX + MSO **(Spring)**	13	14	0.3b	94a	100a
Aggressor AX + MSO **(Spring)**	14	16	1.0b	94a	104a
Aggressor AX + MSO **(10 GPA) (Spring)**	17	16	0b	94a	104a
Aggressor AX + MSO **(20 GPA) (Spring)**	18	16	1.6b	93a	100a
Aggressor AX + MSO + NIS + Soln 32* **(Spring)**	19	12 + 0.25% v/v	1.4b	93a	107a
Aggressor AX + MSO + NIS + Soln 32* **(Spring)**	20	12 + 0.5% v/v	0.5b	92a	104a

*The MSO adjuvant was applied at 1% v/v in all treatments with that adjuvant and Solution 32 was applied at 3 gal/A.



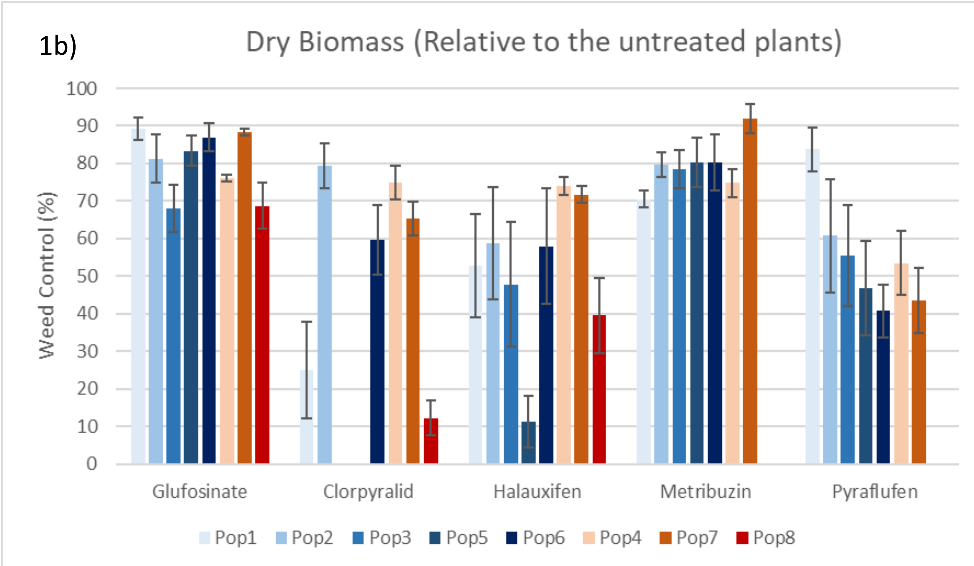


Figure 1. Results from the greenhouse bioassay that tested alternatives herbicides to control horseweed populations (indicated in blue) and hairy fleabane populations (indicated in red-orange); a) with a visual evaluation conducted 3 weeks after treatments (WAT) and b) evaluating the plant biomass also 3 WAT. *Note: Currently we are repeating the bioassay due to the large variability found in the different populations with some of the herbicides. More robust results will be included in the final project report of 2024-2025.*

<u>List of presentations from objective 5</u>:

1. Impact of Fallow and Residue Management in Weed Control. Pacific Northwest Direct Seed Association (PNDSA) Cropping Systems Conference. Three Rivers Convention Center, Kennewick, WA. January 7, 2025 (≈70 attendees). Invited
2. Glyphosate-Resistant Hairy Fleabane and Horseweed Populations in the Pacific Northwest. 2024 Sherman Field Day. Moro, OR June 12, 2024. (≈70 attendees)
3. Herbicide Resistance Initiative: Fallow Weed Control. 2024 Pendleton Field Day. Adams, OR June 11, 2024. (≈150 attendees).
4. Weed Research Update. Sherman Station Field Day. Moro, OR. June 14, 2023 (≈ 110 attendees).

<u>List of publications generated from objective 5</u>:

1. Ribeiro V.H.V., Mallory-Smith C.A., Gourlie J.A., Shelton C.W., and **Barroso J**. 2024. Feral rye (Secale cereale L.) control in quizalofop-resistant winter wheat in Oregon. Weed Technology 38(e14), 1-6. DOI:10.1017/wet.2023.89
2. **Barroso J.** 2025. Glyphosate Resistance Confirmed in Marestail and Hairy Fleabane in NE Oregon. Oregon Wheat Magazine, February 2025.
3. **Barroso J**, Wuest S.W., and Durfee N. 2024. Is it time for the reappearance of the undercutter? Weeders of the West Blog. September 16, 2024. https://smallgrains.wsu.edu/weeders-of-the-west/2024/09/12/undercutter/
4. Oreja, F., Gourlie, J., **Barroso, J**. Confirmation of *Erigeron* spp. glyphosate resistance populations in Oregon. Proceedings of WSWS Annual Meeting. Denver, CO. March 2024.
5. Gourlie J.A., Oreja F.H., and **Barroso J.** Alternative herbicides to control glyphosate-resistant *Erigeron* spp. Proceedings of WSWS Annual Meeting. Denver, CO. March 2024.

Oregon Wheat Weed Management – Final Report

Objective:

1.a Does the carryover after a Beyond (imazamox) treatment impact the emergence or yield of the Nimbus CoAXium line of wheat?

Methods:

Clearfield wheat was planted in two locations during the fall of 2022 and imazamox applied during March of 2023 at 1, 2, and 4x labeled rates (Table 1). The wheat was harvested from Moro, OR and Hyslop Research Farm in the summer of 2023. Nimbus CoAXium and a conventional variety were planted at both locations perpendicular to the sprayed plots so both varieties could be assessed for carryover. At the Moro location, the Nimbus CoAXium variety plots were split in half and one side was sprayed with a 1x rate of imazamox and the other with a 1x rate of quizalofop to assess its ability to metabolize an in-season application in the presence of imazamox carryover in the soil. Visual ratings were taken in Moro, OR in April 2024 prior to post applications. Hyslop Research Farm plots were harvested on August 13, 2024. Moro plots were harvested on August 15, 2024.

Results:

Visual ratings at the Moro location saw minor phytotoxicity differences between the conventional and Nimbus CoAXium varieties (maximum phytotoxicity of 10%). At the Moro location, there was a slight reduction in yield among the 3 rates of imazamox compared to the untreated check but not statistically significant (Table 1).

Table 1: Treatment and yield data from Moro, OR plots with the Nimbus Coaxium wheat. No statistical differences among the yields (p-value <0.05)

	Rate (g ai / a)	Yield (lbs / a)	Yield (bushel / a)
Untreated Check		1825	30.42 -
Imazamox	17.7	1641	27.35 -
Imazamox	35.4	1636	27.27 -
Imazamox	71	1757	29.28 -

At Hyslop, a slight yield reduction of approximately 3 bushels was observed when comparing the 1x, 2x, and 4x plant-back rates; however, the differences were not statistically significant (Table 2). In contrast, conventional wheat showed a 11-bushel yield reduction compared to the Nimbus CoAXium line at the 1x rate (16 bu), suggesting some level of imazamox carryover. The performance of Nimbus CoAXium line is capable of metabolizing residual imazamox, whereas conventional wheat was sensitive to its effects in this study.

Table 2: Yield data from winter wheat planted at Hyslop Research Farm in Corvallis (Untreated check had significantly lower yield that the imazamox treatments (p-value < 0.05).

		Yield (bushel / a)	
	Rate (g ai / a)	Conventional	Nimbus CoAXium
Untreated Check		15.94 a	15.89 a
Imazamox	17.70	15.83 a	26.58 b
Imazamox	35.40	23.01 b	23.89 b
Imazamox	71.00	16.92 a	23.99 b

The Nimbus CoAXium wheat variety could help growers successfully rotate from Clearfield wheat into a non-Clearfield line with minimal concern about imazamox carryover decreasing wheat yields. In addition, the CoAXium trait enables growers to change post-emergent herbicide active ingredients from a group 2 to a group 1 to help manage herbicide resistant grasses. Although the results of the project show that the use of a single resistant gene enables post applications of imazamox to Nimbus CoAXium, it is not recommended based on herbicide resistance management. The Nimbus CoAXium line should be used as a transition from Clearfield lines to help with potential imazamox carryover.

1.b Can Nimbus CoAXium wheat tolerate a labeled rate of imazamox and quizalofop applied before jointing when imazamox carryover is present?

Methods:

Weed pressure during visual ratings in April 2024 required a herbicide application to control downy brome (*Bromus tectorum*) and Russian thistle (*Salsola iberica*) within the trial. Each plot was split in half and applied with Beyond (Imazamox) and Aggressor (Quizalofop-P-ethyl) to assess in season applications of both herbicides that Nimbus CoAXium is resistant to. Rates are shown below in Table 3. Plots were harvested on August 15, 2024.

Table 3: Post application rates of imazamox and quizalofop at Moro location.

		Rate (g ai / a)	Rate (% v/v)
1	Imazamox	17.7	
	Ammonium Sulfate		2.5
	NIS		0.25
2	Quizalofop-P-ethyl	37.42	
	NIS		0.25

Results:

The Nimbus CoAXium wheat line was not impacted by the 1x imazamox plant-back rate followed by a 1x imazamox in season application rate (Table 4). However, there was a decrease in yield as the plant-back rate of imazamox increased. However, this decrease was not statistically significant. The application of quizalofop did not impact yields regardless of the plant-back rate of imazamox.

Table 4: Yield in Moro, OR. Left Column is the post application made in April 2024. Rates and surfactants are shown above in Figure 4. Top Row is the Spring 2023 treatment that the wheat was planted into.

	Yield (bushel / a)			
	Untreated Check	Imazamox 1x	Imazamox 2x	Imazamox 4x
Imazamox Post	22.29	27.00	24.02	21.13
Quizalofop-P-ethyl Post	30.43	27.36	27.27	29.29

Objective

2. **Assess variety lines for canopy closure to determine impacts on weed germination based on red light to far red-light ratios**

Methods:

Seven different Oregon State University wheat lines were used that ranged from upright growth to more tillering to determine the impact of biomass/growth of the varieties on weed emergence. In addition to weed counts, a red/far-red sensor was used to determine the light interception based on canopy density. The greater the biomass, the less red-light is available to promote weed seed germination. The entire field was sprayed with the pre-emergent herbicide pyroxasulfone (Zidua) at the max rate (3 oz/acre) after fall planting.

Weed counts and light-sensor was taken directly next to the crop row between crop rows and next to the next adjacent row.

The seven wheat varieties ranging from most upright to most tillering were: OR3230027, Bobtail, Rosalyn, Nixon, NW Tandem, OR337, and Nimbus.

Results:

The results showed a clear reduction in weed populations when wheat varieties with higher tillering were used (Table 5). Specifically, plots planted with Nimbus, the variety producing the most tillers, had 50% fewer weeds adjacent to the wheat row compared to OR323002, which exhibited a more upright growth habit. A consistent trend emerged, indicating that as wheat biomass increased across varieties, weed density decreased. Average weed counts per 2 ft^2 were as follows: OR323002 – 14, Bobtail – 12, Rosalyn – 11, Nixon – 9, NW Tandem – 7, OR337 – 7, and Nimbus – 5.

These findings suggest that selecting wheat varieties with more tillering and biomass may be an effective cultural strategy for suppressing in-crop weed pressure.

The red/far-red light ratio closely aligned with the observed weed counts (Table 6). For instance, Bobtail, a more upright wheat variety, exhibited a red/far-red ratio of approximately 1:1 next to the plant within the row and averaged 12 weeds per 2 ft^2. In contrast, OR337, which produces more tillers, showed a 70% reduction in red light, corresponding with a 44% decrease in weed density. These findings help explain the lower weed count based on greater canopy closure and shading, reflected in lower red/far-red ratios.

Table 5: Weed count near crop rows and between rows. Letters next to the numbers signify significance within the column (p-value < 0.05)

		Near Crop	Between Rows
OR3230027	1	13.83 a	19.42 a
Bobtail	2	11.92 ab	16.33 ab
Rosalyn	3	10.50 abc	15.08 abc
Nixon	4	8.67 bc	13.75 bcd
NW Tandem	5	7.42 bc	10.58 cde
Nimbus	6	5.42 c	7.83 e
337	7	6.67 bc	9.92 de

Table 6: Light Sensor readings near the crop and between rows. There was no statistical difference among red:far-red ratios.

		Near Crop	Between Rows
OR3230027	1	NA	0.982905983
Bobtail	2	1.111322751	1.053872054
Rosalyn	3	0.86253723	0.835530601
Nixon	4	0.489255504	1.105892202
NW Tandem	5	0.783783784	1.057079415
Nimbus	6	0.707683373	1.035947712
337	7	0.379438609	1.093422955
	Baseline	1.096774194	

The results of this work will be presented to the Oregon State University wheat breeding program to discuss the impact that variety differences can have on weed suppression. Ongoing research can include assessing how varieties could help suppress different weed species (grasses verse broad leaf weeds), the impact on weed seed production, and weed/wheat competition. Integrating culture weed control strategies into wheat lines could impact weed management in wheat producers fields.

Objective 3

Assess chlorophyll content of wheat compared with weeds to determine if optical spot spraying is possible with Beta technology

In January 2025, growers were able to use a green on green option in their Weed-IT spray technology, which is currently only available through the fourth generation. Oregon State University (OSU) received early access to evaluate this new system. Unlike conventional green-on-green systems that rely on image analysis, the Weed-It green-on-green technology functions by sensing changes in photosynthetic activity, enabling targeted spot spraying within the crop. The system offers six sensitivity levels. Initial testing indicates that levels 5 and 6 are optimal, as selecting higher sensitivities resulted in excessive spraying, affecting the crop itself. Further adjustments and testing are ongoing to refine the technology's application efficiency.

The study was conducted at the Hyslop Research Farm in Corvallis, OR, using a fall-planted crop that was 6 to 8 inches tall at the time of herbicide application in the spring. Weed heights ranged from 4 to 14 inches. The green-on-green technology successfully spot sprayed the weeds, with no observed difference in activation between grass species (Italian ryegrass) and broadleaf weeds (dovesfoot geranium and wild radish). Italian ryegrass was effectively targeted both within and between crop rows. Based on visible spray dye on the plants, the system achieved an average accuracy of 84% in identifying and spraying Italian ryegrass. Additionally, the impact of application speed was evaluated at 3, 6, and 9 mph. Speed did not affect the system’s ability to activate and target weeds, as evidenced by dye coverage. However, further research is needed to assess how speed influences herbicide coverage and overall efficacy, particularly regarding nozzle performance at higher speeds.

The technology has recently been introduced to the market, and initial beta testing indicates that it holds promise. However, further testing is still needed to fully understand its optimal application strategies. One of the primary challenges we've identified is the sensitivity required for accurate operation. It remains unclear whether calibration needs to be performed before each use or if a standard calibration, tailored to different crop stages, would suffice. Further research will help establish the most effective calibration protocol to enhance the technology's reliability and efficacy across various growth stages.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Oregon Wheat Weed Managment - Beta testing of Weed-IT G on G technology

Commission Funding Amount:

Funding Year: 2023-2024

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)

Assess chlorophyll content of wheat compared with weeds to determine if optical spot spraying is possible with Beta technology

Study was conducted as described in the proposal

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

In January 2025, growers were able to use a green on green option in their Weed-IT spray technology, which is currently only available through the fourth generation. Oregon State University (OSU) received early access to evaluate this new system. Unlike conventional green-on-green systems that rely on image analysis, the Weed-It green-on-green technology functions by sensing changes in photosynthetic activity, enabling targeted spot spraying within the crop. The system offers six sensitivity levels. Initial testing indicates that levels 5 and 6 are optimal, as selecting higher sensitivities resulted in excessive spraying, affecting the crop itself. Further adjustments and testing are ongoing to refine the technology's

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

The technology has recently been introduced to the market, and initial beta testing indicates that it holds promise. However, further testing is still needed to fully understand its optimal application strategies. One of the primary challenges we've identified is the sensitivity required for accurate operation. It remains unclear whether calibration needs to be performed before each use or if a standard calibration, tailored to different crop stages, would suffice. Further research will help establish the most effective calibration protocol to enhance the technology's reliability and efficacy across various growth stages.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Oregon Wheat Weed Management

Commission Funding Amount: $ 29,887

Funding Year: 2023 - 2024

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)

Identify Beyond (imazamox) carryover in a Co-AXium line with imazamox resistant gene

The projects were performed as proposed

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

The Nimbus CoAXium wheat line (CoAXium and Clearfield resistance variety) and a conventional line were planted into trials where imazamox had been sprayed at a 1x, 2,x and 4x rate (17, 35, and 71 g ai/acre) seven months earlier on Clearfield wheat at Moro and Hyslop research farms. At the Moro location, there was a slight reduction in yield among the 3 rates of imazamox compared to the untreated check but not statistically significant (UTC - 30 b, 1x - 27 bu, 2x - 27 bu, 4x - 29 bu). There was visual phytotoxicity of the conventional wheat planted adjacent to and compared with the Nimbus CoAxium variety in the 2x and 4x plots with a maximum phytotoxicity of 10%.

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

The Nimbus CoAXium wheat variety could help growers successfully rotate from Clearfield wheat into a non-Clearfield line with minimal concern about imazamox carryover decreasing wheat yields. In addition, the CoAXium trait enables growers to change post-emergent herbicide active ingredients from a group 2 to a group 1 to help manage herbicide resistant grasses. Although the results of the project show that the use of a single resistant gene enables post applications of imazamox to Nimbus CoAXium, it is not recommended based on herbicide resistance management. The Nimbus CoAXium line should be used as a transition from Clearfield lines to help with potential imazamox carryover.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Oregon Wheat Weed Management - Row closure based on variety

Commission Funding Amount:

Funding Year: 2023-2024

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)

Assess variety lines for canopy closure to determine impacts on weed germination based on red light to far red-light ratios

The project was conducted as proposed

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

Seven different Oregon State University wheat lines were used that ranged from upright growth to more tillering to determine the impact of biomass/growth of the varieties on weed emergence. In addition to weed counts, a red/far-red sensor was used to determine the light interception based on canopy density. The greater the biomass, the less red-light is available to promote weed seed germination. The entire field was sprayed with the pre-emergent herbicide pyroxasulfone (Zidua) at the max rate (3 oz/acre) after fall planting.

The seven wheat varieties ranging from most upright to most tillering were: OR3230027,

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 this work will be presented to the Oregon State University wheat breeding program to discuss the impact that variety differences can have on weed suppression. Ongoing research can include assessing how varieties could help suppress different weed species (grasses verse broad leaf weeds), the impact on weed seed production, and weed/wheat competition. Integrating culture weed control strategies into wheat lines could impact weed management in wheat producers fields.

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: 2023-2024

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 2023-2024.

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

1) During the 2023 wheat growth season, we identified 6 races of the wheat stripe rust pathogen from 25 samples collected from Oregon and determined their frequencies.
2) We evaluated 265 breeding lines from Margaret Krause's wheat breeding program, 184 entries in the PNW winter and spring wheat variety trial nurseries, and 48 entries in the west uniform regional winter and spring wheat nurseries in various field locations and in the greenhouse, and identified breeding lines with resistance to stripe rust.
3) We made forecasts for stripe rust using our prediction models, conducted field surveys and yield loss/fungicide experiments, and made recommendations for stripe rust management.

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 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 2023 crop season helped prevent 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: Wheat and Barley Variety Testing for Oregon

Commission Funding Amount: $ 167,800

Funding Year: 2023-2024

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 2023-2024 growing season, reports were released for all trials except the Moro-Kaseberg soft winter trial, the Kent spring barley trial, the La Grande spring barley trial, and the Klamath Falls spring trials. The Moro-Kaseberg trial was not released due to a planting error, the Kent spring barley trial was not released due to elk damage, the La Grande spring barley trial was not released due to high variability, and the

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 2024 growing season.

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

59 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. 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: Area-wide survey to understand the extent of an established parasitoid wasp

Commission Funding Amount: $ 5,500

Funding Year: 2023-2024

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)

NA

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

Extneion publication was made available

https://extension.oregonstate.edu/catalog/pub/pnw-777-integrated-pest-management-guidelines-biocontrol-cereal-leaf-beetle-pacific

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

Out of the 16 commercial cereal fields sampled across the major cereal-producing regions of the Pacific Northwest during the summer of 2023, we discovered unexpectedly low parasitism levels of CLB larvae (0–28%). This may be because CLB and parasitoid wasps were active at different stages of development. Or, the low levels could be due to prophylactic insecticide applications over the last decade or so. Sporadic CLB outbreaks have been reported since 2021, underlining the importance of regular pest monitoring at different crop growth stages to maximize insecticide effectiveness and improve parasitoid survival.

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: 2023-2024

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 "2024 Preferred Wheat Varieties Based on End-Use Quality" brochure. Sixteen new entries were added to the published list this year, 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: 2023-2024

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 line 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: 2023-2024

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 2023 harvest were received and organized into 40 nurseries. The samples totaled 968. 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.

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: 2023-2024

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)

In the original proposal, Dr. Pat Hayes wrote that he would retire in 2023/2024 and that there was the expectation that barley breeding at Oregon State University would continue. Dr. Margaret Krause took over leadership of the program following Dr. Hayes's retirement. Dr. Hayes went down to half-time at the end of 2023 and fully retired at the end of June, 2024. Senior Faculty Research Assistant Scott Fisk was promoted to the role of assistant breeder.

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

The first objective of the project was to make crosses to 'Successor' with the goal of creating a spring-sown, Beyond-tolerant barley variety with higher yield and quality and adaptation to Oregon's dryland environments. Successor was crossed to 'Oregon Promise', 'Woody-1', 'Woody-2', '14WAIM-3605.5', 14WAIM-3608.3', 14WAIM-3620.17', 'KWS Jessie', 'KWS Willis', 'Lenetah', and 'Tetonia' with a 92 percent success rate. F1 plants were grown in the greenhouse, and F2 seed was sent to Ryan Graebner for planting in Pendleton in spring 2024. Ryan's team harvested F3 seed at the close of the 2024 field season and provided these to the barley breeding program for planting the next generation in the greenhouse over

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

I would recommend for Oregon Wheat producers to consider testing out Successor if spring barley is relevant for their rotation. Data on Successor's performance in Dr. Ryan Graebner's extension trials is available for locations in Athena, Ione, Klamath Falls, La Grande, and Pendleton from 2023 (https://cropandsoil.oregonstate.edu/wheat/variety-trials/2023-oregon-wheat-and-barley-yield-trial-data) and in Athena, Ione, and Pendleton from 2024 (https://cropandsoil.oregonstate.edu/wheat/osu-wheat-variety-trials/2024-oregon-wheat-and-barley-yield-trial-data). Foundation seed is available from WSCIA. Because registered and certified seed is not available, interested growers could request a sample of Successor from WSCIA to try out under a Material Transfer Agreement.

The Oregon State University program has produced a number of high performing winter malting barley varieties that may be of interest to Oregon producers if they are interested in and can secure a malting barley contract.

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: $ 217,080

Funding Year: 2023-2024

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 winter of 2024. All hard white winter yield plots that had been planted in the fall of 2023 were harvested for grain yield in the summer of 2024, but other data collection on these lines was reduced.

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

The soft white winter (SWW) breeding project, which is the primary project of the breeding program, prepared for the release of OR2180377 and OR2190025 CL+. OR2180377 is being released under the name 'Gale'. It is targeted for the Willamette Valley as a replacement for 'Rosalyn'. It is awnless/awnletted with an intermediate heading date. It has good stripe rust resistance and strawbreaker foot rot resistance. It has shown good/excelent yield potential, and the Pacific Northwest Wheat Quality Council rated it as "Most Desireable". Loren Behrman of Tualatin Valley Seeds produced foundation seed during the 2024 growing season. An announcement about Gale was made during the Hyslop field day on May 22nd.

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

Results from Objective 1 indicate that the CoAXium wheat technology can help Oregon wheat growers selectively control winter annual grasses such as downy brome, feral rye (Secale cereal), and jointed goatgrass (Aegilops cylindrica). However, prudent use and implementation of sound best management and stewardship practices of CoAXium wheat are critically important for preserving the efficacy and longevity of this new technology. The use of Aggressor AX (quizalofop) in combination with a pre-emergence herbicide (e.g. Zidua or Anthem Flex) would be a good strategy to reduce the weed infestation to be treated with quizalofop and consequently the probabilities of selecting for resistant plants to this group 1 herbicide.
The original Aggressor has been removed from the market and it is not safe in soft white CoAXium wheat. Only Aggressor AX should be used in soft white CoAXium wheat.

Results from objective 3 indicate that the undercutter sweep in late summer to control broadleaf weeds in fallow does not do a lot of damage to soil, and it might be a sustainable practice for combating herbicide-resistant weeds.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Gene Introgression and Gene Editing for Developing New and Improved

Commission Funding Amount: $ 62,080

Funding Year: 2023-2024

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)

When Dr. Margaret Krause took over leadership from Dr. Bob Zemetra on 1 November 2023, CRISPR-Cas9 work was scaled back, as this is not in line with Dr. Krause's expertise.

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

Regarding the introgression of new genes into Oregon State University wheat breeding lines, crosses were made in the spring of 2020 to initiate two major stripe rust resistance genes (Yr5 and Yr15) into PNW adapted breeding lines. F4 generation plants that carry both resistance genes were identified. Top and backcrossing continued to transfer disease resistance genes for barley yellow dwarf virus (BYDV), soil borne wheat mosaic virus (sbWMV) and Fusarium head blight into elite Oregon germplasm. Crossing continued to integrate a null gene for polyphenol oxidase (PPO) reaction into soft white winter and hard red winter cultivars and advanced breeding lines.

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

Oregon wheat producers who are interested in utilizing CoAxium wheat varieties are encouraged to attend the CBARC Pendleton and Sherman Co. field days on 9 and 10 June 2025, respectively. Growers will be able to view the most advanced Clearfield and CoAxium breeding lines in the Oregon State University wheat breeding program and provide feedback to the breederse.

Growers who have seed samples that they would like to have tested for the presence of Clearfield or CoAxium genes should contact the Oregon State University wheat breeding program and provide the program with grain samples. The program can perform both genotyping and the new seedling assay to determine the samples' genotypes.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Screening for Resistance to Major Wheat Diseases in Oregon

Commission Funding Amount: $ 45,533

Funding Year: 2023-2024

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.

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

Planted plots for disease screening included all entries from the 2023-24 OWEYT and HWEYT trials and 72 additional elite or advanced lines from the OSU Breeding Program. These entries were tested against stripe rust, Septoria leaf blotch, Cephalosporium stripe, Fusarium crown rot, strawbreaker foot rot, barley yellow dwarf, and sharp eyespot. Twenty-four lines from Agripro were tested against the same diseases, except for sharp eyespot. In addition, 24 lines from Limagrain and 24 lines from the WSU/ARS club wheat program were tested for Cephalosporium stripe resistance. The Fusarium crown rot plots were lost to winter injury at the Sherman Station. The 2023-24 season was favorable for

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

Recommendation of varieties for disease resistance are often specific to production conditions. Such information is often transmitted via direct communications with individual growers, presentations at field days, interactions with extension and breeding personnel, and through data and ratings included on Ryan Graebner's OSU Wheat Variety Trials website. Information from disease screening trials is transmitted via close associations with mutiple breeders and have proven to be very useful to the variety development process. I would recommend to the OWC that such work be continued by other pathologists as I phase out my contributions.

Oregon Wheat Commission Project Report

Add additional pages as needed

Project Overview

Title of Project: Nitrogen Fertility in Spring and Winter Wheat with Biofertilizers

Commission Funding Amount: $ 15,000

Funding Year: 2023-2024

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)

Due to space and equipment limitations the 2024 spring wheat trial examining the use of the biological seed inoculate MycoGold planned to be at the Sherman Experiment Station will take place instead at the Pendleton Experiment Station at a smaller plot scale but with more replicates. No changes were made though to research trials harvested or seeded in 2023 .

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

Winter wheat yield was increased with the nitrogen fixing biofertilizer Envita from 1.1 to 11 bu/acre at lower fertilizer rates and in one trial produced the greatest return on investment over higher fertilizer rates without Envita ($121/acre increase). Spring wheat yield was not increased with Envita. Envita significantly increased nitrogen uptake in 2 of the 4 trials, but did not influence grain protein. The biofertilizer Fresh Tracks Universal Microbes did not produce a significant response, but did generate the highest return on investment in 1 spring wheat trial where no fertilizer was added ($103 increase over control at full fertilizer rate). Soil variables in the top foot showed a significant response to fertilizer rate, but not biofertilizers.

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

Envita significantly increased nitrogen uptake in winter and spring wheat and increased winter wheat yield from 1.1 to 11 bu/acre where fertilizer rate was reduced. However, this response was not consistent and only generated a positive return on investment in 1 of the 4 trials. Crop yield may have had a more consistent response if late season drought had not developed. Similarly, there was not a strong response from spring wheat or from Fresh Tracks Universal Microbes possibly due to drought impacts, though there was a positive return on investment in 1 trial. Additional years of research are needed to see what the crop response would be under years of higher precipitation and different drought timing. If wheat producers are considering using biofertilizers our research suggests that fertilizer rates should be lowered by 75% or less, especially if high levels of soil residual nitrogen are present (70-90 lbs of nitrogen in 10-12" rainfall areas). During years with above average spring precipitation fertilizer rates should only be reduced by 25-50%. Producers should consider trying out biofertilizers on small areas of the farm before considering large scale adoption as our research shows a variable response. In addition, the earlier that biofertilizers can be applied the better i.e. at 4 leaf stage vs. 6 leaf stage or later, depending on the biological product being used. More information can be found here: https://beav.es/cm7