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2025 Report of Activities

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Effects of Seeding Date and Rate on Cereal Rye as a Cool-Season Cover Crop

In 2024, multiple Plant Material Centers (PMCs) across the nation began a two-year study looking at the effects of seeding rate, seeding date and termination timing on biomass and canopy cover for cool season cover crops. Ideally, cover crops are planted within the recommended planting window of the cover crop species to obtain the desired stand, soil cover, and accumulated fall biomass. While Fall planting of cover crops is often dictated by the harvest date of the summer cash crop, planting cover crops beyond the recommended seeding date affects productivity and performance and may jeopardize the purpose of the cover crop planting. In western Oregon and Washington, fall weather is very favorable to cover crop establishment, and mild winters do not kill cereal rye (*Secale cereale*). However, seeding too late can greatly reduce the amount of biomass produced and not provide enough leaf cover to protect the soil from rain/erosion. The suggested window for cereal rye cover crop planting in western Oregon and Washington is September 15th to November 15th. For the purpose of this study, we planted our plots on three dates: October 15th, November 5th, and November 27th. On each seeding date, plots were sown at five different seeding rates. Typical seeding rates for a full stand are 90-100 pure live seed (PLS) lbs./ac. We planted plots at 15, 30, 60, 90, 120 PLS lbs./ac. And each seeding date and rate was replicated four times (for a grand total of 60 plots).

One purpose of a winter cover crop is quickly growing leaves to protect the soil from pounding rain. We assessed this by collecting canopy cover data on all plots on December 30th, 2024 (Figure 1). The first seeding date had the highest canopy cover, as expected. Even though the seeds were only sown 20 days apart, there is a large difference between how much growth occurred on plants October 15th- November 15th versus November 15th- December 15th. In October, soil is typically warm, sunlight is greater, and rain is plentiful

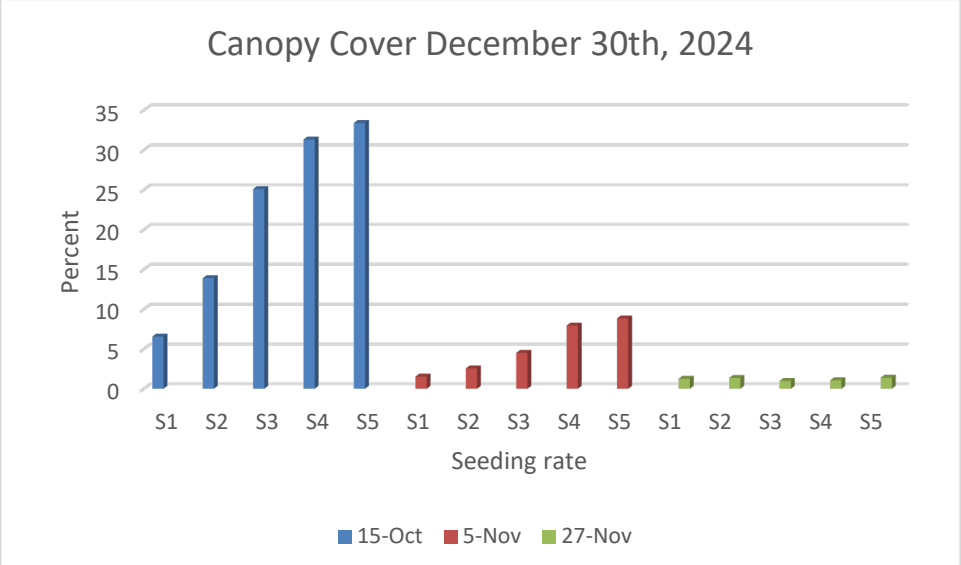

Figure 1. Average canopy cover on December 30th, 2024, of plots of cereal rye planted at three different sowing dates (October 15, November 5, November 27) and five different PLS pounds per acre rates (S1=15, S2=30, S3=60, S4=90, S5=120).

enough to sustain rapid plant growth. In November, soil has typically cooled to the lower 50's, day length is shortening, and most days are very cloudy. Plants grow slowly in these conditions. The winter cover of the second seeding date greatly lagged behind the first seeding date, and the last seeding date was almost a failure. Canopy cover was assessed again in the spring, and the first seeding date had more than double the canopy cover than the same seeding rate sown on the second seeding date. The first seeding date only had a 20-day head start over the second seeding date, but the plants were still twice as large in the spring, after four months of growing!

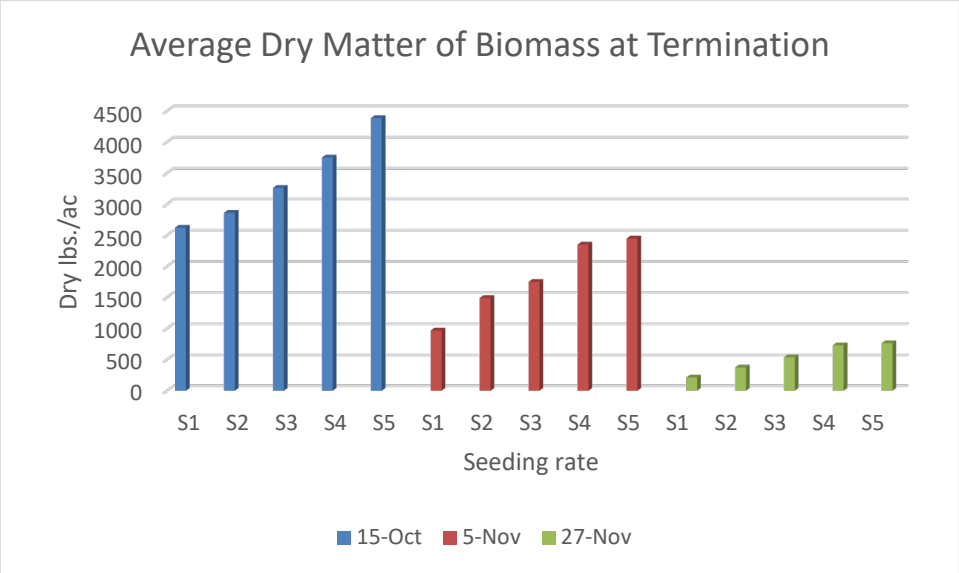

Figure 2. Average dry matter lbs. per acre of biomass of cereal rye planted at three different sowing dates (October 15, November 5, November 27) and five different PLS pounds per acre rates (S1=15, S2=30, S3=60, S4=90, S5=120).

In late May, each plot was terminated after seed heads emerged and anthers were beginning to show. Biomass was collected, dried, weighed. Results are shown in Figure 2. Increased seeding rate always resulted in increased biomass. However, a later seeding date with a high seeding rate can produce a similar amount of biomass as a very low rate seeded at an earlier date. In conclusion, when sowing a cereal rye cover crop in the fall, seed before October 15th or as early as possible.

FY25 Cover crop projects

In 2025, the Corvallis Plant Materials Center (ORPMC) continued to collaborate with the Agricultural Research Service (ARS) and various university cover crop breeders across the United States through the Cover Crop Breeding Network. The primary objective of the project is to assess the performance and identify promising new breeding lines for crimson clover and hairy vetch through trials conducted at twelve locations nationwide. At the ORPMC, we evaluated 25 crimson clover (*Trifolium incarnatum*) lines and 33 hairy vetch (*Vicia villiosa*) lines during the year. In addition to testing potential breeding lines, the ORPMC plays an important role in producing seed for the entire network. Taking advantage of the optimal climate for seed production in the Willamette Valley, we produced seeds of three promising hairy vetch lines and 12 crimson clover lines within pollinator enclosures. We produced a total of 180 lbs. of vetch and 8 lbs. of crimson clover.

Figure 3. Mowing edges of hairy vetch seed yield trials. In 2025, the ORPMC installed trials of hairy vetch grown with triticale (on left of tractor) to compare it grown in a monoculture (on right of tractor).

While the Willamette Valley of Oregon is a prime location for seed production of many cover crop species, other areas could be suitable and be developed into new seed production regions. Multiple PMCs began a new project in 2025 to assess regions for cover crop seed production. In 2025, we installed plots of crimson clover and hairy vetch using large scale farming methods. In colder regions, hairy vetch is planted with a grain crop as a nurse crop to help it survive cold winters and the grain acts as a trellis in the spring, providing more surface area for the vetch to grow. Although it is uncommon in Oregon to plant bi-culture fields of vetch when growing vetch as a seed crop, we planted replicated fields with triticale/hairy vetch in a bi-culture as well as replicated fields of a monoculture of hairy vetch. "Gainer", a small-statured variety of triticale, was selected for use in this study, but it grew to over 6 feet tall in our fields. The vetch grew up the triticale and overtopped it. We were concerned about the quantities of biomass in the fields and if our combine could properly thresh the dense material. Fields were swathed in early July and combined about a week later after drying. Combining the bi-culture fields was slow, but successful. The density of the vetch caused the triticale to produce very little viable seed, it wasn't enough seed to make it worthwhile as a second crop, and it required a specialized spiral seed separator to remove it from the vetch seed. Based on our 2025 experience, we would not recommend a bi-culture hairy vetch planting in our region. Our average yields for the monoculture plots were 1800 lbs./ac compared to 1490 lbs./ac for the bi-culture plots.

Figure 4. PMC employees, Tyler Ross and Claire Morris assess crimson clover as a seed crop.

We also performed similar trials on crimson clover. As usual, it is very easy to grow and produces well in our region. Average yields in our fields for 2025 were 772 lbs./ac.

Seed production of rare plants

We continued our Interagency Agreement with US Fish and Wildlife Service (USFWS) to collect seeds of federally or state-listed threatened/endangered species and bring them to the ORPMC. Seeds are used to develop plant technology such as germination and production protocols, but the most impactful portion of the ORPMC's work is producing seeds of these rare plants. This partnership has successfully led to the delisting of three plant species, Golden paintbrush (*Castilleja levisecta*), Bradshaw's lomatium (*Lomatium bradshawii*) and Nelson's checkermallow (*Sidlacea nelsoniana*). Yet there remains a multitude of species in need of assistance. In 2025, the ORPMC had 7 fields of 5 listed species in production and six additional fields of species of concern. This was our biggest year for Kincaid's lupine seed production! We produced a total of 47.5 lb. of seed for three

Figure 5. Seed increase field of Kincaid's lupine (*Lupinus oreganus*) grown at the Corvallis, OR PMC.

different recovery zones. Most of this seed was planted on restoration sites in the fall of 2025.

Publications/Presentations

Our publications and presentations this year included the following:

- Evaluation of forage plant species in a mid-rotation Douglas-fir silvopasture: Final Study Report.
- Interagency Agreement Annual Progress Report- T&E Plant Materials Development
- Corvallis Plant Materials Center 2025 Report of Activities

Trainings

The Corvallis PMC hosted Nutrient Management training for 30 field office staff and partners in March 2025. NRCS Oregon state agronomist Joshua Hall put together an array of dynamic speakers such as Kurt Carpenter from USGS Oregon Water Science Center, and Betsy Verhoeven of OSU who gave an amazing crash course in soil science. The three-day event provided NRCS field staff with knowledge of soil and water chemistry, and how excessive nitrogen and phosphorus can pollute our water. Several participants completed the work to earn job approval authority (JAA) for the Nutrient Management practice. The ORPMC staff Amy Bartow, Ian Silvernail, and Tyler Ross were integral to the training, providing space, equipment, and planning the training. Tyler led one of the most effective parts of the training by teaching participants how to interview clients, and what to look for in the field while planning for nutrient management. The training was a huge success and was vital for preparing planners to put conservation on the ground.

Figure 6. NRCS field staff view plots of forages for non-irrigated pastures at the PMC, June 26, 2025.

In late June, study leader, Ian invited the conservation community to the ORPMC to show off some results from the Comparisons of Novel Forages study. The field day focused on diversification of non-irrigated pastures. Forage diversity can equate to improvements in animal nutrition, soil health, and overall farm ecosystem health and resilience. Demonstrations included plots of single species and mixes that were "grazed" (mowed) at various times in the spring/summer. Attendees were able to witness the species and mixtures' ability to regrow after grazing in non-irrigated areas.

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