CROPPING SYSTEMS CONFERENCE

BREAKOUT PRESENTATION SUMMARIES

TUESDAY, JANUARY 13, 2026 – MORNING

ROOM A

10:15-11:15 A.M. **Using Drones and NDVI to Determine Nutrient Deficiencies in Dryland Wheat**, Jacob Powell OSU (1- Precision Ag CCA Credit)

The use of drones is becoming more common in dryland cropping systems, however the technology still has a way to go before widespread adoption by farmers in the Pacific Northwest. Drone imagery was taken throughout the growing season in 2024 and 2025 in North Central Oregon across multiple wheat trials at different locations examining different fertilizer rates with foliar and soil applied microbial products. Both a normal single sensor camera and multispectral camera were used mounted on a DJI Mavic 3M Drone. Fertilizer rate and crop available soil nitrogen were found to be significantly correlated with Normalized Difference Vegetation Index (NDVI) values. However, no significant correlation was found for microbial products being examined. In addition, there were significant differences in NDVI between different wheat varieties being grown at the same location. Drone imagery was flown and analyzed for the remainder of the 2025 growing season to examine the correlation between NDVI values and post-harvest soil nutrients, wheat yield, grain protein, nutrients in wheat tissue, and foliar and soil applied microbial products. These results may be able to better inform how drone imagery can be utilized in dryland cropping systems in the future to determine nutrient deficiencies and possibly soil health.

ROOM C/D

10:15-11:15 a.m. **Optimizing Harvest Residue Management: Equipment, Strategies and Outcomes,** Jesse Brunner, Devin Moon, Jake Markgraf (1-Nutrient management CCA)

This session will provide a grower-focused discussion on practical strategies for managing harvest residue to support soil health, planting efficiency and residue management approaches using various equipment setups, including combines, straw choppers, and stripper headers.

Room E/F

10:15– 11:15 a.m. **Regan 101: Soil Health in Action,** Grower panel, Tom Conklin, Jake Dewald, Allen Druffel, and David Dahlsrud
(1 Nutrient Management CCA Credit)

Join producers, Tom Conklin, Allen Druffel,
Travis Dewald, and David Dahlsrud, for an interactive panel on regenerative farming. Hear real experiences with no-till systems, carbon amendments, and biological products—what they are using, how long they have used them, what's worked, and what hasn't.

The discussion will cover topics such as practical carbon inputs and integrating biology into fertility programs. Whether you are regenerative-curious or already experimenting, this session is built for learning, questions, and honest farmer-to-farmer insight.

Tuesday, January 13, 2026 - Afternoon

Room A

12:45-1:45 p.m. **Technology Driven Approaches to Weed Control,** Judit Barroso, OSU, Adam Hutto, WeedIt, Joan Campbell, University of Idaho, and Katy Hill RDO

This session will focus on new technologies for weed control.

This panel discussion will feature industry and research experts who will share thier research and experience with **new** weed destruction technology.

Joan Campbell will share her research on using blue light for weed destruction and crop seed enhancement.

Katy Hill with RDO will share the latest technology behind RDO. Equipped with cameras, Ai-Machine learning and Machine control. John Deere's See and Spray precisely identifies targets and sprays weeds. The vision processing units provide real-time data, and the system determines whether each element is a weed or a crop. If it spots a crop, it activates a nozzle and sprays the weed. All of this occurs within milliseconds.

Adam Hutton of WeedIt will discuss a study that investigated the power of fluorescence to detect different levels of chlorophyll in plants to detect weeds within a crop. Ultimately, providing a technology that is versatile across a large variety of crops with a higher processing speed and the ability to spray at night.

Judit Borroso, Oregon State University, Judit will discuss her research with Optimizing the Use of Green-on- Brown Precision Sprayers. Green on brown sprayers may be more useful in this region due to the number of fallow acres.

Room C/D

12:45-1:45 p.m. **Tools of the Trade: Drills that Drive Direct Seeding Success**, Dusty Walsh, Eric Hasselstrom, and Jesse Brunner (1-Crop Management CCA)

Eric Hasselstrom – Rainfall 24 to 26, Drill 1870 JD Conserva pack Drill, Jesse Brunner- Rainfall 15-20, 895 Disk Drill, Dusty Walsh- Rainfall 16-18, Bourgault Single Disk and John Deere Planter

This session will feature No-till growers from three separate areas and different rainfall zones. They will discuss the drills they use and why. What has worked for them and what has not. This session is for growers who are considering making the transition to no-till.

Room E/F

12:45-1:45 p.m. **Cover crop management effects on soil moisture, nitrogen and crop yield in inland Pacific Northwest dryland wheat cropping systems.** Kendall Kahl, Mark Greene, Clint Zenner, Doug Schuster (1-Nutient Management CCA Credit)

Cover crops are increasingly used to improve nutrient retention, reduce fertilizer needs, limit erosion, and enhance soil health, yet questions remain about how best to manage them in dryland systems. In the inland Pacific Northwest, soil moisture and nitrogen availability are key considerations for integrating cover crops into wheat rotations. This session highlights findings from a multi-farm study evaluating different cover crop mixes and termination timings, with a focus on how management decisions influence soil moisture, nitrogen dynamics, and subsequent winter wheat performance. Insights from collaborating producers will also be shared.

Wednesday, January 14, 2026

Room A

10:30-11:30 a.m. **Compost Tea and Extract Research**, Carol McFarland, WSU, and Douglas Poole (1-IPM CCA)

An update on the Compost Tea and Extract Research Project will be presented by Carol McFarland followed by grower Douglas Poole's perspective on using compost tea and its impacts on plant growth.

Room C/D

10:30-11:30 a.m. **Optimizing Fertility and Fallow: Timing, Tools and Data Management**, Brad McManigal and Aaron Esser (1 CM- CCA Credit)

Aaron Esser (WSU) and Oregon producer Brad McManigal will lead a discussion on fertility management tools, timing, and products, including considerations for data management.

Room E/F

10:30 -11:30 a.m. **Strategies for Success With Canola: From Soil to Oil,** (1- C CCA Credit) Karen Sowers, Pacific Northwest Canola Association, Grower Panel, Mark Greene, Aaron Madison. Moderated by Don Wysocki (1 CM-CCA)

Karen Sowers Executive Director of the Pacific Norwest Canola Association, and a panel of PNW winter and spring canola growers will share their insights about maximizing canola production in various cropping systems.

Subsurface Fluid Lime Corrects Soil pH Stratification in No-Till Systems

Leah Chidziwe, Joaquin Casanova, Claire Phillips, Richard Korneg, Joao A. Antonangelo

Washington State University

Soil acidification in long-term no-till (NT) systems restricts root growth and nutrient availability, especially where deep-banded nitrogen fertilizers create acidic subsurface layers. Surface-applied lime is often ineffective at correcting stratified acidity without soil disturbance. This study evaluated subsurface fluid lime injection as a precision strategy to ameliorate acidity while maintaining NT management. Field experiments were conducted in eastern Washington across a three-year rotation (Winter Pea, Spring Canola and Winter Wheat) in a long-term NT system with documented pH stratification. Fluid lime was injected at variable rates, and soil responses were assessed at two depths (0–2, 2–4 inches) using soil pH, phospholipid fatty acid (PLFA) analysis, and crop yield measurements. Increasing lime rate resulted in clear pH increases at both depths, with the greatest response observed in the 2-4 inches target zone, confirming effective subsurface placement. Improvements in soil pH were associated with increased microbial biomass and arbuscular mycorrhizal fungi indicators, suggesting enhanced soil biological health. Grain yield responses to lime rate were variable across landscape positions, reflecting topography-driven differences in application uniformity and soil buffering capacity. Overall, results show that subsurface fluid lime application can mitigate stratified soil acidity, improve soil health indicators, and support crop productivity in NT systems, offering a viable alternative to tillage-based lime incorporation.

Key words, Subsurface liming, soil pH stratification, no-till systems, soil health, grain yield

Do Flea Beetles Prefer Certain Canola Varieties?

Caitlyn C. A. Horsch, James Uhlenkott, Jim B. Davis, Julia Piaskowski, & Kamal Khadka
Department of Plant Sciences, University of Idaho, Moscow

Crucifer flea beetles (*Phyllotreta cruciferae*) are a major cause of economic loss for Inland Pacific Northwest spring canola (*Brassica napus*) producers. They can kill plants early in the season, and insecticides prices can decrease crop profits. We recorded flea beetle damage across cultivars over two years in a small plot study, replicated in two sites. We found early spring flea beetle damage correlated with decreased yield (p-value: < 0.0001), and flea beetle damage severity varied by cultivar (p-value: < 0.0001). This indicates that some cultivars may be more resistant to flea beetles than others, and resistance may result in higher yields. If so, this could help crop breeders develop more resilient canola cultivars, helping canola producers across the region.

Which Canola Varieties Perform Best in Your Region of the Inland Pacific Northwest?

Caitlyn C. A. Horsch, James Uhlenkott, Julia Piaskowski, & Kamal Khadka

Department of Plant Sciences, University of Idaho, Moscow

Canola (*Brassica napus*) grows best under certain environmental conditions, however, due to genetic variation, some canola varieties may be better suited to our regional climate than others. We conducted two experiments across the Inland Pacific Northwest, to test 1) which regions are best suited for growing winter and spring canola, 2) which winter and spring canola varieties perform best across different regions of Washington and Idaho, and 3) how unreleased breeding lines from the University of Idaho's Canola Breeding Program compare to commercially available canola cultivars. We tested 30 winter and 32 spring canola genotypes in small-plot trials across the Inland Pacific Northwest. We found that yield was impacted by variety and site, and there was a significant site-variety interaction, indicating that some cultivars perform better in different environments across the region, than others. Kicker, from Rubisco Seeds, had the highest overall winter canola yield, and CS2600 CR-T from Canterra Seeds had the highest overall spring canola yield. Genesee, ID had the highest winter canola yield and Bonners Ferry had the highest spring canola yield. These results may help producers and crop breeders improve canola yields across our region.

The synergistic effect of multiple soil health practices and their impact on the soil microbial community

Richardson, Kameron and Micheal Strickland, University of Idaho, Soil and Water Systems

Individual soil health practices, such as the addition of cover crops during fallow time, have been shown to benefit agroecosystems. Some of these benefits are increased microbial diversity, increased soil carbon sequestration, and increased microbial activity. However, few studies have examined the impacts of multiple practices, and these studies have only looked at combinations of two practices (ex. crops and no-till). To examine if there are benefits to implementing multiple practices long term, a field project has been implemented at the NRCS Plant Materials Center near Pullman, WA. The four practices that were implemented were: cover crop diversity (0, 1, 6, and 12 species), addition of compost, mowing of cover crops, and intercropping of cash crops. Analysis of year 2 data has shown that compost was the main driver of differences in the bacterial community, while mowing was the main driver in the fungal community. Though combination of treatments didn't show overall changes in community, other analyses showed changes in abundance of specific groups of bacteria and changes in relationships between groups of microorganisms. As this project continues, impacts of the soil microbial community will continue to be monitored.

Optimizing Canola Production through Depth-Specific Lime Application

Cawayne B. Bryan[1], Joaquin Casanova[2], Richard T. Koenig[1], and Joao A. Antonangelo[1*]
[1]Department of Crop and Soil Sciences, Washington State University, Pullman
[2]USDA-ARS Northwest Agroecosystem Research Unit, Pullman, WA
[*]Corresponding author: joao.antonangelo@wsu.edu

In the Pacific Northwest, soil acidification has become a major constraint to agricultural development, primarily associated with the continuous application of nitrogen-based fertilizers. This study addresses the gap in understanding how lime management and tillage practices affect canola production by evaluating their interaction under realistic field conditions. A field trial was conducted using a randomized complete block design (RCBD) with a 2x2 factorial structure to compare four treatments: lime with tillage, lime with no-tillage (NT), no lime with tillage, and no lime with no-tillage.

Results demonstrated that surface-applied lime in no-till systems created a stratified pH profile, raising the soil pH above 6.5 in the critical top 1.5 inches and nearly eliminating toxic aluminum in the surface layer. In contrast, tillage created a more uniform pH profile but resulted in a less potent pH increase throughout the root zone due to dilution.

Challenging the belief that mechanical incorporation is required for effectiveness, the study found that the no-till approach was superior to tillage, at least in the short term. The highest mean yield (>1,750 lbs/ac) was observed in the Lime + NT treatment, suggesting that the concentrated surface amendment created a favorable zone for early root development. Additionally, the analysis of seed quality indicated that the Lime + NT treatment produced a notably consistent oil content distribution. These findings provide strong evidence that surface liming is an effective strategy for maximizing canola yield and quality in no-till systems without the need for mechanical incorporation.

Optimizing Soil Base Saturation with Lime to Maximize Canola Yield in Acidic Soils of Eastern Washington

Bishal Lamsal, Washington State University, Department of Crop and Soil Sciences, Pullman

Joaquin Casanova, METER Group, Inc., Pullman

Richard T. Koenig, Washington State University, Department of Crop and Soil Sciences, Pullman

Joao A. Antonangelo, Washington State University, Department of Crop and Soil Sciences, Pullman

Soil acidification (SA) is an emerging issue for canola production in the Inland Pacific Northwest (iPNW). Major consequences of SA include aluminum (Al) solubilization, which restricts root growth, and reduced base saturation (BS%) and nutrient availability. However, BS% levels that maximize canola yield remain unclear, so we aim to determine its threshold for optimal yield without economic loss. A greenhouse (GH) experiment with an initial soil pH of 4.4 ± 0.05 (87 ± 1 mg Al kg^{-1}; BS% = 59 ± 2.8), and a field experiment (FE) with an initial soil pH of 5.5 ± 0.2 (30.7 ± 28.5 mg Al kg^{-1}; BS% = 77 ± 2.0), were conducted using increasing lime rates. In GH, optimum yield occurred at BS% of 86 ± 3.9 and pH of 6.2 ± 0.4 at lime rate of 1,607 lb $acre^{-1}$, beyond which yield plateaued. In FE, yield increased significantly ($p < 0.01$) at a lime rate of 4,465 lb $acre^{-1}$, corresponding to a soil pH of 5.6 ± 0.1 and BS% of 83 ± 1.8, after which yield plateaued. Since yield peaked at balanced nutrient conditions corresponding to optimum BS%, before there were any significant changes in soil pH, BS% better predicted yield.

Agronomic Performance of Winter Pea Varieties in the Pacific Northwest

Addison Kinzer, Sophie LeBard, and Kurtis Schroeder,

University of Idaho Plant Sciences Department- Moscow, ID

The University of Idaho Variety Testing program tests winter and spring pulse crops across the rainfed growing regions in northern Idaho and eastern Washington. Winter peas (*Pisum sativum* L.) are one of the few fall-seeded crop options in these rainfed regions. Fall-seeded peas have a higher yield potential than spring peas, reduce spring field work, and mature earlier than spring peas, reducing the risk of high temperatures impacting pod set in early summer. Winter peas have been grown in the region for decades. Previously winter peas were restricted to Austrian winter pea used primarily for cover crops and forage. Newer varieties with improved seed size and color have expanded the market access into feed and food. For the past several years, winter pea variety trials have been conducted at four locations in Idaho and Washington. During 2025, the average location yield varied between 1,842 to 3,946 lb/A. Whether grown for cover crop seed, feed or food, winter peas can benefit farmers economically and environmentally in rainfed production systems in the Pacific Northwest.

Soil Base Saturation Optimization for Wheat Cultivation in Acidic Soils of the Pacific Northwest

Deepanjan Mridha[1*], Joao Arthur Antonangelo[1*], Richard T. Koenig[1], Joaquin Casanova[2]

[1]Crop and Soil Sciences, Washington State University, Pullman, WA, US

[2]METER Group, Inc., Pullman, USA

Corresponding authors: mridha.deepanjan@wsu.edu, joao.antonangelo@wsu.edu

Abstract

Soil acidity remains a major constraint to wheat (*Triticum aestivum* L.) production in the Pacific Northwest (PNW), especially under long-term no-till systems where acidification and aluminum (Al) toxicity are intensified. This study evaluated the effects of increasing lime application rates (0, 0.5, 1.0, 2.5, 5, and 10 t/ac) on soil base saturation (BS) and wheat performance under controlled greenhouse conditions using an acidic soil (initial pH = 4.5) from Rockford, Washington. Two cultivars differing in Al-tolerance (AlumPair-05R, resistant; AlumPair-05S, sensitive) were grown to maturity. The lime application rates indicated that approximately 3 t/ac of lime is required to achieve optimum BS (98%), ensuring soil health and optimal crop yield. Liming significantly increased soil pH and available Ca, while reducing Al toxicity, leading to improved root growth, biomass accumulation, and grain yield. The AlumPair-05R variety outperformed AlumPair-05S variety at low lime rates, but both responded similarly beyond 2.26 t/ac (equals to ~85% base saturation). These findings demonstrate that optimizing BS% through appropriate liming enhances nutrient availability, mitigates Al-stress, and promotes sustainable wheat productivity in acidic soils of the PNW.

Keywords: Soil acidity; Wheat; aluminum (Al) toxicity; Base saturation; Soil pH; Crop yield

PNDSA Abstract

Diana Salguero-Gaibor[1], Gabby Hannen[2], Kendall Kahl[2], Ryan Boylan[1]

[1]Palouse Conservation District, [2]Univeristy of Idaho

FLOURISH (Farmers Leading our United Revolution in Soil Health) is an ongoing project across the Inland Pacific Northwest (WA, ID and OR) that includes 26 producers experimenting with cover crops and grazed cover crops to improve soil health. Each producer selected a unique cover crop mix for a 30-acre field plot that was paired with a summer-fallow or a cash crop business as usual (BAU) management field site. To monitor the impact of cover crops on soil health properties we: 1) compared biological, physical, and chemical indicators from 0-6 inch soil samples collected at cover crop termination and six months following to BAU management, and 2) explored relationships between number of functional plant families in cover crop mixes and soil health properties under ungrazed and grazed management. Preliminary results suggest improvements in select soil health indicators following 1-3 years of cover crops and increase in soil pH under continuous grazed cover crops. Additionally, cover crop mixes containing 1–4 plant families tended to indicate greater improvement in soil health indicators than mixes with 5–6 families. Cover crop mixes with moderate diversity (1-4 families) appeared optimal for enhancing soil health properties in the three years of this study.

Influence of Soil pH on Weed Growth and Crop Competition in Northern Idaho

Tristan S. Blain, Albert Adjesiwor, Joan Campbell, and Kurtis L. Schroeder

Department of Plant Sciences, University of Idaho

The continual application of ammonium-based nitrogen fertilizer has contributed to soil acidification in northern Idaho. The incorporation of calcium carbonate (lime) improves soil pH and reduces aluminum toxicity. Field experiments were conducted at Potlatch and Lenville, Idaho to determine how lime application might influence crop competition and weed interactions in plots planted with wheat. These sites were amended with 0 to 3 ton/A of ground limestone in 2016 (Potlatch) and 2023 (Lenville). At Potlatch, there were significant reductions in weed seedlings, weed biomass, and weed seeds in the soil seed bank with increasing rates of lime. At Lenville, there was only a significant reduction in weed seedlings in 2025 as the lime rate increased. Similarly, the wheat crop became more competitive with higher rates of lime as demonstrated by increasing spikes, crop biomass and yield. Results of these studies indicate that liming acidic soil improves crop performance and reduces weed seedling densities, weed biomass and seeds in the soil seed bank. A comparison of results between the two locations indicates that impacts on weed populations may take several years to become apparent. Application of lime in acidic soils can be used as another tool to manage problematic weeds.

Soil microbial communities and stress indicators varied with legume living mulches in organic dryland wheat systems

Quinn Yates[1*], Ava Heathman[1], Shikha Singh[1], Jeremy Hansen[2], Christina Hagerty[3], Don Wysocki[4,] Udayakumar Sekaran[5], Orion Raabe[1], Surendra Singh[1]

[1]Lind Dryland Research Station, Washington State University, Lind WA 99341

[2]United States Department of Agriculture-Agriculture Research Service, Pullman WA 99163

[3]Columbia Basin Agricultural Research Center, Oregon State University, Adams, OR 97810

[4]Oregon State University Extension, Pendleton, OR 97801

[5] Malheur Experiment Station, Oregon State University, Corvallis, OR 97331

A four-year study initiated in 2024 in Adams, Oregon to examine the suitability of organic production of spring wheat (*Triticum aestivum)* (SW) using leguminous living mulches as a nitrogen source and weed control. Treatments were; (i) perennial Aberlasting clover *(Trifolium hybridum)* with SW (*cv. Ryan)* (ii) annual Red clover (*Trifolium pratense*) with SW and (iii) SW-no living mulch (control). Post-harvest soil microbial biomass and microbial diversity were determined through phospholipid fatty acid (PLFA) assays taken from soil samples at two depths (0-6 and 6-12 in) in 2024. Results showed an increase in the gram postive:gram negative ratio in both clover treatments within 0–6 inch soil depth. Arbuscular mycorrhizal fungi (AMF) were highest in the control treatment at 0-6 in. Microbial stress response ratios were calculated utilizing PLFA results, finding that within 0-6 inches, two ratios indicated improved stress response in both clover treatments. This suggests that living mulch may create a more resilient environment through colonization of beneficial microorganisms. Overall, the increase in AMF and decreased soil organic matter indicates nutrient limitation in the control. When concluded, this research is expected to provide growers with an improved understanding of soil microbial communities in organic systems.

Living mulch impacts on crop yield components and soil fertility in organic wheat systems

Quinn Yates[1*], Ava Heathman[1], Shikha Singh[1], Jeremy Hansen[2], Christina Hagerty[3], Don Wysocki[4,] Udayakumar Sekaran[5], Orion Raabe[1], Surendra Singh[1]

[1]Lind Dryland Research Station, Washington State University, Lind WA 99341

[2]United States Department of Agriculture-Agriculture Research Service, Pullman WA 99163

[3]Columbia Basin Agricultural Research Center, Oregon State University, Adams, OR 97810

[4]Oregon State University Extension, Pendleton, OR 97801

[5] Malheur Experiment Station, Oregon State University, Corvallis, OR 97331

Despite considerable research on organic wheat (*Triticum aestivum)* systems across the world, research-based information on including legume-living mulches (e.g., annual and perennial clovers) is limited, especially in Pacific Northwest. Therefore, a four-year study was initiated in 2024 in Adams, Oregon to determine the feasibility of organic spring wheat (SW) system using leguminous-living mulches for nitrogen and weed management. Treatments included; (i) perennial Aberlasting clover *(Trifolium hybridum)* with SW (*cv. Ryan)* (ii) annual red clover (*Trifolium pratense*) with SW and (iii) no living mulch with SW (control). Post-harvest nutrient analysis was conducted on soil samples taken at from 0-6 and 6-12 inches in 2024. There were no statistical differences among treatments at either depth for any nutrients analyzed. Although not significant, there was an observed positive trend for soil organic matter in control treatment and an increase in phosphorus in Aberlasting clover within 6-12 in. This suggests possible effects under longer-term conditions, highlighting the need for multi-year evaluation. Wheat yields and yield components (i.e., spike density) were also not different among three treatments, in first year of study. This study is expected to provide growers with an improved understanding of crop yields and soil fertility under an organic dryland wheat system.

Legacy Effects of Biosolids on Soil Health and Microbial Communities: A 9-Year Study

Ava E. Heathman[1], Shikha Singh[1], Surendra Singh[1], William F. Schillinger[1], and Jeremy Hansen[2].

[1]Lind Dryland Research Station, Washington State University, Lind, WA 99341

[2]USDA-ARS, Pullman, WA,

In dryland Pacific Northwestern US (PNW), wheat (*Triticum Aestivum*)-fallow (WF) cropping system is popular where wheat crops are grown every alternate year. Despite reliable yields, WF systems face challenges like declining soil organic matter, low microbial biomass, and overall soil health decline. Application of biosolids can be crucial for the WF cropping systems of PNW in addressing these challenges. While the immediate agronomic and environmental impacts of frequent biosolid applications have been widely studied, there is limited research on their long-term residual, or "legacy," effects, especially for dryland region of PNW. This study was conducted at Washington State University's Lind Dryland Research Station to understand legacy effects on soil health and microbial abundance, nine years after the last biosolids application. The results showed that biosolids treatments, when compared to those with synthetic fertilizer applied, had increased total carbon (C), total nitrogen (N), available phosphorus (P), and sulfur. Additionally microbial biomass, fungi, and arbuscular mycorrhizal fungi were higher in biosolids treatments than those with synthetic fertilizer. Overall, our data shows that periodically applying biosolids can have a positive effect on soil microbial communities and soil health in dryland WF systems of PNW.

Dryland wheat yields, yield stability, and net returns varied with chloride applications in dryland Washington

Solomon Amissah[1], Aaron Esser[2], and Surendra Singh[1]

[1]Lind Dryland Research Station, Washington State University, Lind, WA 99341

[2]Department of Extension, Washington State University, Ritzville, WA

Chloride is essential for plant water regulation, enzyme functions, and gas exchange. In dryland inland Pacific Northwest (iPNW), chloride fertilization may enhance wheat yields and disease resistance. Although global studies highlight chloride's benefits for wheat (*Triticum aestivum* L.), research on dryland wheat in the iPNW remains limited.

We studied chloride's effects on winter wheat (WW) yields, grain protein, test weight, and net returns through field trials in WW–fallow systems, including on-farm trials (2011–2012) and research farm trials at WSU's Wilke Farm, Davenport, WA (2021–2023). Liquid Ammonium Chloride (4-0-0-0-10) was applied at 10 lbs/ac before seeding on plots measuring 32 by 500 ft. Data analysis was conducted using R software at $p \leq 0.1$.

Applying chloride increased yields in three out of five years (2012, 2021, 2022) but didn't affect grain protein or test weight. The results also showed that fields treated with chloride produced more stable and reliable yields, indicating improved tolerance to stressful environmental conditions. However, chloride improved net return only in one out of five years (2021), as profitability depended on wheat prices and yield response. Despite these fluctuations, chloride can enhance dryland wheat production, but further research is needed to optimize its application.

Comparing 3-year rotations: Spring wheat yields after winter pea vs winter wheat

Solomon Amissah[1], Surendra Singh[1], Shikha Singh[1], and William F. Schillinger[1]

[1]Lind Dryland Research Station, Department of Crop and Soil Sciences, Washington State University, 781 E. Experiment Station Road, Lind, WA 99341, USA

While providing reliable yields, the dominant Winter Wheat (*Triticum aestivum* L.)-Fallow (WW-F) system in the low rainfall zone of eastern Washington (<12 inches) lacks diversity, increasing its susceptibility to weeds and pests. Crop diversification enhances resource use efficiency, disrupts weed and pest populations, and improves soil health. Winter pea (*Pisum sativum* L.) (WP) is ideal for drylands due to its reliable deep germination, cold tolerance, and early maturity, which helps it avoid the hottest summer months.

A 14-year study at Ron Jirava farm near Ritzville compared spring wheat (SW) yields across two 3-year rotations: WP-SW-F and WW-SW-F. SW yields varied significantly year-to-year across both systems. Specifically, SW yields following WP were higher in 2013, 2015, and 2021, while yields following WW increased in 2017, 2022, and 2023. Tall, thick WW stubble trapped more overwinter moisture (37%) than flat, sparse WP residue (31%). However, SW yields were more consistent when following WW but were more sensitive to rising temperatures during grain filling. SW after WW outperformed SW after WP with higher moisture storage, yet 13-year average yields were similar, highlighting WP's nitrogen-fixing benefit and its value as a rotation alternative in Eastern Washington.

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Gaining Grain: Examining the Yield and Land-Use Efficiency of Pea-Canola Intercrops

Lauren R. Stubbs, Washington State University, Lind Dryland Research Station, Lind, WA 99341

Ava E. Heathman, Washington State University, Lind Dryland Research Station, Lind, WA 99341

Surendra Singh, Washington State University, Lind Dryland Research Station, Lind, WA 99341

Don Wysocki, Oregon State University Extension, Pendleton, OR 97810

Garrett C. Heineck, Smith Seed Services, Halsey, OR 97348

Aaron D. Esser, Washington State University, Adams County Extension, Ritzville, WA, 99169

Haly L. Neely, Washington State University, Department of Crop and Soil Sciences, Pullman, WA 99164

Shikha Singh, Washington State University, Lind Dryland Research Station, Lind, WA 99341

Drought, rising input costs, herbicide-resistant weeds, and declining soil health are challenges faced by producers in the inland Pacific Northwest U.S. (iPNW). Innovative practices such as intercropping may alleviate these issues, but little is known about intercropping in the iPNW. This study aims to evaluate varied seeding and nitrogen (N) rates in an intercropped pea (*Pisum sativum* L.)-canola (*Brassica napus* L.) ("peaola") system. Seeding rates of 1/3pea + 2/3canola, 1/2pea + 1/2canola, and 2/3pea + 1/3canola and N applications of 0, 50, and 100% of the recommended N rates for canola were used. Pea and canola monocultures were included as controls. Yield data indicated that 1/3pea + 2/3canola treatments outyielded 2/3pea + 1/3canola treatments, and treatments that received ≥50% N outyielded 0% N treatments. No significant differences in grain quality attributes were observed across treatments. Treatments with favorable land equivalency ratios (≥1.00) were predominantly or half-canola with ≥50% N or were pea-dominant with ≤50% N. Potential yield advantages can be attained by producing canola-dominant intercrops at ≥50% N. These findings serve as a resource for producers interested in establishing peaola intercrops, and indicate a need for on-farm peaola trials in the iPNW.

Peas + Canola = Soil Health Success in the inland Pacific Northwest

Lauren R. Stubbs, Washington State University Lind Dryland Research Station, Lind, WA 99341

Ava E. Heathman, Washington State University Lind Dryland Research Station, Lind, WA 99341

Surendra Singh, Washington State University Lind Dryland Research Station, Lind, WA 99341

Don Wysocki, Oregon State University Extension, Pendleton, OR 97810

Garrett C. Heineck, Smith Seed Services, Halsey, OR 97348

Jeremy C. Hansen, USDA-ARS, Pullman, WA 99164

Aaron D. Esser, Washington State University Adams County Extension, Ritzville, WA, 99169

Haly L. Neely, Washington State University Department of Crop and Soil Sciences, Pullman, WA 99164

Despite reliable yields, winter wheat (*Triticum aestivum* L.)-fallow cropping systems in the inland Pacific Northwest U.S. (iPNW) face challenges such soil erosion and loss of soil organic matter, weed and pest pressure, soil acidification, and low soil microbial abundance and diversity. Pea (*Pisum sativum* L.)-canola (*Brassica napus* L.) ("peaola") intercropping may address these issues, but little is known about growing peaola in the iPNW and its impact on soil health and crop productivity. This study aims to evaluate varied seeding and nitrogen (N) rates on N derived from the atmosphere (%Ndfa) and soil microbial communities in a spring peaola system. Seeding rates of 1/3pea + 2/3canola, 1/2pea + 1/2canola, and 2/3pea + 1/3canola and N applications of 0, 50, and 100% of the recommended N rates for canola were used. Pea and canola monocultures were included as controls. No significant differences were observed between treatments for any microbial class or stress response ratio. A positive trend for %Ndfa was observed, with over half the treatments fixing as much or more N than the pea monoculture. These preliminary findings suggest that producers can reduce N applications and sustainably intensify iPNW cropping systems without sacrificing yield.

Wild Oat Resistance Herbicide Survey in Northern Idaho and Eastern Washington

Traci Rauch and Joan Campbell, University of Idaho, Moscow

The PNW is a productive wheat growing region with significant yield loss from annual grass weeds. Persistent use of herbicides with the same modes of action has resulted in the selection of many herbicide-resistant weeds. A survey in 2023 of 59 fields in northern Idaho and eastern Washington was conducted to determine the extent of wild oat resistance to grass herbicides commonly used in winter wheat-cropping systems. Plants were grown from collected seed samples in a greenhouse and were tested for resistance to mesosulfuron, quizalofop, fenoxaprop, pinoxaden, clethodim, triallate, ethalfluralin and glyphosate. Mesosulfuron is an ALS-inhibiting herbicide used in wheat and resistance was observed at 34% in populations tested. Quizalofop, an ACCase-inhibiting non-selective herbicide in grass crops, is used in rotational broadleaf crops and quizalofop resistant wheat. Resistance occurred in 17% of the tested populations. Fenoxaprop and pinoxaden are ACCase-inhibiting herbicides used in wheat and barley and resistance was observed at 22 and 15%, respectively. Triallate, a pre-emergent lipid synthesis inhibiting herbicide used in wheat and legume crops, had 4% resistant populations. All populations tested were susceptible to clethodim and ethalfluralin, both herbicides are used in wheat-cropping system rotational crops. Populations are still being screened with glyphosate.

Annual Grass Weed Control and Crop Tolerance with Indaziflam in Kentucky Bluegrass Grown for Seed

Traci Rauch and Joan Campbell, University of Idaho, Moscow

Annual grass weeds are difficult to control in Kentucky bluegrass because they are closely related. In 2020, indaziflam (Alion) was labeled for use on many established grasses grown for seed but not Kentucky bluegrass. Studies in 2020 and 2021 evaluated annual grass control and Kentucky bluegrass tolerance with indaziflam applied at three application timings at three rates. Indaziflam was applied at 0.026, 0.039, and 0.052 lb ai/A early fall (preemergence), late fall, and spring. Annual grass control was evaluated visually. In the tolerance studies, seed yield and germination were determined. Rattail fescue control averaged 99% for both fall applications all rates. Wild oat control was better preemergence and late fall compared to spring application. The high rate early fall timing controlled Italian ryegrass 97% but did not differ from any fall application at any rate. Downy brome and interrupted windgrass control averaged 97% for all treatment rates at both fall timings. Kentucky bluegrass injury was 18% at the preemergence timing high rate and 19 and 21% at the two higher rates at the late fall timing but did not differ among treatments. In both years, seed yield and germination did not differ among treatments including the untreated check.

Dryland Winter Wheat-Winter Pea Cover Crop Decreased Nitrate Leaching Compared to Winter Wheat-Fallow

Hero T. Gollany and Robert W. Polumsky

Nitrogen (N) is most often limiting crop yields. However, there is a widespread belief that there is no nitrate (NO_3^-) leaching under dryland production systems. Our objectives were to determine: 1) nitrate tracer (^{15}N) leaching from five nitrogen fertilizer rates (0, 40, 80, 120, and 160 lb N ac/yr) under dryland winter wheat – fallow (WW-F) and winter wheat- winter pea (WW-WP) cover crop rotation; and 2) determine wheat protein content under the five nitrogen rates. We used a long-term WW-F experiment which was established in 1982, and a second WW-F experiment which was established in 1997 (NTB) and converted to WW-WP cover crops in 2010. The ^{15}N tracer was applied in March 2017 and moved below 5 ft depth by 2019. Wheat grain protein content reached 10.5% in the WW-WP at ~ 61 lb N/ac, while in the WW-F it reached 10.5% at ~86 lb N/ac application rate. Three-year ^{15}N recoveries were 57.5% and 32.7% in the WW-WP and WW-F, respectively. Nitrogen contribution from pea cover crops could reduce N fertilizer application rates and improve economic return while reducing nitrate leaching and nitrogen fertilizer losses to ground water and rivers, mitigating potential health consequences.

Extension-Led, Grower Monitoring Bridges Research and Practice in Pest Management

Jemila Chellappa, Area Extension Educator-Cropping Systems, University of Idaho Extension, Southern District, Idaho

The University of Idaho Extension collaborated with a Payette County barley grower and regional researchers to investigate the resurgence of cereal leaf beetle (CLB) after reports of silvery leaves, feeding damage, and unexpected yield loss in fall 2023. The project set up an Extension-led, grower-driven monitoring program across seven barley fields during the 2024–2025 season to confirm pest identity, track CLB development, and integrate Growing Degree Days (GDD) (base 48°F) into local IPM decisions. Weekly scouting documented active biological control by *Tetrastichus julis*, while soil fertility and irrigation checks identified crop stress factors that increased pest vulnerability. Degree-day analysis showed a consistent 360–420 GDD larval feeding window, helping to improve timing for scouting and treatment. Consequently, insecticide use dropped by over 80% without losing yield, with six of seven fields staying below threshold levels. These findings were incorporated into the PNW Pest Alert Network's CLB Beta Version GDD model, strengthening cross-state research and Extension collaboration while boosting grower confidence in evidence-based, threshold-driven IPM strategies. This work highlights Extension's role in linking research to farm practices through biological control, soil and irrigation diagnostics, and predictive modeling to support sustainable small grain production in Southwest Idaho.