



United States Department of Agriculture

Corvallis, Oregon Plant Materials Center

Natural
Resources
Conservation
Service

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2023 Report of Activities

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Published January 2024

New study to evaluate pollinator plants for hazelnut orchard floor systems

In 2023 we completed a first year of field evaluations assessing pollinator resource plants for orchard floor systems. While results could be applied to several orchard and vineyard crops, hazelnut production systems are of particular interest in Oregon's Willamette Valley due to their proliferation in the past several years. Additionally, typical floor management in hazelnut orchards includes bare soil that is flailed, scraped, and/or floated to provide a harvestable surface. In recent years, field offices have offered a cost share program to establish conservation cover in hazelnut orchards to limit erosion, compaction, and run-off, but limited knowledge exists on species appropriate for hazelnut management systems, and the standard recommendation has been to plant a single-species stand of creeping red fescue (*Festuca rubra*). While plantings of this non-native grass do help to achieve some of the goals previously listed, ecosystem services are minimal due to the lack of pollinator and other arthropod resource plants.

To this aim, in collaboration with the Oregon Bee Project, Oregon State University, and the Xerxes society, in October 2022 we established a replicated trial to assess the adaptation of 17 species of native and non-native flowering plants to the hazelnut floor system. All species were established in combination with creeping red fescue to determine their suitability in addition to the existing recommendations. All plots were evaluated for abundance of floral resources throughout the season, and cover of all species at peak bloom. At monthly intervals through the summer, all plots were flailed to the surface a total of three times to simulate pre-harvest preparation commonly seen in nut orchards here. Remaining residue after flailing was sampled to assess potential impact of different plant species on harvest efficacy. Evaluations will continue for two more years to assess plant species persistence, floral resources, cover, and residue over time. The Oregon Bee Project team assessed several study entries for nectar and pollen nutritional status and pollinator visitation to provide further valuable information for species selection.

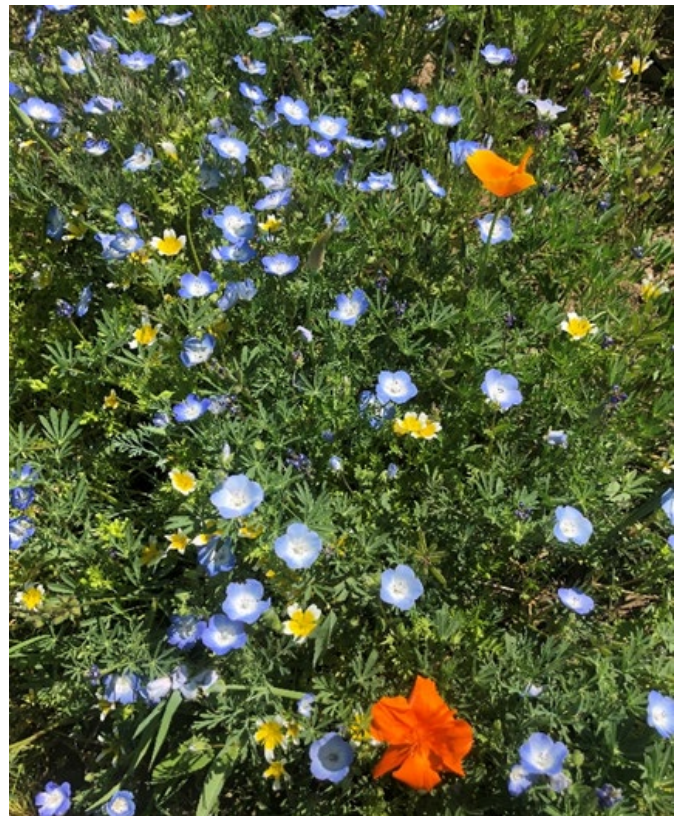


Figure 1. A trial mix of baby blue eyes, Douglas meadowfoam, California poppy, bicolor lupine, and creeping red fescue in full bloom in mid-May.

Springbank Clover Common Garden

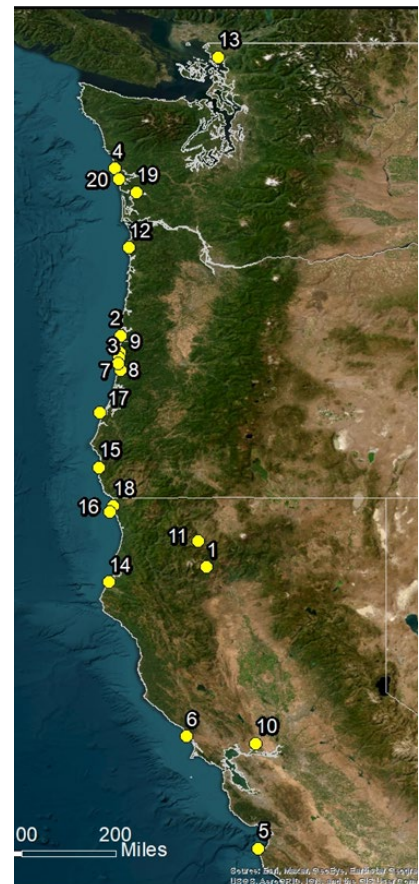
We frequently receive requests to research and develop a native legume suitable for diverse applications, including conservation cover, ecological restoration, forage, and pollinator habitat. Springbank clover (*Trifolium wormskioldii* Lehm.), a native rhizomatous, perennial clover, exhibits potential to fulfill these various roles. Seeds were collected from populations ranging from Sonoma County, California, to Gray's Harbor, Washington. These seeds were then planted in a common garden study for an initial evaluation of springbank clover's viability as a native forage or cover crop in both Oregon and California.



Figure 2. Springbank clover (*Trifolium wormskioldii*) plants flowering at the Corvallis PMC.

Our objectives encompass: 1) identifying differences among accessions, 2) assessing variations in environmental association, phenology, rate of spread, and stand persistence over a three-year period, 3) quantifying wet and dry biomass without supplemental irrigation, and 4) determining insect and disease susceptibility of the species. Notably, there is a lack of information regarding seed transfer zones for this species. Despite being utilized in restoration projects along the Oregon and California coasts, practitioners in this region currently employ very small seed zones due to the absence of comprehensive information. 2023 marked the first complete year with the plants in the ground, allowing us to collect a comprehensive dataset on their performance. Highlights included identifying individuals with promising forage production/regrowth and other individuals that bloomed for 4 weeks!

Figure 3. (below) Yellow dots show the collection location of the 20 populations in the springbank clover common garden study at the Corvallis PMC. Populations range from the Canadian border to the Bay Area in California.



FY23 Cover Crop Studies With ARS

In 2023, our collaborative efforts continued with the Agricultural Research Service (ARS), the Noble Foundation, and various university cover crop breeders across the United States. The primary objective of the project was 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 Corvallis PMC, we evaluated 12 crimson clover lines and 39 hairy vetch lines during the year.

Taking advantage of the optimal climate for seed production in the Willamette Valley, we expanded the seed production of four promising hairy vetch lines. Additionally, we engaged in experimental seed production of 12 crimson clover lines within pollinator enclosures. Notably, other centers nationwide faced challenges in producing seed for this crop. To avoid interbreeding while cultivating the 12 clover lines,

each line was grown within an enclosure, and pollinators were introduced. Though this technique was novel to us, we successfully collaborated with a local beekeeper who provided small honeybee boxes for placement in the enclosures during flowering. The clovers thrived, and the bees efficiently facilitated pollination. Despite most enclosures having around 80 plants, they yielded nearly a pound of seed per enclosure. The successful seed production at the Corvallis PMC in 2023 means that in 2024, numerous centers across the country will have the opportunity to evaluate these promising breeding lines.

Partnerships

In addition to our efforts with ARS in cover crop studies, we sustained our Interagency Agreement with USFWS. This partnership has successfully led to the delisting of four plant species, yet there remains a multitude of species in need of assistance. One such species is Kincaid's lupine (*Lupinus oregonus*), a threatened species endemic to the upland prairie/oak savannas of western Oregon. This lupine serves as the main larval host plant for the endangered Fender's blue butterfly. In alignment with the Service's Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington, NRCS and its partners are actively engaged in conserving these habitats and the associated populations of Kincaid's lupine. The Recovery Plan mandates the production of genetically unique units of Kincaid's lupine based on recovery zones. The overarching objective of the Service is to make Kincaid's lupine seed available to all conservation efforts, irrespective of funding sources, within the appropriate recovery zone. In 2023, the PMC achieved significant seed production milestones, yielding 16 lbs of seed for the Salem West recovery zone and 5 lbs for the Douglas County recovery zone.



Figure 4. White topped aster (*Sericarpus rigidus*) flowers are less showy than most plants in Asteraceae, but pollinators don't seem to mind.

Another exciting achievement this year was the establishment of our first field of white-topped aster (*Sericarpus rigidus*). Designated as Threatened by the State of Oregon and found in only a few populations, this species became the focus of our efforts. With limited amounts of wild-collected seed, we established a field containing approximately 2000 plants, surpassing the existing wild population in Oregon. These plants thrived throughout 2023, many flowering in their inaugural growing season. Hand-collecting ripened seeds from these rayless flowers, which are less appealing to humans, we observed a diverse array of small native bees attracted to the simple white blossoms. Given its late blooming period, the white-topped aster proved to be a valuable food source for native bees on our farm.

Forage research continues with addition of pasture overseeding study

The last several years have seen a hearty emphasis on forage adaptation trials at the Corvallis PMC. This fall we wrapped up fieldwork for a two-year trial assessing adaptation and production of 104 forage cultivars from 62 species across three sowing dates and under both irrigated and dryland conditions. Data analysis is underway, and a final study report will be produced by summer 2024. This year we also partnered with the Oregon Bee Project, who completed pollinator visitation observations and analyzed pollen and nectar nutrition on a large subset of the study entries. One exciting observation from the study was the demonstrated drought resilience of several perennial species that remained productive through the later months of the dry summer we



Figure 5. Tyler Ross and Ian Silvernail used the no-till drill to seed over 90 plots in the pasture overseeding trial. The other half of the plots were broadcast seeded.

had in 2023. Drought-resilient forage mixes utilizing these species were sown this fall for performance evaluation in the coming years. This large study has helped us take a broad view of potential forage species for our region, and we are now utilizing some of the top performers in additional studies. A year ago, we initiated a study trialing forage species in a Douglas-fir dominated silvopasture setting. We collected data on forage production this year and will continue data collection in 2024. We're also working in collaboration with Oregon State University, US Fish and Wildlife Service, Lincoln Soil and Water Conservation District, and two NRCS field offices to oversee and evaluate forage performance and pollinator resources on five

coastal farms. Oregon coastal livestock producers frequently work with pastures with acidic soils with a high buffering capacity, which tends to limit legume establishment and persistence.

In Fall 2023 we established a pasture overseeding study at the PMC using 22 of the top performing legume and other forb species from the larger trial. Interest in overseeding existing pastures without tilling or plowing is of high interest in our region. The study site is an existing low-diversity, grass-dominated pasture that was cut for silage in the early summer and flailed to the ground surface just prior to seeding. Seed was both broadcast and no-till drilled into single-species replicated plots. Seedling establishment data was collected in November, and we will gather data on productivity in the spring and summer. Data collection will continue for two years.

Publications/Presentations

Our publications and presentations this year included the following:

- Evaluating native plant characteristics and production requirements to support coastal dune revegetation in the Pacific Northwest- National Native Seed Conference, Washington DC.
- Hedgerows and Conservation Cover for Pollinators in Vineyards– Oregon Bee Friendly Wine Workshop
- Summary of studies on grass genetic variation to inform seed zone determination– Coastal Seed Partnership Annual Meeting.

Training

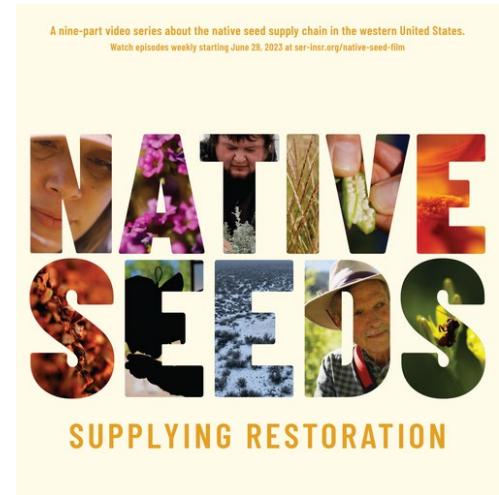
2023 was another busy year for training and tours at the PMC! It was exciting to have so many new employees spend time at the Center. Oregon NRCS had many interns this year and they came to the PMC for a full day of learning about the Plant Materials Program and helped us with some data collection in our shrub establishment study. Many of the interns expressed that it was their favorite day as an intern because they were able to do something hands on and see the obvious differences of the treatments in the study.

We also partnered with Plant Material Specialist Kathy Pendergrass and Grazing Specialist Kari Littrel for a comprehensive seeding training held at the PMC. Around 25 conservation planning staff attended to obtain JAA. Day one was mostly classroom presentations with an afternoon session of looking at seed beds and seeding methods. Day 2 was in the field where we visited pastures and oak restoration areas.

Staff News

In the mild climate of the Pacific Northwest, we only get about two months of down time. In December and January, plants slow down and grow less, giving us a brief reprieve to catch up on repair, maintenance, writing, and planning. We were grateful in 2023 to have two of our seasonal employees return and we hired a new one. They worked with us for the busiest six months of the year.

Amy Bartow and Tyler Ross are featured in a new video series produced by the International Network of Seed-based Restoration. [Native Seeds: Supplying Restoration](#) “explores the native seed supply chain in the western United States.”



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