# Corvallis Plant Materials Center
# 2011 Progress Report of Activities
## September 2011

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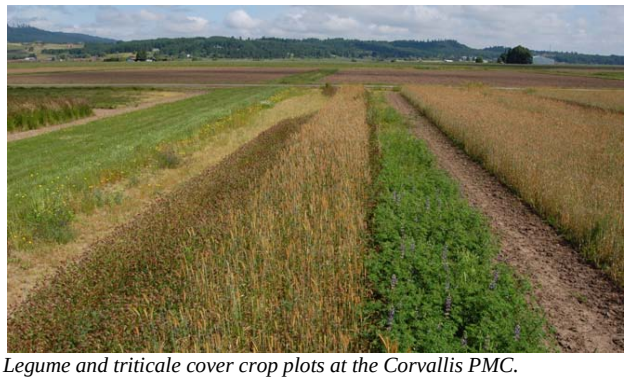
## PLANT TECHNOLOGY DEVELOPMENT

Overall, 46 new or ongoing studies and associated seed or plant increases were conducted in 2010-11. In terms of general production, more than 53,000 container plants, 500 camas bulbs, and 4,000 pounds of common seed were grown. In addition, 4,750 cuttings and 111 pounds of seed of PMC releases were produced this year.

### Legume and Triticale Cover Crops for Improvement of Soil Quality



*Legume and triticale cover crop plots at the Corvallis PMC.*

Temporary cover crops are an important method to control erosion and improve soil quality on farm fields. In October 2010 the PMC initiated a two year cover crop trial in cooperation with the Benton County Soil and Water Conservation District. The purpose is to compare biomass production and assess soil improvement (through incorporation of residues) among three commonly used legumes and triticale alone and in legume/triticale mixes. The three legumes are crimson clover (*Trifolium incarnatum*), 'Hederma' riverbank lupine (*Lupinus rivularis*), and fava beans (*Vicea faba*). Among the soil quality parameters that will be monitored over two years are: organic matter, aggregate stability, nitrates, pH, cation exchange capacity, phosphorus, and total nitrogen and carbon.

### Pollinator Planting Trial

Evaluating and promoting plant species that will provide the best food and habitat for native bees and other pollinators is a new area of investigation at the PMC. In November 2010, PMC staff along with staff members of the Xerces Society planted a pollinator wildflower trial. The trial consists of 3 replicates of 15 treatments including 12 single species plots and three mixes: early to mid-season blooming flowers, mid to late-season blooming flowers, and a mix of all 12 of the native species. The species were chosen because they have a high likelihood of being excellent sources of pollen and nectar for bees and other pollinators. This trial will last several years with the hope of identifying good seed mixes that are easy to plant and manage and are available on the commercial market. We plan to initiate a pollinator visitation study with OSU in the spring of 2012.

*Mixed wildflower plot (including riverbank lupine and clarkia) in pollinator study.*

## Cascade Seeding Trial

*Vegetation establishment on BLM Cascade roadbed seeding trial in 2011. Lane Co., OR.*

The NRCS Oregon Plant Materials Program entered into an interagency agreement with the Bureau of Land Management (BLM) and Forest Service (FS) on the west side of Oregon in 2008. The NRCS, BLM and FS have an interest in developing native plant seeding recommendations and mixes for various erosion control purposes. The objective of this study was to look at different broadcast seeding rates (15 or 30 lbs/acre) of blue wildrye (*Elymus glaucus*) with and without a legume, big deervetch (*Lotus crassifolius*), to determine which rate and composition performed better and/or proved to be more cost-efficient while still effectively stabilizing disturbed sites. A longer-term goal of this study is to determine whether BLM and FS should develop various legume seed availability for land rehabilitation.

The roadbed was seeded in fall, 2009. Permanent 1-$m^2$ plots were established and cover and density counts were taken in 2010 and reevaluated on August 4, 2011. Plant establishment was still fairly patchy during this second growing season, but the majority of the area had good cover of blue wildrye, big deervetch, and/or other volunteer seedlings. Big deervetch appeared to establish more in areas with poorer soil (less apparent organic matter), while the blue wildrye faired better in soil with some apparent organic matter (i.e., darker soil color, duff and woody debris). The grass-plus-legume plots had greater overall vegetation cover compared to the grass-only plots. Some blue wildrye plants in the denser seeded plots (30 lbs/acre) appeared shorter and necrotic in comparison to the 15 lbs/acre plots. This could be due to competition stress, suggesting that the 30 lbs/acre seeding rate may be more than is needed for good establishment and cover. The 15 lbs/acre seeding rate established adequate cover on this relatively level site, although better overall cover was gained with the legume addition. Scarification of big deervetch seeds prior to planting improved germination and establishment compared to a small plot of unscarified seed.

## Hutchinson Wetland Reserve Program (WRP) Seeding Trial

Currently, there are no best management practices established for restoring diverse native Willamette Valley prairies. The objective of the Hutchinson WRP Seeding Trial is to determine whether grasses or forbs should be seeded first with over-seeding of the missing component during one or more following years, or whether grasses and forbs should be seeded together. Results will help define the best seeding method to achieve the most cost-effective and diverse native plant community.

In fall of 2007, nine one-acre plots were no-till seeded to one of three treatments: 1) Grasses-First, 2) Grasses & Forbs, or 3) Forbs-First. The Grasses-First plots have become very densely and heavily vegetated with grasses up to 5-6' tall. The Grasses & Forbs plots have also become fairly dominated with grasses, but are less dense than the Grasses-First plots, and many native forbs are establishing. The Forbs-First plots have far shorter stature and less vegetation (biomass) than the other treatments, and many native forbs are establishing, although there is an abundance of non-native weedy forbs present as well.

During fall of 2010, the study plots were no-till drilled with their missing component seed mixtures; grasses were seeded into the Forbs-First plots and forbs were seeded into the Grasses-First plots. In the Grasses-First plots, the seeding row was

concurrently sprayed with a 10-inch width of 2% glyphosate at seeding time to kill some existing vegetation and open up space for the forbs to establish. Evaluation will continue and technical summaries will be published in future PMC Technical Reports.

*Sara Taylor (left) and Kathy Pendergrass reading a Grasses-First plot at Hutchinson seeding trial.*

## Seed Production, Germination and Establishment Studies

The major challenges facing the widespread increase and availability of native grasses and forbs are unknown seed production techniques and inherent low seed yields for many species. To address these bottlenecks, the PMC conducts studies and evaluates seed production and establishment methods. Topics include fertilization, post harvest residue management, harvest methods, seed dormancy, processing, and germination, and control of annual grasses and broadleaf weeds. Fifteen species of native grasses are currently being evaluated (see table).

### Native Grasses under Increase or Study

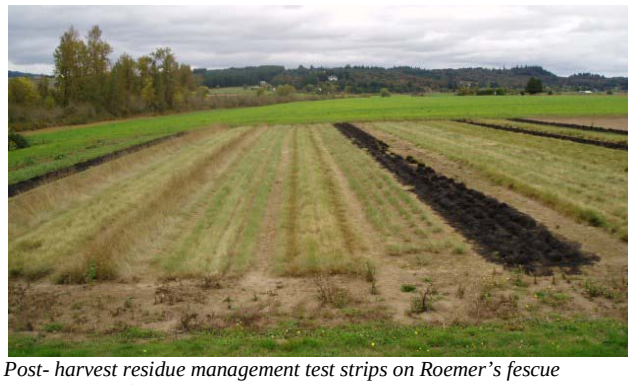
| Common name | Scientific name | Technology Issues |
|---|---|---|
| Lemmon's needlegrass | *Achnatherum lemmonii* | Harvest methods, stand establishment, seed dormancy |
| California brome | *Bromus carinatus* | Volunteer seedlings, production, control |
| Sitka brome | *Bromus sitchensis* | Production methods |
| Western panic grass | *Dichanthelium acuminatum var. fasciculatum* | Production methods |
| Tall mannagrass | *Glyceria striata (elata)* | Production methods |
| California oatgrass | *Danthonia californica* | Establishment, seed dormancy, adaptation |
| Tufted hairgrass | *Deschampsia cespitosa* | Adaptation (inundation, salinity) ecotypic variation |
| Blue wildrye | *Elymus glaucus* | Seed shattering |
| Sand fescue | *Festuca ammobia* | Seed yield, rust, harvest techniques |
| California fescue | *Festuca californica* | Production methods and sensitivity to forms of residue management |
| Roemer's fescue | *Festuca roemeri* | Seed fill, longevity, low yields, rust disease |
| Red fescue | *Festuca rubra* | Seed yields |
| Meadow barley | *Hordeum brachyantherum* | Seed retention, harvest techniques, diseases |
| Prairie junegrass | *Koeleria macrantha* | Adaptive genetic variation, turf potential |
| Foothill needlegrass | *Nassella lepida* | Seed production technology |

## Effect of Nitrogen Fertilization Timing and Rate on Seed Production of Two Native Grasses

The rate and timing of nitrogen fertilization can have a major impact on the seed yield of native grasses. Maximizing seed yields is important for commercial viability. To this end, two new experiments were initiated in the fall of 2009, one with meadow barley (*Hordeum brachyantherum*) and the other with Roemer's fescue (*Festuca roemeri*). The experiments compare fall application (20 lbs N/acre) alone and in combination with spring applications at different rates (50 vs. 75 lbs N/acre) and different times (February, March, and April). The meadow barley experiment was conducted once and the Roemers fescue was repeated in 2011. Results will be described in the 2012 PMC Technical Report.

*Nitrogen fertilization study on Roemer's fescue seed increase field.*

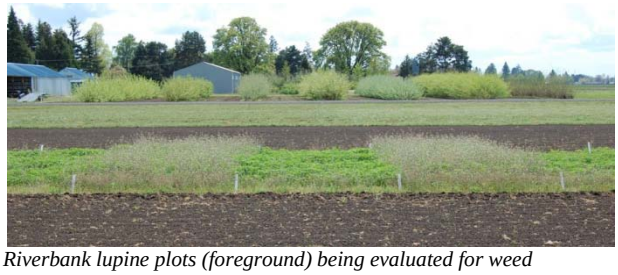
### Influence of Post-harvest Residue Management on Seed Yields of Roemer's Fescue



*Post- harvest residue management test strips on Roemer's fescue seed increase field.*

The method chosen to remove crop aftermath (herbage residues) after harvesting a grass seed crop from a production field can often affect seed yields. Therefore in 2010-2011, a study was conducted to evaluate the influence of three different flail chop mowing/residue removal treatments and one burn treatment on the recovery and seed yield of Roemer's fescue. Treatment strips were super-imposed onto an existing stand of this grass. Results will be reported in 2012.

### Weed Control in Native Grasses and Lupine Grown for Seed



*Riverbank lupine plots (foreground) being evaluated for weed control and injury using the herbicide diuron.*

One of the biggest impediments facing the commercialization of native grass and forb seed production is the lack of labeled herbicides for weed control. Since 2006, experiments have been conducted to (1) evaluate several herbicides for their ability to control annual bluegrass (*Poa annua*) and other weeds in established stands of blue wildrye, tufted hairgrass, and broadleaf lupine (*Lupinus latifolius*) and (2) evaluate the herbicide diuron (coupled with carbon banding) on newly seeded stands of blue wildrye, tufted hairgrass, meadow barley, Roemer's fescue, and riverbank lupine (*Lupinus rivularis*). Each diuron experiment has been repeated twice, with the second and final seeding of riverbank lupine done in the fall of 2010. The goal of this cooperative study with the OSU Crop and Soil Science Dept. is to produce data in order to obtain "special local needs labels" for diuron for native plant seed production. Final results will be published in Weed Technology and PMC technical reports.

### Seed Germination of Lemmon's Needlegrass

Lemmon's needlegrass (*Achnatherum lemmonii*) is a native bunchgrass important for wildlife habitat improvement and prairie restoration, especially on sunny, very dry south slopes. However, germination and establishment requirements remain an issue. Even fall seedings to overcome physiological seed dormancy have met with failure on some occasions. This suggests there may a different mechanism preventing germination, including the potential existence of double or combined seed dormancy, at least in some populations. To investigate this phenomenon, a new laboratory germination experiment was conducted in 2011 using two populations (seed lots) of Lemmon's needlegrass.

Highest germination rates occurred with a combination of soaking the seeds in 50% dilute sulfuric acid (15-30 minutes to erode the hull and seed coat) followed by 60-100 days of cold moist chilling at 39°F. Results suggest that both a physical (hull or seed coat) and physiological (embryo) dormancy may exist.

## PLANT GENETIC STUDIES AND RELEASES

Wild populations of plants are collected, propagated, evaluated in a common environment for their differences, and sometimes selected for their physical attributes, area of adaptation, or potential or proven performance. Material from such studies may be further evaluated in a series of experiments or plantings to determine how capable the species or selections are at addressing conservation needs.

Purposeful selection can be important for farm or other pragmatic uses such as erosion control, forage, seed production, windbreaks, or water quality improvement. However, species are not bred, genetic changes are intentionally minimized, and genetic diversity is emphasized when ecological restoration is the primary goal.

Studies can begin with assemblies of numerous wild ecotypes and the establishment of an initial evaluation planting or common garden. After populations are chosen from comparative evaluations, propagation and increase methods are determined and field tests are conducted. The material may then be released and made available to commercial growers. They in turn produce the seed or plants on a much larger scale and make it available for sale to the public for conservation, reclamation, or restoration purposes. Currently, the Corvallis Plant Materials Center maintains and promotes 14 plant cultivar and pre-variety releases.

### Pre-variety Native Plants to Address Resource Needs

Commercial sources of genetically appropriate native plants are needed for wetland, upland, and riparian revegetation and other resource conservation and enhancement needs on the basis of ecoregion, seed zone, or Major Land Resource Area (MLRA). The PMC addresses this need by providing pre-varietal releases of species from specific areas for use in the same or similar areas. Pre-varietal release is a process whereby a plant (individual, population, or group of populations) from a specific location or area is identified and studied (by the PMC), increased (by the PMC or private grower), and certified (by the official seed certification agency in the state it was collected or grown). Pre-varietal releases may be categorized as “source identified”, “selected”, or “tested” material, depending on the degree of testing, selection, or evaluation they undergo.

### Mass Selection of Sand Fescue

*Sand fescue second cycle (generation) of plant selection*

Sand fescue (*Festuca ammobia,* synonym *Festuca rubra* var*. arenicola*) is native to beach front meadows along the Pacific coastline. It is classified by some as an endemic red fescue. This attractive grass is fine textured, low-growing, and green to blue in color with occasional purple tinges. It spreads slowly by short rhizomes and produces an abundance of short stalked seedheads. A source of this species is already being used for low input native turf in California. With a similar goal in mind, the PMC began mass selection of a coastal Oregon population for leaf color, stem height, and freedom from a disease called “leaf rust” (*Puccinea* spp.). Non-manipulated germplasm of sand fescue is also being increased by the PMC for coastal habitat restoration by other agencies. Last year three groups or subsets of germplasm were selected based on stem height, rust, and maturity differences. The third cycle of selection is now underway.

### Prairie Junegrass Common Garden Study

A common garden study was launched with prairie junegrass (*Koeleria macrantha*) in 2007-08 in collaboration with the US Forest Service (USFS), Pacific Northwest Research Station, Corvallis, OR, and the USFS Region 6. Common garden studies involve growing populations from multiple locations in the same place. Their purpose is to explore genetic variation of adaptive

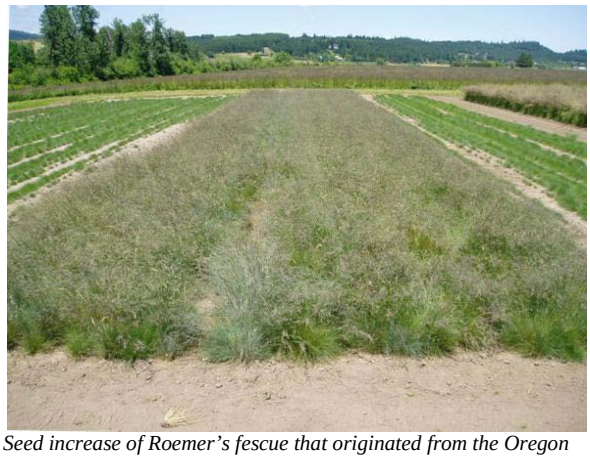
*Prairie junegrass common garden study at the Corvallis PMC cooperative with the U.S. Forest Service.*

traits within a species and their relationship to source environments. From the data that is collected and analyzed, seed zones and seed transfer guidelines are developed to help ensure adapted populations are used in restoration and revegetation. Secondarily, such studies also afford the opportunity to identify, increase, and potentially release pre-varietal germplasm for use in specific seed zones. This improves the possibility that ecologically adapted seed will be commercially available for field office and landowner use.

Found naturally across most of North America, prairie junegrass is useful for revegetation of mined lands, burns, and other disturbed sites, improvement of rangelands, and restoration of prairie, savanna, and chaparral. Seed of this species was collected by the USFS from at least 120 populations primarily from Oregon and Washington, but from outlying areas as well. Duplicate common gardens with 10 replications each (using single plant plots) were established at an Oregon State University Experiment Station near Powell Butte, OR, and at the Corvallis PMC. The sites were planted in August and October of 2008, respectively. Data were collected in 2009 and 2010 on phenology (date a certain growth stage is reached), certain leaf and seed stalk traits, form, above ground biomass, spread, and plant basal width. Additional data will be collected in 2011 and results and seed transfer guidelines will be published thereafter. The work is under the leadership of USFS geneticists.

Traits measured at Corvallis in 2009 were significantly different from traits measured on the same plants and populations at Powell Butte. Plants at Corvallis had wider crowns, larger leaves and later growth stages than plants at Powell Butte. For nearly all traits, variation among populations was much greater when plants were grown at Corvallis even though variation among individual plants was similar at both sites. Four traits that had large population variation and were correlated with climates at the source locations were crown width, inflorescence number, leaf width, and bloom date. These traits are generally correlated with temperatures, precipitation, and aridity. The general patterns of variation that emerge from across the landscape from this preliminary analysis are largely congruent with large-scale Level III ecoregions, suggesting these regions may be useful for seed zones. A final report will be published in 2012.

## Roemer's Fescue



*Seed increase of Roemer's fescue that originated from the Oregon Coast. These plants are comparatively more robust than most other populations.*

Roemer's fescue (*Festuca roemeri* synonym *Festuca idahoensis* ssp*. roemeri*) is a native fine leaf fescue found exclusively west of the Cascade Mountains in Washington and Oregon as well as northwestern California. There is considerable interest in this species for ecosystem restoration as well as revegetation, cover, and erosion control. As the result of a common garden study conducted with the cooperation of Institute for Applied Ecology (IAE) in Corvallis, the Bureau of Land Management (BLM), and the US Forest Service (USFS), five seed zones for Roemer's fescue were delineated which largely correlate with EPA Level III ecoregions. Seed movement within each

zone is considered "safe" in terms of plant adaptation. A composite or polycross of two to nine populations evaluated in the original study were chosen to represent each seed zone. Four of the polycrosses will become selected class releases for use in plant community and wildlife habitat restoration. A fifth population from the Oregon coast has also been targeted for increase and use in general erosion control. Seed is now available to private seed growers in the Pacific Northwest for commercial scale production.

## PARTNERSHIPS WITH OTHER AGENCIES

### Upland Plants and Technology for the National Park Service

The Native Plants for Parks Program is based on a cooperative agreement between NRCS and the National Park Service (NPS). It began in 1989 to share expertise and develop plant materials for use in Park programs. In 2010-11, the PMC collaborated with three National Parks under four agreements. Propagation, seed technology and increase, and revegetation techniques developed or refined by the PMC in the process benefit all of the PMC's customers interested in native plants for production, restoration, erosion control, wildlife habitat and related conservation efforts. The same holds true for other agencies the PMC works with on native plants.

*PMC staff visiting restoration sites in Lassen Volcanic National Park, October 13, 2010.*

Lassen Volcanic National Park, located in the SE corner of the PMC service area, is a dry, rugged, high elevation park with a unique and diverse flora. Propagation techniques are not known for many plants that occur in the Park. Germination trials were performed in 2011 on over 30 forbs and sedges from the Park. The results of these trials were used in late spring of 2011 to produce over 10,000 plants of 45 species. In early September, the PMC delivered these plants to be planted at the new visitors' center and other revegetation projects in the Park. The PMC and Lassen Volcanic National Park have interagency agreements that include yearly plant propagation and delivery for the next three years.

*Pioneer species such as Oregon sunshine (Eriophyllum lanatum) were selected for seed increase for the Elwha Dam removal project.*

Since 2004, the PMC has been working with Olympic National Park which is preparing for the removal of two large dams on the Elwha River. The dams are now scheduled to be removed in 2012. Their elimination is necessary to restore the salmon runs that historically had access to the upper reaches of the river prior to the dams being built. The revegetation plan is in its final stages and it is anticipated that the PMC will produce over 7,000 lbs of seed to revegetate the 500 acres of exposed lake beds. Wild seed collections were completed in 2010, and large grass and forb fields were planted at the PMC in the fall of 2010. This year, over 2,000 lbs of seed were produced for this project in preparation for the dam removal. Seed will be held in the PMC seed storage facilities until requested by the Park.

In 2009, the PMC and San Juan Island National Heritage Preserve began an interagency agreement to produce seed of three native grasses for on-going prairie restoration. The Park plans to restore about 100 acres over the next six years. Approximately 300 lbs of seed were produced in 2011 for this Park.

### Wetland and Wet Prairie Species for the Bureau of Land Management

In 2002, the Corvallis PMC entered into an agreement with the Eugene District of the Bureau of Land Management (BLM) to perform seed germination trials and conduct small-scale increases of native wetland and wet prairie species. The PMC agreed to investigate and document seed propagation techniques for these species and to evaluate their potential for agronomic seed increase. The agreement has been renewed on a yearly basis, and since its inception, the PMC has successfully produced over 300 lbs of 85 species. Most of them have little if any published data on germination or production methods. Improved production techniques have been developed for small-scale seed increase, such as planting annuals in fields covered with weed fabric to facilitate weed control and vacuum harvesting. In 2011, establishment techniques were researched for the earliest blooming forbs. Seeds and greenhouse-grown transplants were directly planted into holes in the weed fabric plots. The direct-sown seedlings were hardier; some bloomed earlier and overall were healthier and better adapted to the cool spring weather. The direct sowing technique will be used for these early bloomers in future plantings. However, slugs can be a problem in these small plots due to the weed fabric.

### Native Grasses and Forbs for Fire Rehabilitation and Wildlife Habitat in Southern Oregon

The Roseburg District of the BLM manages the North Bank Habitat Area for the endangered Columbian white-tailed deer (*Odocoileus virginianus* ssp. *leucurus*). The species has only been delisted for Douglas Co., OR, and remains listed in other counties of Oregon and Washington along the lower Columbia River. The PMC entered an agreement with the BLM in 2007 to produce seeds of native grasses, legumes, and forbs. In 2011, new species were added to the production list. Showy annuals such as farewell-to-spring (*Clarkia amoena*), blue gilia (*Gilia capitata*), and two species of tarweed (*Madia elegans* and *M. gracillis*) were direct sown in the fall of 2010 and produced seed in 2011. These small, highly managed plots produced an amazing amount of seed. Two sedges were also added to the agreement: *Carex densa* and *C. gynodynama*. Plugs were grown in the summer of 2011 and will be planted into seed increase fields in the fall of 2011.

*Blue gilia (Gilia capitata) has blue pollen and bees that pollinate it have blue pollen sacs.*

The Medford District of the BLM has partnered with the PMC since 2004. They are often in need of large amounts of seed for revegetation after wildfires. The PMC agreed to work with certain native grasses and forbs that are seldom grown by large-scale seed producers. In 2009, plugs of lupine (*Lupinus adsurgens*) and scurf peas (*Rupertia physoides*) were produced and transplanted into a field covered with weed fabric. These fields seemed to benefit from the long wet spring in 2011. Plants were much larger and seed yields were higher than in previous years. PMC staff noticed an unusually high concentration of queen bumblebees in the *Rupertia* field. The two new fields produced 50 lbs of seed. Older forb fields also produced 30 lbs of seed in 2011. Both BLM contracts are renewed on a yearly basis.

## SPECIAL PROJECTS AND ACTIVITIES

### Threatened and Endangered Plant Species

*Flower pickers and bulb collectors are a major threat to the beautiful but endangered western lily (Lilium occidentale).*

The western lily (*Lilium occidentale*) is a federally listed endangered plant. There are only 28 populations known along the coast of Southern Oregon and Northern California. Major threats to its existence are horticultural collecting, conversion to agriculture, and tree encroachment. In 2010, the PMC entered an agreement with the US Fish and Wildlife Service (USFWS) to develop a propagation protocol for this species, and produce 2,000 bulbs within six years. In spring of 2010, germination studies were performed on the seeds. Seeds origin was tracked to see if there were significant differences in germination by mother or by population; none were observed. Seedlings grew amazingly well in 2010, and by 2011 many of the bulbs were large enough to flower. This is unusual for a two-year-old bulb. More seedlings were grown in 2011 using the techniques that were developed the previous year. Bulbs will be grown and prepared for outplanting in October of 2012.

Small plots of Willamette Valley daisy (*Erigeron decumbens*) were established at the PMC in 2007. It is a federally listed endangered species that was considered extinct in 1939, but a few populations were found again in the 1990s. This species was probably widespread in the bottomlands of the Willamette Valley, but most of its habitat has been converted to agriculture. With less than 30 known populations left and few plants remaining on protected sites, the species needs augmentation. The PMC's two increase plots range in size from 200 to 400 plants and produce ¼ to ½ lb. of seed each per year. There are approximately 500,000 seeds per pound. Seed from these plots is used for research and restoration? purposes by the PMC and its partners.

Nelson's checkermallow (*Sidalcea nelsoniana*), is a threatened species that is a prime candidate for federal delisting. It is presently found on 62 patches within five relict population centers in Oregon, and at two sites in Washington. This species is very easy to grow, produces lots of viable seed, and is relatively easy to establish on restoration sites. The PMC is partnering with the Institute for Applied Ecology (IAE) in Corvallis, OR, and the USFWS to produce seeds and plants of this species for planting on appropriate sites. IAE staff collected seed from two designated recovery zones. The seed was delivered to the PMC in the fall of 2008 and was used to grow plants to establish two separate seed increase fields in the spring of 2009. In three years, the PMC has produced over 310 lbs of seed, 16,000 plugs and over 12,000 rhizomes, all of which have been planted out on NRCS Wetland Reserve Program (WRP) sites in 2010 and 2011.

*Nelson's checkermallow (Sidalcea nelsoniana) seed increase field, June 16, 2011.*

Golden paintbrush (*Castilleja levisecta)* is considered to be extirpated from Oregon, but a few populations still remain in Washington. The PMC is working with IAE and USFWS to produce seeds and plants to reintroduce this plant back into Oregon. In the spring of 2010, the PMC produced 5,000 plants, most of which were planted out in protected sites in the Willamette Valley. The remaining 1,800 plants were transplanted into a seed increase field at the PMC. This plant is a hemiparasite and performs better if planted with a host, except in small containers. The paintbrush plants were planted with a sand fescue (*Festuca ammobia*) "buddy" in the seed increase field. The field produced 4 lbs of seed in 2011 (there are approximately 400,000 seeds per pound). The PMC also produced 3,000 plugs with various hosts that were planted out in restoration sites. These paintbrushes will be monitored for survival and analyzed to see if they have a host preference. In the early stages of the study, yarrow (*Achillea millefolium*) appeared to the best host.

*Golden paintbrush seed increase field growing with host sand fescue at the PMC, May 27, 2011.*

## Seed and Plant Propagation for Oregon Silverspot Butterfly Recovery

The PMC has the opportunity to assist with the recovery of Oregon silverspot butterfly (*Speyeria zerene* spp*. hippolyta*). The species was declared a federally listed threatened species in 1980 and is classified as endangered in Oregon and Washington. It occurs in small, isolated populations on grassland habitats within its range from coastal Washington south to coastal northern California. In 2005, the PMC and Anne Walker of USFWS began a collaborative effort to develop a long-term seed source for habitat restoration. The seed and plant production is a small part of a larger project focusing on the recovery of the Oregon silverspot butterfly. Butterflies and caterpillars are also raised by the Oregon Zoo, and many federal, state, and non-profit entities are working together to restore sites in the critical habitat area. This effort has become a national model for butterfly conservation.

Since 2005, the PMC has been growing plugs of early blue violet (*Viola adunca*), which is the larval (caterpillar) host plant, as well as producing a couple pounds of violet seed per year. In 2008, larger seed increase fields were established of violets, sand fescue (*Festuca ammobia*), and nectar plants such as pearly everlasting (*Anaphalis margaritacea*), goldenrod (*Solidago canadensis*), yarrow (*Achillea millefolium*), and pacific aster (*Aster chilensis*). Other coastal meadow species like edible thistle (*Cirsium edule*), sand clover (*Trifolium wormskioldii*), and coastal wormwood (*Artemisia suksdorfii*) were added to the seed production list in 2009.

The violets are a very difficult species from which to collect seed, and production presents interesting challenges! These low-growing plants produce seed all summer long in pods that shatter upon maturity. Plugs were grown and transplanted into a field covered with weed fabric. As seeds began to shatter on to the fabric, wind quickly blew the round seeds off the surface preventing easy collection. A four-sided "wind fence" was installed around the production plot, which allowed more of the seed to remain on the fabric. Unfortunately, the wind fence created a protected enclosure for mice to harvest and cache unripe pods. Mouse traps were set all over the plot to control them and reduce further losses. As seed accumulated on the fabric,

*Sand clover (Trifolium wormskioldii) is a low-growing, perennial legume that spreads from rhizomes.*

a flock of doves discovered the seeds. Flashy bird tape was hung all over the plot to scare the birds away. This resulted in even more birds in the plot! Finally, pieces of bird netting were fastened together and used to enclose the entire plot. Every gap had to be filled or the doves would find a way in. Once all of these problems were finally solved, massive amounts of seed piled up on the weed fabric and were vacuum harvested throughout the growing season.

In 2011, the PMC produced 40 lbs of violet seed, 170 lbs of fescue seed, and over 80 lbs of seed of the nectar species. One of the benefits of working with a variety of new native species is that we find multiple uses for these plants. Two species in this project have caught our eye. Sand fescue selections have been made from these fields to develop a low-maintenance turf. Sand clover displayed an impressive amount of growth and lateral spread in one year. It is also very low-growing, which makes it a candidate for erosion control, and long term cover crop, such as in vineyards.

## TECHNOLOGY TRANSFER

The PMC conducts and contributes to field days, workshops, and tours, writes and produces publications, and makes presentations in order to train or disseminate technology to NRCS and Soil and Water Conservation District employees, growers, and other agency partners, as well as the general public.

In the 2011 fiscal year, the PMC jointly conducted a field day on farmscaping, a workshop on beneficial habitat, a workshop on native grasses and forbs for revegetation in western Oregon, and at least five additional presentations and/or tours. The PMC also published an e-newsletter, three Plant Guides, five Plant Fact Sheets, and 16 annual reports on current projects.

Kathy Pendergrass, Plant Materials Specialist for the Corvallis PMC service area conducted seven additional presentations and training sessions on topics such as threatened and endangered species, the Endangered Species Act (ESA) and the National Environmental Policy Act (NEPA), using native plants for erosion control, and wetland plant identification.

### PMC Field Day 2011 – 3rd Annual Farmscaping with Native Plants

*Kathy Pendergrass (2nd from left, Plant Materials Specialist) and Mace Vaughan (3rd from left, Xerces Society) lead a discussion in front of a field of Oregon sunshine during the 2011 PMC field day.*

For the third consecutive year, the Corvallis PMC and Plant Materials Specialist Kathy Pendergrass teamed up with Oregon State University researchers from the Integrated Plant Protection Center (IPPC), the Xerces Society for Invertebrate Conservation, native plant and seed retailers, and insect and native plant enthusiasts for a field day at the PMC on June 16th, 2011.

Thirty-one farmers, landowners, NRCS field staff, and Soil and Water Conservation

District (SWCD) employees spent the afternoon learning about the importance, identification, and habitat needs of beneficial insects and native pollinators by touring and scouting the PMC forb seed increase fields and demonstration hedgerow. Besides the field tour and insect ID, presentations included an introduction to farmscaping with native plants, native grass establishment and use in habitat, getting forbs established on your farm, an overview of the replicated pollinator forb/forb mix trial, hedgerow species selection and establishment, willows for beneficial insects, PMC cover crop trials, nursery and seed stock availability from vendors, and conservation programs for private farms.

**Plant Selection and Propagation for Beneficial Habitat Workshop for Farmers**

*Gwendolyn Ellen (IPPC) provided training on beneficial insect habitat during a workshop at the PMC, February 2011.*

The Corvallis PMC and the Farmscaping for Beneficials Project of the Integrated Plant Protection Center (IPPC) at Oregon State University co-sponsored a workshop on plant selection and propagation for beneficial habitat at the PMC on February 17, 2011.

Twenty-two farmers, nursery growers, students, non-profit personnel, NRCS and SWCD employees attended the successful workshop. The workshop included classroom presentations on the following topics:

- Planning for pollinator plants ~ Kathy Pendergrass, PM Specialist & Joe Williams, PMC Manager
- Interactive habitat planning ~ Gwendolyn Ellen, IPPC
- Basics of woody and herbaceous plant propagation from cuttings and seed ~ Dale Darris, PMC Conservation Agronomist
- Techniques for processing and planting willow slips (with practice at cutting blocks) ~ Dale Darris

All farmer participants who responded to a post-workshop evaluation said they intend to create new habitat for beneficial insects (beetle banks, insectary plantings, flowering cover crops, bee nest boxes, etc.), consider landscape ecology in future pest management decisions, and propagate native plants on their farm.

**Publications in 2011**

- Corvallis PMC e-news (3 pages)
- Plant Guides:
  - ✓ tufted hairgrass (*Deschampsia cespitosa*)
  - ✓ Sitka alder (*Alnus viridis* ssp. *sinuata*)
  - ✓ big deervetch (*Lotus crassifolius*)
- Plant Fact Sheets:
  - ✓ sand fescue (*Festuca ammobia*)
  - ✓ twinberry honeysuckle (*Lonicera involucrata*)
  - ✓ California hazelnut (*Corylus cornuta* var. *californica*)
  - ✓ big deervetch (*Lotus crassifolius*)
  - ✓ orange eye butterflybush (*Buddleja davidii*)
- The 2010 Bureau of Land Management Annual Report: *West Eugene Wetlands* (10 pages)
- The 2011 Bureau of Land Management Annual Report: *Medford District* (6 pages)
- The 2010 Bureau of Land Management Annual Report: *Roseburg District* (7 pages)
- The 2010 Bureau of Land Management Annual Report: *Willamette Valley Daisy* [Erigeron decumbens *var.* decumbens] *Breeding System Study* (4 pages)
- The 2010 Golden Gate National Park Annual Report: *Marin*

*Headlands Revegetation Project* (3 pages)

- The 2010 Institute for Applied Ecology Annual Report (6 pages)
- The 2010 Lassen Volcanic National Park Annual Report: *Visitors' Center Landscape and Disturbed Lands Project* (6 pages)
- The 2010 Mount Rainier National Park Annual Report: *Nisqually Entrance Revegetation Project* (2 pages)
- The 2010 Olympic National Park Annual Report: *Elwha River Ecosystem and Fisheries Restoration* (7 pages)
- The 2010 San Juan Islands National Historical Park Annual Report: *American Camp Prairie Restoration Project* (4 pages)
- The 2010 Seed Increase of Threatened and Endangered Species Annual Report (9 pages)
- Steven's Canyon Road Revegetation Project (3 pages)
- The 2010 US Army/USFWS Annual Report: *North Coast Oregon Silverspot Butterfly Seed Increase Project* (8 pages)
- The 2010 US Fish and Wildlife Annual Report: *Western Lily (*Lilium occidentale*) Bulb Production Project* (5 pages)
- The 2010 US Fish and Wildlife Annual Report: *Oregon Silverspot Butterfly Seed Increase Project* (10 pages)
- The 2010 US Forest Service Annual Report: *Forest Service Seed Increase Projects* (4 pages)

## FACILITIES AND EQUIPMENT

### The Corvallis PMC has a new shop

This year, the PMC was fortunate enough to build a 2,000 square foot workshop. The shop is a welcome addition and greatly expands the work and storage space of the farm. This new shop has been wired for electricity and compressed air and has been outfitted with a welder and new tools.

*New 2,000 sq. ft. shop building at the Corvallis PMC*

## ABOUT THE CORVALLIS PMC

Development of vegetative solutions to conservation problems is a primary function of the USDA NRCS Plant Materials (PM) program. As one of 27 centers nationally, the Corvallis Plant Materials Center (PMC) serves western Oregon, western Washington, and northwestern California. Its primary mission is to develop new technology in plant propagation, plant establishment, seed production, revegetation, restoration, and erosion control, and to test, release, and increase plant sources for use in riparian areas, wetlands, and uplands. The major focus is on native grasses, forbs, and shrubs.

The program's principal customers include:

- ✓ NRCS field offices, who in turn serve both rural and urban landowners, farmers, ranchers, and other land managers,
- ✓ Public agencies, universities, tribes, and private conservation organizations that utilize technology and plants selected or produced by the program, and
- ✓ Commercial seed producers and nurseries who receive information on production technology as well as seed and plants of selected species for further increase.

Technology development at the Corvallis PMC to address priority resource needs involves:

- ✓ determining vegetative propagation, seed germination, production, and establishment methods of plants for rehabilitating, stabilizing or restoring riparian areas, wetlands, uplands, and critical sites;

- ✓ Installing demonstrations and conducting studies to illustrate and evaluate the use of native species for cover crops, wildlife and pollinator habitat, low input turf, natural area landscaping, and other ecologically sound uses;
- ✓ investigating adaptation of select grass, forb, and woody species and populations to environmental variation (differences in soil, climate, water);
- ✓ evaluating progress and monitoring maintenance needs of sites restored or revegetated through direct seeding, planting, and soil bioengineering;
- ✓ assessing adaptive genetic variation within select plant species through studies (done in collaboration with geneticists) that help ensure adapted populations are used in revegetation and restoration;
- ✓ determining seed and vegetative propagation methods and increasing native species that facilitates revegetation work by National Parks, the Bureau of Land Management, U.S. Forest Service, U.S. Fish and Wildlife Service, and Federal Highways;
- ✓ Conducting special purpose studies such as the evaluation of certain species with potential for biofuel.

*Prepared by Dale Darris, Amy Bartow, Joe Williams, Annie Young-Mathews, and Kathy Pendergrass. All articles and photos are by NRCS Plant Materials Center staff and Plant Materials Specialist.*

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