



NRCS Corvallis Plant Materials Center 2014 Progress Report of Activities

January 2015

Planting Date and Pollinator Mix Establishment

With the first fall rains in the Pacific Northwest, weed seeds germinate and grow rapidly in the last warm weeks of early fall. It may seem like a good idea to wait out this initial flush of weeds, apply herbicide to remove them, then proceed with seeding your site. But studies at the PMC are suggesting otherwise.

In the fall of 2013, we began a study looking at the effects of seeding date on establishment of a forb-rich, native Willamette Valley prairie seed mix. The field was tilled in mid-September, then the first plots were broadcast seeded by hand and received rain within a couple of days. Additional plots were seeded in mid-October and mid-November. These later plots were sprayed with glyphosate one week prior to seeding to remove weeds that had germinated and the soil surface was raked lightly to mimic the conditions of the September seeding. In May, we collected data on canopy cover and plant density in all plots. Treatments were not replicated so no statistical analysis is possible, but the trends are striking.

We saw a much higher cover of native plants when plots were seeded in September (Figures 1-4). Surprisingly, the weed cover was also lower in the early plots, even though they were not sprayed with herbicide prior to seeding. We also saw better establishment in terms of native species diversity in early plots. September-sown plots had an average establishment of 16 of the 21 species planted (78%), October plots had an average of 14 of the 21 species present (70%), and November plots had only 13 of 21 species found in the plots (66%). Not only were



Figure 1. In May, the plots that were seeded in September had impressive stands of native wildflowers.



Figure 2. October-seeded plots were mostly covered with non-native mayweed and a few scraggly Plectritis congesta.



Figure 3. There's nothing nice to say about the November seeded plots.

most of the plants larger in the September seeded plots, annuals bloomed earlier and had longer bloom times. Short-lived perennials such as river lupine and self-heal bloomed in the first year in the September plots, but not in the others.

So far, we are seeing a clear advantage for better native establishment and less weeds by seeding early in the fall. However, this is only preliminary data from a single year. Species composition of these plots will likely change over time, so current trends may not necessarily reflect our recommended treatment after we collect data on these plots in years two and three. Since weather changes year to year, we repeated this study in the fall of 2014 and results will be compared to see if mid-September remains the optimum time to plant.

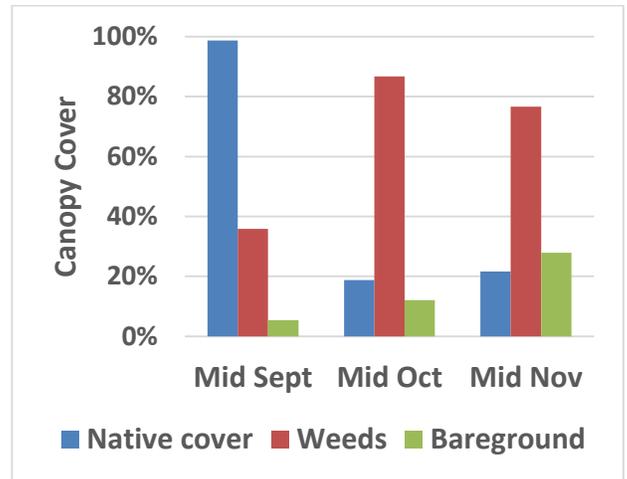


Figure 4. Average percent canopy cover of natives, weeds and bare ground in plots seeded in September, October and November 2013 at the Corvallis PMC. Cover data were collected along 3 transects per plot in May 2014.

Evaluating Commercial Pollinator Mixes

The commercial seed industry is now marketing a wide variety of pre-made pollinator seed mixes, and the choices can be overwhelming for a landowner or conservationist without some information on how well the mixes establish and perform in their area and the quality of pollinator habitat provided by each. To address this issue, the Corvallis PMC began a new study in the fall of 2014 to evaluate a number of commercially available pollinator mixes. Our criteria for a good pollinator mix include: 1) abundant bloom throughout the season, 2) inclusion of late-season nectar and pollen sources, 3) a balance of annuals and perennials, 4) variety of flower shapes and sizes (small, open flowers for tiny bees, wasps, and flies and lupines or other larger flowers for bumblebees), 5) reasonable cost, and 6) good establishment and cover to resist weed invasion and persist for multiple years.

After reviewing many pollinator mixes on the market, we selected seven mixes to include in our trial (Table 1). We standardized all seeding rates to apply about 60 seeds/ft². The planting area was tilled in September, and the 20 by 50-ft plots were hand seeded and lightly raked in. The first fall rain came two days after planting, and most plots had germination within two weeks. In 2015 we will collect data on establishment and cover of planted species, bloom time, and native pollinator visitation.

Vendor	Mix Name	Cost/ 1000 ft ²	Bloom Length	Mix Composition	
				Native	Annuals
Silverfalls Seed	West Cascades Wildflower Economy	\$14	moderate	70%	30%
Silverfalls Seed	Native Pollinator Mix	\$20	moderate	65%	40%
Heritage Seedlings	General Pollinator Mix	\$79	no late	100%	20%
Heritage Seedlings	Wetland Prairie Flowers 1	\$26	good	100%	40%
Xerces Society	Pollinator Mix 2014	\$20	good	95%	25%
Nature’s Seed	Northwest Wildflower Mix	\$11	no late	0%	80%
American Meadows	Native Pacific Northwest Wildflower	\$21	no late	10%	80%

Soil Health Study

In 2014 the Corvallis PMC completed the second year of a 3-year national study looking at the effects of different cover crop mixes and seeding rates on soil health. The no-till seeded trial includes three mixes (2-, 4-, and 6-species) seeded at three rates (20, 40 and 60 seeds/ft²), along with a non-cover cropped control, and a commodity crop of sweet corn grown each summer. The cover crop species in the trial are cereal rye, crimson clover, forage radish, hairy vetch, oat, and forage turnip.

First year cover crop growth was impressive, but due to a variety of factors (heavy slug and bird predation, late planting date, and poor weather) our cover crop treatments failed to establish this year. We tried a 2-month catch-up cover crop of peas in the spring, but biomass and N production were still substantially lower than Year 1, and we had no harvestable yield from the sweet corn in 2014 (probably due to late planting date and N-deficiency in this unfertilized study).

However, we were still able to collect soil data and are continuing to see improvements in certain Soil Quality Indicators (SQIs), probably due to no-till practices, even without a good second year cover crop. All cover cropped plots have shown a significant increase in soil organic carbon (SOC) levels and available phosphorus in the top 6 inches, and increasing Soil Health Nutrient Tool scores and soil microbial activity over the two years of the study (Figure 1), but there are no differences among cover crop treatments yet. Soil penetration resistance declined the first year, but then went back up somewhat the second year, while bulk density continued to increase, showing varying effects of cover crops and no-till on soil compaction.

Slug control continues to be a major challenge for no-till cover crop production in this part of western Oregon, but our Year 3 cover crop treatments established well and are looking good so far, so we're hopeful for better production and data from this last year of the study.

Partnerships

The Corvallis PMC partners with many federal agencies to provide plant materials for projects on federal lands when suitable materials are not available from private growers. In 2014, the PMC contracted with:

- USFWS for production of 6 Threatened & Endangered plant species and over 15 additional species to support habitat for endangered butterflies.
- Four BLM districts to produce seed and plants of over 60 species.
- Seven National Forest districts for technology development on 25 species.
- Two National Parks to provide seeds and plants for restoration projects within the parks.

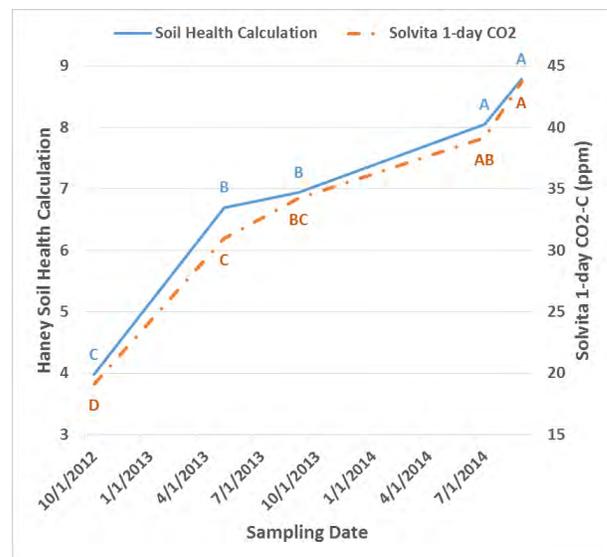


Figure 5. Average Haney Soil Health Nutrient Tool soil health calculations and Solvita 1-day CO₂ (soil respiration) in all cover cropped plots over two years of the Soil Health Study at the Corvallis Plant Materials Center. Means with the same letter for each measurement are not significantly different in Tukey HSD tests at $\alpha=0.05$.

Conservation Field Trials

We currently have five active conservation field trials under way in partnership with private landowners and their local Field Office staff. These field trials are aimed at testing the efficacy of native plants as cover crops in perennial orchard, berry, and vineyard crops, as well as evaluating different site preparation methods and seeding rates for reestablishment of native upland prairie/oak savanna grasses and forbs for pollinator and wildlife enhancements.

Training and Presentations

In FY14, a number of different groups requested plant materials training from PMC staff and the PMS.

- Challenges in Native Seed Production – Southern Oregon Native Plant Society
- Using native plants in wet areas on your property – Yamhill SWCD landowner workshop
- What does it take to save a species? – group of northwest environmental educators
- Effects of Mixed-species Cover Crops on Soil Health – Oregon SWCD Annual Conference
- Costs and Benefits of Riparian Buffers and Filter Strips – Marion SWCD landowner workshop
- Restoration in an Agricultural Landscape – 6th Western Native Plant Conference
- Pollinator Enhancements for Farms – SWCD Rural Farm Day landowner workshop
- Identification of federally-listed threatened water howellia and general plant identification – SWCD and CREP technicians
- Threatened & Endangered Plant Surveys and the ESA/NEPA process – Oregon Planning Course



Figure 6. Perfect habitat for water howellia.

If you have topics you'd like us to cover for events in 2015, please contact us to make arrangements.

Publications

This year we published a *Propagation Protocol for Early Blue Violet* in the Native Plants Journal, as well as *Tech Note 41: Cover Crop Resources and Seed Vendors for Oregon and Washington*. These and past publications are available on the Corvallis PMC Publications page:

<http://www.nrcs.usda.gov/wps/portal/nrcs/publications/plantmaterials/pmc/west/orpmc/pub/>.

Corvallis Plant Materials Center

Since 1957, the USDA-NRCS Corvallis Plant Materials Center (PMC) has selected conservation plants and developed innovative planting technology to solve natural resource concerns. The Corvallis PMC service area covers western Oregon, western Washington, and northwestern California, including six ecoregions: the northern Pacific Coast Range, Willamette Valley, Puget Sound Lowlands, and the Olympic, Cascade, and Siskiyou Mountains. Please feel free to contact us regarding your plant technology questions.

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New acquisitions at the Corvallis PMC this year include a roller-crimper for cover crop termination (above) and a Truax no-till drill for seeding field trials and study plots (below).

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