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Hyslop Farm Field Day Agenda 2023

8:30 – 9:00 AM: Welcome with Coffee and Doughnuts

9:00 – 11:30 AM: Grass and Legume Seed Production Field Tours
   Symphylan Control Options in Grass Seed Crops ........................................1
   Comparing Carbon Sources for Carbon Banding Applications .......................2
   Alternative Methods to Carbon Seeding in the Establishment of Tall Fescue and Perennial Ryegrass Seed Crops Using a Safener.................................3
   Pushing the Yield Barrier: New PGR Concepts in Grass Seed Crops .............4
   Evaluating Yellow Dwarf Virus Management in Grass Seed Production ......5

11:30 AM – 12:00 PM: Interactive Exhibits
   Interactive Exhibits..........................................................................................6

12:00 – 1:00 PM: Lunch and Featured Speaker OSU President Dr. Jayathi Y. Murthy

1:00 – 3:00 PM: Cereal and Plant Pathology Field Tours
   Improving Resistance to Septoria Leaf Blotch in Wheat ..............................7
   Wheat Variety Testing for the Willamette Valley..........................................8
   Yellow Dwarf Virus Resistance in Barley – Perspectives from the Genome and the Sky ..........................................................9
Symphylan Control Options in Grass Seed Crops
Navneet Kaur1, Alison Willette1, David Maliszewski1, Seth Dorman2, Nicole Anderson1
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2National Forage Seed and Cereal Research Unit, USDA-ARS
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Research Summary
Efficacy of new and existing insecticidal chemistries representing diverse mode(s) of action was evaluated for the management of symphylans in tall fescue [Schedonorus phoenix (Scop.) Holub] and perennial ryegrass (Lolium perenne L.) grown for seed as pre-plant incorporation (PPI) during spring and fall 2022, respectively. Insecticide treatments (Figure 1) were incorporated into the top 2 inches of soil using a tractor mounted rotavator, immediately prior to planting tall fescue var. ‘Titanium G-LS’ and perennial ryegrass var. ‘Fastball 3GL’ on April 8, 2022 and October 20, 2022, respectively.

Spring 2022. At 10 days after treatment (DAT), symphylans were not detected in plots containing treatments of Capture LFR, indicating a significant suppression compared to control plots (avg. 9.25 symphylans) and Vantacor treatments (avg. of 4.25 symphylans) (P= 0.006). At 14 DAT, a similar trend emerged for Capture LFR and A21377X with no symphylans present and no significant suppression compared to Vantacor (avg. of 3 symphylans) (P= 0.031). At 25, 32 and 39 DAT no treatment differences were detected compared to the control (P≥ 0.05). There was no difference in plant densities in the spring (Figure 1A) (P≥ 0.05).

Fall 2022. At 8 DAT, Capture LFR, Warrior II, Velum Prime, Torac, and control had comparable counts and no difference in mean symphylans (Figure 1B) (P≥ 0.05). At 13 DAT, all insecticide treatments suppressed symphylans when compared to the control (avg. of 10.3 symphylans) and Nimitz plots (avg. 7 symphylans) (P= 0.055). No differences in the between treatments found at 33 DAT (P≥ 0.05). At 50 DAT, plant densities of all insecticide treatments were comparable to the control except Nimitz, indicating its poor performance (P= 0.005).

Acknowledgments
We thank OSU Agricultural Research Foundation, Oregon Grass Seed Commissions, and Oregon Department of Agriculture Specialty Crop Block Grant Program for funding.
Comparing Carbon Sources for Carbon Banding Applications
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Research Summary
Carbon banding in grass seed production systems is accomplished by applying activated charcoal on one inch row bands over the seed furrow prior to herbicide applications. Greenhouse data suggest that some biochar sources may be as effective as activated charcoal for this purpose.

To understand how biochar may perform in the field, an experiment took place comparing a mixed-conifer biochar versus activated charcoal and a non-treated control. In addition, seven different pre-emergent herbicides were applied. ‘Prominent’ perennial ryegrass was sown at 12 lbs./acre on 12-inch row spacings and carbon banding was applied behind the seed furrows as a slurry of 5 lbs. of carbon mixed in 10 gallons of water at a rate of 300 lbs./acre. The study was implemented on 19 Oct. 2022 and repeated on 25 Apr. 2023. Rain or irrigation totals were at least 0.25 inches within 2 days after the herbicides were applied in both iterations of the study.

Preliminary data of plant counts on 09 Jan. 2023 suggest that the biochar tested is as effective as activated charcoal as a carbon-banding product. Importantly, neither carbon source significantly increased plant counts compared to no carbon when Alion was applied, and the biochar did not increase plant counts compared to no carbon when Eptam 7E was applied (Figure 1).

**Figure 1:** Plant counts as influenced by carbon source and herbicide on 09 Jan. 2023. Sowing and carbon banding occurred on 19 Oct. 2022. Herbicides were applied on 21 Oct. 2022. Means not sharing a letter are significantly different according to Tukey’s HSD test at 5% significance.

**Acknowledgements:** The authors thank Karl Strahl with Oregon Biochar Solutions for donating biochar and Paul Hedgpeth with Columbia River Seed for donating perennial ryegrass seed.
Research Summary
Concept III (fluxofenim) is used in sorghum production as a seed safener. Seed is coated with the product, which causes an increase in enzyme activity that metabolizes Dual II (s-metolachlor), reducing herbicide phytotoxicity. This study tested the use of Concept III on tall fescue and perennial ryegrass to determine if coating the seed with the safener could replace carbon seeding during stand establishment. Fields were planted in the fall of 2022, and plots sprayed with rates of Dual II at 0, .5x, .75x, 1x, 2x, 1x (Dual II Magnum), 1x late application. 10 and 15 lb planting population rates of grass seed were used with each population having either 1x and 2x seed treatments of Concept III. The same titrating rates of Dual II were applied to carbon seeded plots and used as the grower standards for acceptable phytotoxicity. Phytotoxicity (biomass changes compared to the check) were assessed, as well as weed control. Tall fescue and perennial ryegrass had a decrease in phytotoxicity of 21 and 13%, respectively, when the planting population increased from 10 to 15 lbs with 2x safener rates. There was also a decrease in phytotoxicity of about 10% in both tall fescue and perennial ryegrass when the safener was doubled from the 1x to 2x rate with the 15lb planting population rate. Phytotoxicity ranged between 20 and 90% for both species depending on treatments and yields will be taken during the summer of 2023. Carbon seeded phytotoxicity ranged between 20 and 43% for both species.

Planting and Application Layout for One Replication

<table>
<thead>
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<th>Planting</th>
<th>Carbon 1x Population</th>
<th>Control</th>
<th>.5x</th>
<th>.75x</th>
<th>1x</th>
<th>2x</th>
<th>1x DM</th>
<th>1x Late</th>
</tr>
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<td></td>
<td>2x Safener 15 lbs seed</td>
<td>Control</td>
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<td>.75x</td>
<td>1x</td>
<td>2x</td>
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<td>1x DM</td>
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</tbody>
</table>
Pushing the Yield Barrier: New PGR Concepts in Grass Seed Crops

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Research Summary
Plant growth regulators (PGRs) are one of the most economical crop inputs which provide substantial return on investment in Oregon's grass seed cropping systems. Recent OSU studies have shown that the use of trinexapac-ethyl (Palisade EC) can be advantageous in both grazed and non-grazed annual ryegrass seed crops (Figure 1) as a result of decreased spike length (Figure 2). However, the upper end of the application rate range has not been determined. Additionally, there has been a recent introduction of generic PGR products into the marketplace. Studies in Europe and New Zealand have shown that not all formulations of trinexapac-ethyl and prohexadione calcium (Apogee) are equivalent and it is advantageous to run side-by-side comparison before adopting generic formulations into the production system. Thus, the objective of this work is to 1) determine the upper rate range of trinexapac-ethyl in both grazed and non-grazed annual ryegrass and 2) evaluate efficacy of generic PGRs to compared to current industry standards in tall fescue.

Acknowledgements: The authors wish to thank the Oregon Seed Council and Agricultural Research Foundation for funding these projects. We are also grateful for the numerous chemical manufacturers who have contributed product to these efforts.

Figure 1. Effect of spring mowing and PGR interactions on seed yield of annual ryegrass.

Figure 2. Effect of spring mowing and PGR interactions on seed yield of annual ryegrass.
Evaluating Yellow Dwarf Virus Management in Grass Seed Production

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Research Summary

To determine effective management strategies to reduce outbreak severity of aphid-vectored yellow dwarf viruses (YDV) in perennial grass seed crops, a small-plot field trial was established at OSU’s Hyslop Research Farm in the fall of 2021. The trial includes a split-split plot arrangement of treatments and four replications. Each main plot consists of a different genotype of perennial ryegrass to evaluate host resistance, including ‘Top Gun II’ (Barenbrug USA) and ‘Fastball’ (Mountain View Seeds). Split plots include two randomized nitrogen rates. Nitrogen was applied in spring 2022 in 16.8 × 15.2 m blocks at a low (135 kg N ha\(^{-1}\)) or high rate (225 kg N ha\(^{-1}\)). Within each split plot, five 3.4 × 16.8 m subplots were randomly assigned an insecticide treatment timing with formulated product Sivanto (flupyradifurone): 1) untreated control, 2) autumn only, 3) spring only, 4) autumn+spring, or 5) autumn+spring+summer application.

For the 2021-22 growing season, differences were detected in aphid abundance between cultivars and insecticide application timings (Fig. A). Cultivar ‘Fastball’ had lower aphid counts in plots with a spring insecticide application compared to the single fall application treatment or the untreated control. The autumn+spring+summer spray timing treatment for ‘Fastball’ cultivar had a higher seed yield than the control (Fig. B). Cultivar ‘Top Gun II’ showed a similar pattern in aphid counts, although no differences in aphid abundance or seed yield were observed. BYDV incidence was greater overall in ‘Fastball’ compared to the ‘Top Gun II’ cultivar (Fig. C). CYDV incidence was more consistent in ‘Top Gun II,’ showing genetic variability in susceptibility to different YDVs (Fig. D). For both cultivars, low nitrogen plots had lower aphid abundance and YDV incidence and similar seed yield compared to high nitrogen plots in a first-year stand (Figs. E, F).

Acknowledgments

Research is supported by the Agricultural Research Foundation and Oregon Grass Seed Commissions.
Interactive Exhibits

**BYDV Resistance in Barley**
Drs. Pat Hayes and Chris Massman will demonstrate how GWAS and other techniques are used by their team to investigate BYDV resistance in barley production.

**Cereal Quality Demonstrations**
Dr. Andrew Ross, cereal quality specialist, will demonstrate aspects of flour and starch quality analysis.

**Developments at OSU Seed Laboratory**
Dr. Sabry Elias will present information on new seed testing services and policies at OSU’s Seed Laboratory.

**Entomology Table**
Dr. Navneet Kaur’s extension entomology group will have insect display boxes with many locally collected pest specimens.

**Fractional Deep Tillage to Improve Crop Yields and Carbon Accrual**
Dr. Markus Kleber will discuss the concept in the context of the greater tillage vs no-till discussion, and technical realization will be highlighted using images of specialized equipment.

**GIS Technology in Field Plot Analysis**
Dr. Pete Berry will demonstrate how drones and sensors can be utilized to generate GIS data for research and farming applications.

**Organic Extension Program**
Serves farmers and other professionals interested in sustainable, regenerative, and Organic farming. Barley cookies, and information about transitioning to organic will be provided!

**Oregon IPM Center: Pest Phenology Models and USPEST.ORG**
The Oregon IPM Center promotes and supports integrated pest management (IPM) for Oregon and the Northwest region, serving as a one-stop hub for IPM information.

**Rainfall and Evaporation Tracking**
Gurpreet Singh in OPEnS lab will showcase a low-cost, open-source load cell-based rain gauge system they developed called the Evaporometer for collecting rainfall and evaporation data.

**Slugs!**
Dr. Rory Mc Donnell’s lab will have pest slug specimens, novel attractants, and slug-killing nematodes on display.

**Soil Health and C Sequestration**
Dr. Jennifer Moore will provide an overview of sampling techniques and measurements for soil health, C sequestration, and GHG measurements for Willamette Valley soils in the field and lab.

**Soil Health Lab**
Present information about the lab services that we offer and how we can be of help to growers in the Willamette Valley and beyond.
Improving Resistance to Septoria Leaf Blotch in Wheat

Chris Mundt¹, Bob Zemetra²

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Research Summary

*Septoria tritici* leaf blotch is one of the most important diseases of wheat in the Willamette Valley. High genetic variation of the pathogen enables it to adapt over time to both fungicides and host plant resistance. The OSU Cereal Pathology and Wheat Breeding programs began a collaboration several years ago to increase levels of Septoria resistance in lines that also have high stripe rust resistance and yield. Advanced F₆ lines resulting from this collaboration are currently planted in the field and results from F₅ lines in spring 2022 are shown in Figure 1. Two-thirds of the advanced lines in 2022 showed lower Septoria levels than Bobtail wheat. Preliminary results suggest that it may be possible to combine improved Septoria resistance and high yield. History of the project will be described and advanced lines will be shown to Hyslop Field Day participants.

**Figure 1.** Severity of *Septoria tritici* leaf blotch for 77 experimental wheat lines and three check varieties. Each vertical line indicates severity level of a given breeding line or check variety and is the average over four disease observation plots. One experimental line was substantially more susceptible than Stephens, but is not shown on the figure. The five red lines indicate Septoria levels for the five highest yielding experimental lines in an unreplicated, preliminary yield trial conducted by the OSU Wheat Breeding Program in 2022.

Acknowledgments

Research was supported by the Oregon Wheat Commission and the Oregon Agricultural Experiment Station.
Wheat Variety Testing for the Willamette Valley
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Research Summary
The Oregon Cereal Extension Program provides growers with performance information on commonly grown and newly released wheat and barley varieties from public and private breeding programs. Wheat varieties are evaluated in four trials (the Oregon Soft Winter Wheat Variety Trial, the Oregon Hard Winter Wheat Variety Trial, the Oregon Soft Spring Wheat Variety Trial, and the Oregon Hard Spring Wheat Variety Trial) while barley varieties are evaluated in the Oregon Spring Barley Variety Trial. This year, we are conducting trials in 22 locations, winter sites and one spring site in the Willamette Valley. Trial data is released as soon as possible after harvest through our website, https://cropandsoil.oregonstate.edu/wheat/osu-wheat-variety-trials, so that variety testing data can be used to make planting decisions for the following crop year. Key traits we evaluate include yield, test weight, grain protein, plant height, and heading date. In addition, we collaborate with Professor Chris Mundt, Professor Andrew Ross, and the Western Wheat Quality Laboratory to evaluate the entries for disease resistance and end-use quality. Program priorities include ensuring that our testing conditions reflect production conditions, maintaining consistency in the locations we test from year to year, and testing experimental lines as early as possible to develop an understanding of their performance before they are released.

Acknowledgments
We would like to thank the Oregon Wheat Commission for support of this work. We would also like to thank all of the growers who have hosted variety trials on their farms.
Yellow Dwarf Virus Resistance in Barley – Perspectives from the Genome and the Sky
Christopher Massman¹, Seth Dorman², Scott Fisk¹, Chance Frederickson¹, Pat Hayes¹, Laura Helgerson¹, Hannah Rivedal², Christy Tanner¹

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Research Summary
Yellow Dwarf Viruses (YDVs) can be controlled by targeting the aphid vectors with insecticides. However, host plant resistance is preferable for economic and environmental reasons. Assessing resistance is a challenge. In barley, this has been addressed by inoculation of plants with reared viruliferous aphids under controlled environment conditions. This approach limits the number of plants/genotypes that can be tested. Genome wide association analysis (GWAS) is a tool that can identify regions of the genome associated with resistance by integrating genotype and trait data. However, it requires larger populations. In this study, we are using a panel of barley genotypes coupled with 1) plant phenotype data generated by visual assessment and remote sensing, 2) aphid population abundance and type data, and 3) virus type data to assess the feasibility of identifying resistance genes.

The GWAS panel consists of 192 genotypes from 20 pedigrees, selected from a larger set of fall-planted breeding lines based on apparent YDV symptoms in 2022. Checks include Thunder, Lighting, and UC Tahoe. The two-replicate alpha design was planted on 10/4/22 to encourage YDV infection. Three applications of fungicide were used to reduce the incidence of fungal pathogens. Weekly aphid monitoring using sticky cards recorded the timing of winged alates starting one week after germination. On 11/21/22 plots were sampled to determine in-plot aphid species counts and fall virus status. To assess in-plot aphid populations, five plants per plot were visually inspected for aphid counts and identities. To assess virus infection status, five representative leaves per plot were used for PCR detection of YDV genera and species. In the 2022 season, multiple YDV ratings were used. In 2023 disease was rated on a 0-9 scale. Multispectral and natural color (RGB) aerial imagery was collected using a drone at a height of 20 m. After the drone images were processed, canopy height and normalized differential vegetation index (NDVI) values were extracted for each plot using GIS software. GWAS was conducted using Illumina 50k SNP chip data, as well as drone image data and phenotypic information from 2022 and 2023.

The GWAS using YDV phenotype data from 2022 identified significant marker-trait associations on chromosome 2H, independent of the reported yd2 locus on 3H. Analyses of YDV infection in the 2023 trial are ongoing: there are significant differences in resistance between genotypes. NDVI Drone data collected in 2023 led to the identification of marker-trait associations for plant height and leaf area. In the 11/2022 sampling, 49% of the plots had aphid populations. Approximately 86%, 5.6%, and 3.5% of total aphids observed were bird-cherry oat aphid, English grain aphid, and greenbug, respectively. 50 of 384 plots had a positive detection of BYDV (Luteovirus genus). Two plots also had positive detections of CYDV (Polerovirus genus). Preliminary results detected virus species BYDV-GAV, BYDV-PAS, and BYDV-PAV, indicating a mixed population of viruses expected with multiple species of aphids present.
Thanks for joining us, we hope to see you again at next year’s Field Day on May 22, 2024!

Want to stay up to date with what is going on in the Department of Crop and Soil Science? Sign up for our quarterly newsletter here: https://beav.es/S9u, or scan this QR code:

Feedback Welcome!