



Corvallis Plant Materials Center 2007/8 Progress Report of Activities

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

The principal program customers include:

- ✓ NRCS field offices, who in turn serve both rural and urban land owners, 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.



Use of a new 4-row Hege cone seeder for precision planting of grasses and forbs for seed increase. The PMC added the tank (far right) and spray nozzles to apply activated carbon bands over each seeded row. A nonselective herbicide is sprayed shortly afterwards for weed control between rows. The carbon protects the crop seed.

PLANT COLLECTIONS and RELEASES

Wild populations of plants are collected, propagated, and selected for their physical attributes, area of adaptation, potential performance, or documented capabilities from a series of evaluations aimed 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.

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Studies may 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 15 plant cultivar and pre-varietal releases.

Pre-varietal 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 “source identified”, “selected”, or “tested class”, depending on the degree of testing, selection, or evaluation they undergo.

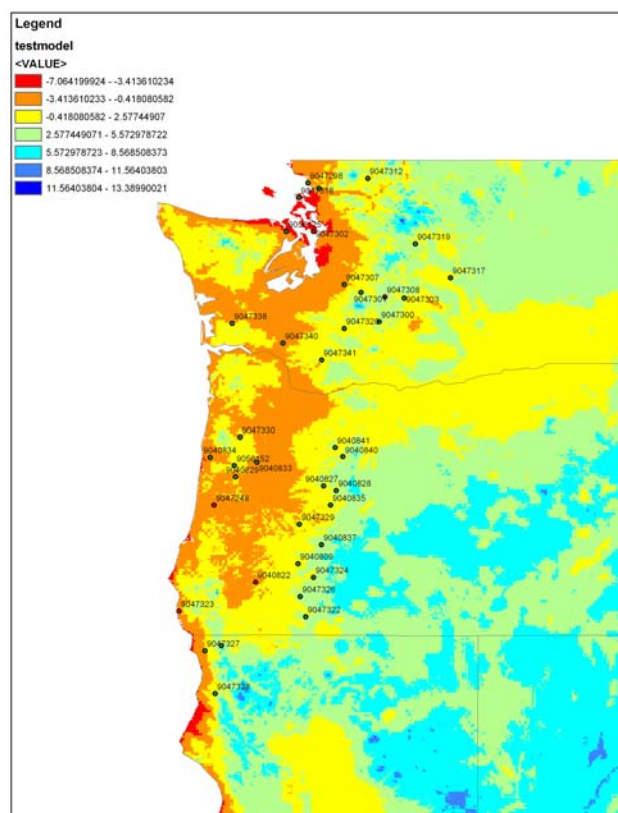
Meadow barley

The release of source identified Jackson-Frazier germplasm meadow barley (*Hordeum brachyantherum*) for use in the Willamette Valley of Oregon was completed in 2008. This is a versatile native grass important for wetland restoration, quick cover, and erosion control along ditches, waterways, and streams. It prefers full sun and tolerates summer drought as well as long-term winter and spring flooding

to a depth of one foot or more. Seed should be commercially available in one or two years.

Oceanspray

Oceanspray (*Holodiscus discolor*) is a native shrub useful for riparian revegetation and wildlife habitat in western Oregon, western Washington, and northwestern California. Two pre-varietal germplasm releases of this species are targeted for completion within two years. Thanks to Dr. Matt Horning of the US Forest Service in Corvallis, data from the original common garden study was re-analyzed. Based on statistical correlations between plant growth and environmental factors such as collection site elevation and temperature, unique seed zones or genetic regions are suggested for this species. A related article will be published shortly in the journal of Restoration Ecology. The PMC is establishing isolated seed orchards for selected populations. Seed certification and harvest began in 2007.



Colors represent tentative “seed zones” for oceanspray based on analysis of data collected from the PMC’s common garden study in the 1990s. The USFS Pacific Northwest Research Station, Corvallis, did the analysis. Dots represent seed collection sites. Map by Dr. Matt Horning, USFS.

Mass Selection of Sand Fescue

Sand fescue (*Festuca ammobia*) is native to the Pacific coastline and was previously classified as a red fescue. Fine textured, low growing, and spreading, a source of this species is already being used for low maintenance “native” turf in California. With a similar utilitarian goal in mind, the PMC began mass selection of a coastal Oregon population for leaf color and freedom from a leaf disease generally known as “rust”. Non-manipulated genetic material of sand fescue is already being increased by the PMC for coastal habitat restoration by other agencies.



Sand fescue is endemic to coastal, beachfront meadows in Oregon and California. It is rhizomatous and often has a strong bluish tint.

Roemer’s Fescue

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. It was once a dominant bunchgrass of oak savannas, prairies, and coastal headlands throughout the region. Because of extensive agriculture, urbanization, and other land use changes, there remain only small remnant populations throughout much of its natural range. There is considerable interest in this

species for ecosystem restoration as well as revegetation, cover, and erosion control.

To address the need, a common garden study of Roemer’s fescue was conducted between 2003 and 2005 in cooperation with the Institute for Applied Ecology (IAE) in Corvallis, the Bureau of Land Management (BLM), and the US Forest Service (USFS). By collecting seed from throughout its geographic range and growing out plants in a common garden, it is possible to identify patterns of genetic variation that may statistically correlate to environmental variables such as elevation or precipitation. The study contained 14 populations of Roemer’s fescue from Washington, 30 from Oregon, and 3 from California.

Results of the study were used to delineate five seed zones for Roemer’s fescue. Specific results will be published in the Native Plants Journal in the fall of 2008. A composite mixture or polycross of two to nine populations evaluated in the original study represents each seed zone. Four of the polycrosses will become selected class releases for use in plant community and wildlife habitat restoration. A fifth highly productive population from the Oregon coast has also been targeted for increase and use in general erosion control. A seed increase field of each composite population will be planted in the fall of 2008. Actual release and availability on the commercial market are three to four years away.



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

PLANT TECHNOLOGY and INCREASES

The NRCS is a USDA agency with the responsibility of administering technically based conservation programs. Many of these programs, such as CRP, CREP, GRP, WRP, and WHIP, directly involve the use of plant materials and plant technology. For the agency, the primary responsibility for developing new plants and related technology lies within the PM program.

- Portions of the plant technology developed are incorporated into the Field Office Technical Guide (FOTG) or supporting handbooks, technical notes, fact sheets, etc, and therefore integrated into conservation practices implemented on public and private lands.
- The National PM program maintains a web site which contains useful information on plant releases as well as progress reports, technical reports and other publications developed by the PM program. The website address is <http://plant-materials.nrcs.usda.gov>
- The PM program supports other NRCS computer applications such as the PLANTS database and VEGSPEC.
- New plant propagation and seed increase protocols are entered in the Native Plant Network website.
- Other publications appear in conference proceedings, abstracts, trade magazines, and scientific journals.

Technology studies at the Corvallis PMC to address priority resource needs involve:

- ✓ determining vegetative propagation, seed production and establishment methods of plant materials (native forbs, shrubs, and grasses) for rehabilitating, stabilizing or restoring riparian areas, wetlands, and uplands, primarily at low elevations;
- ✓ studying and increasing plant materials for use in soil bioengineering;
- ✓ evaluating progress and monitoring maintenance needs of sites restored or

- revegetated through direct seeding, planting, and soil bioengineering;
- ✓ assessing flood inundation tolerance and other adaptive qualities of select grass, forb, and woody species;
- ✓ increasing and testing seed and plant materials for revegetation at low to high elevation areas in National Parks;
- ✓ increasing and determining seed propagation methods of native species for the Bureau of Land Management and Federal Highways; and
- ✓ installing demonstration plantings and providing materials to illustrate and promote the use of native species for windbreaks, landscaping, and wildlife.

Overall, 55 new or ongoing studies and increases were conducted in 2008. In terms of production, over 55,000 container plants, 7500 cuttings, and an estimated 975 pounds of common and 408 pounds of certified seed were produced by the PMC this past year.

Native Shrub Rooting Trials are Applicable to Streamside Planting and Soil Bioengineering

Native shrubs that root from dormant branches and cuttings often supplement use of willows for riparian restoration, streambank erosion control, and soil bioengineering practices such as live stakes, fascines (branch bundles) and brush layering. Many native shrubs however, do not establish as readily as willows from dormant cuttings. The PMC began a study in 2006 to look at the effect of wood fiber mulch, slow release fertilizer, and end sealing (application of wax or paint to top end of cutting) on survival and growth of ten native shrub species from unrooted live stakes. The plots received no supplemental water.

The native plants being studied are arroyo willow, *Salix lasiolepis*; black cottonwood, *Populus balsamifera* ssp. *trichocarpa*; coyote brush *Baccharis pilularis*; mock orange, *Philadelphus lewisii*; ninebark, *Physocarpus capitatus*; redosier dogwood, *Cornus sericea*; salmonberry, *Rubus spectabilis*; Scouler's willow, *Salix scouleriana*; snowberry,

Symphoricarpos alba; and twinberry, *Lonicera involucrata*.

First and second growing season evaluations confirm that fiber mulch makes a substantial improvement in the initial establishment and growth of shrubs from live stakes. Slow release fertilizer generally resulted in lower survival but slightly increased vigor among those plants surviving while end sealing was generally associated with decreased survival and vigor.



Establishment and growth of native shrubs from dormant unrooted live stakes without special treatment. Left to right: Scouler's willow, black cottonwood, and salmonberry.

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 this bottleneck, the Center 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. Twenty-one species of grasses are currently being evaluated.

NATIVE GRASSES UNDER INCREASE OR STUDY

Common name	Scientific name	Technology Issues
Lemmon's needlegrass	<i>Achnatherum lemmonii</i>	Seed yields, harvesting, indeterminate flowering
Hall's bentgrass	<i>Agrostis hallii</i>	Establishment, harvest technology, seed yields
Spike bentgrass	<i>Agrostis exarata</i>	Production methods
Western sloughgrass	<i>Beckmannia syzigachne</i>	Soil moisture mgt., rust, production techniques
California brome	<i>Bromus carinatus</i>	Volunteer seedlings, production, control
Columbia brome	<i>Bromus vulgaris</i>	Establishment, stand longevity
Bluejoint	<i>Calamagrostis canadensis</i>	Seed fill, establishment from seed, stand mgt.
California oatgrass	<i>Danthonia californica</i>	Establishment, seed dormancy, adaptation
Tufted hairgrass	<i>Deschampsia caespitosa</i>	Adaptation (inundation, salinity) ecotypic variation
Slender hairgrass	<i>Deschampsia elongata</i>	Soil moisture management, longevity
Bottlebrush squirreltail	<i>Elymus elymoides</i>	Harvest methods and awn removal
Blue wildrye	<i>Elymus glaucus</i>	Seed shattering
Slender wheatgrass	<i>Elymus trachycaulus</i>	Stand longevity, production management
Sand fescue	<i>Festuca ammobia</i>	Seed yield, rust, harvest techniques
Roemer's fescue	<i>Festuca roemeri</i>	Seed fill, longevity, low yields, rust disease
Red fescue	<i>Festuca rubra</i>	Seed yields
Tall mannagrass	<i>Glyceria elata</i> (<i>G. striata</i>)	Soil moisture mgt., seed dormancy, establishment
Meadow barley	<i>Hordeum brachyantherum</i>	Seed retention, harvest techniques, diseases
Rice cutgrass	<i>Leersia oryzoides</i>	Harvest techniques, stand rejuvenation, seed dormancy, production, establishment
Pine bluegrass	<i>Poa secunda</i> (<i>P. scabrella</i>)	Stand longevity, harvesting, row spacing
Weak alkaligrass	<i>Torreyochloa pallida</i> var. <i>pauciflora</i>	Stand longevity, soil moisture management, establishment

Weed Control in Native Grasses and Lupine Grown for Seed

One of the biggest impediments facing the commercialization of native grass and forb seed production is the lack of labeled herbicides for weed control. In November 2007, experiments were initiated to evaluate various herbicides in their ability to control annual bluegrass and other weeds in established stands of blue wildrye and tufted hairgrass grown for seed. Likewise, repeat experiments similar to those planted in fall 2006 were undertaken in 2007 to further confirm the affect of various rates of diuron (coupled with carbon band seeding) on weed

control in newly sown stands of blue wildrye, tufted hairgrass and meadow barley. Repeat experiments with Roemer's fescue and lupine will also be established in the fall of 2008. The work is cooperative with the Oregon State University Crop and Soil Science Department.



Diuron herbicide trial on tufted hairgrass. In October 2006 and November 2007 plots were sown with carbon bands applied over the rows of seed and treated with herbicide. Control of weeds and damage to the tufted hairgrass varies by rate of chemical applied.

The goal is to produce data in order to obtain "special local needs labels" for herbicides useful in native plant seed production.

Regional Comparative Evaluation of Tall Wheatgrass for use in Biofuel Applications in Western States

Tall wheatgrass (*Thinopyrum ponticum*) is a productive, introduced, perennial grass that has potential as biofuel feedstock. In November 2007 a three-year trial of four commercially available plant releases of tall wheatgrass were planted at the PMC. Each treatment was replicated 4 times for a total of 16 plots. Plots consisted of four, 20-foot long rows spaced 12 inches apart. The seeding rate was 8 lbs Pure Live Seed/acre. First year evaluations have been promising for both stand and vigor. Each replication has been free of disease and insect damage and the potential for biomass production looks promising thus far.



Plots of tall wheatgrass established for biofuel study.

Waterway Seeding Trials with Native Wetland Grasses

Native wetland grasses may have the potential to control erosion in the bottom of grass waterways where prolonged flooding often eliminates less tolerant species. In 2005, the PMC, in partnership with the OSU Extension Service, the Linn County Soil and Water Conservation District, and select growers, began testing certain wetland grasses in grassed waterways. Among the most promising species to date are Jackson-Frazier germplasm meadow barley, spike bentgrass, introduced 'Seaside' creeping bentgrass, and Willamette germplasm tufted hairgrass. Completed in 2008, one of the study sites was part of a field day held in March by the Cooperative Extension Service.



Jackson-Frazier meadow barley being evaluated in a grassed waterway on Pugh Seed Farm, Linn Co., OR.

Effect of Small Grain Cover Crop Residues on Establishment, Growth, and Biomass of two Native Grasses

Wheat, cereal rye, barley, triticale, and oats are commonly used as cover or nurse crops prior to or along with the planting of native plant species. However, residues (straw, roots) from different varieties of these small grains are known or suspected of containing chemicals that can negatively affect the germination or growth of desirable as well as weedy species. To observe these possible influences on native grasses, a new study was initiated in 2007. Ten different small grain species and varieties were fall sown and the residue incorporated into the soil during the summer. Two native grasses, blue wildrye and pine bluegrass, will be sown into the site in the fall of 2008 and their establishment, growth, and biomass production measured to observe potential effects of the small grain residues.



Ten different small grains were sown into a field to evaluate the effect of their residues on establishment and growth of native grasses.

New Demonstration Hedgerow Planted at the PMC

In February, 2008 a demonstration hedgerow using native plants was established at the PMC. The purpose of this demonstration is to initiate the use of native plants with early to late seasonal bloom times in an on-farm setting to promote pollinator and beneficial insect habitat. The hedgerow was planted in a north-south direction with the southern end displaying “early” blooming species (March/April) gradually moving north and ending with

species that bloom into August/September. The goal of the hedgerow is to provide nectar and pollen sources for pollinators throughout the year, but most importantly early and late in the season when most plants haven’t flowered or have flowered and are setting seed.

Eleven native shrubs were planted on four foot centers to start the project. In March, 2008 six native forbs were transplanted in groups among the shrubs. Like the shrubs, these forbs are planted in groups of similar bloom times. All of the shrubs and forbs established well this first year. From May until the end of August, insect collections were taken by Oregon State University personnel to document the number of species that visited the hedgerow. The results are still being evaluated but so far the results look very positive!



Pollinator hedgerow planting at the PMC.

PARTNERSHIPS WITH OTHER AGENCIES

Upland Plants and Technology for the National Park Service

The Native Plant 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 2008, the PMC collaborated with three National Parks under six agreements.



Lake Helen, Lassen Volcanic National Park

Lassen Volcanic National Park, located in the SE corner of the PMC service area, is a dry, rugged, high elevation park with unique and diverse flora. Propagation techniques are not known for many plants that occur in the park. Germination trials were performed in 2007 as part of the process to determine how to produce plants for two agreements that are scheduled to be completed in 2008. The results of these trials were implemented in 2008 to produce over 15,000 plants of 21 species. In early September, the PMC delivered 11,000 plants to be planted at the new visitors' center. This delivery included 1095 containers of four shrub species, 2257 plugs of two grass species, 3182 plugs of five species of sedges and rushes, and 749 plugs of six forb species. Also in this delivery were plants that are to be planted after repaving along the highest sections of road in the park. The plants will be planted around pullouts and other areas impacted by the road construction. This part of the delivery included 126 containers of one shrub, 2343 plugs of three species of sedges and rushes, and 1247 plugs of one grass and one legume.

Cooperative agreements between Mt Rainier National Park and the PMC have been on-going since the early 1990s. In 2008, the PMC produced seed of three species of grasses for two separate agreements. Both of these agreements are for roadside reseeding following repaving. Ending in 2008, is the SR123 project. This year, two grass fields produced an impressive 270 lbs of seed. In late August, the PMC delivered 330 lbs of seed to the park. Seed increase of three grasses for Steven's Canyon Road began in 2008. This long road traverses the southern end of the park and contains high and low elevation ecotypes of two of the grasses included in the agreement. These ecotypes are grown in separate fields and are properly isolated from each other to maintain their genetic integrity. PMC staff helped collect more seed from the park in late August. This seed will be used to expand the current fields. The project is scheduled to be complete in 2010.



Roadside seed collection in Mt. Rainier National Park.

Since 2004, the PMC has been working with the Olympic National Park on preparing for the removal of two large dams on the Elwha River.

The dams are scheduled to be removed in 2012. Their removal 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 estimated that the PMC will produce over 7000 lbs of seed to revegetate the 500 acres of exposed lake beds. Large-scale seed collections resumed this year in preparation for dam removal. PMC staff collected 15 lbs of grass seed in July and August. Collections are scheduled again for 2009 and the seed collected in 2008 and 2009 will be used to establish seed increase fields in the fall of 2009.

Since 2005, the PMC has been producing seed for post-construction revegetation along Hurricane Ridge Road, in Olympic National Park. The project was complete in 2008 and the PMC delivered 300 lbs of seed to the park in early August. This delivery included 35 lbs of high elevation grass seed, 60 lbs of high elevation forb seed, and 206 lbs of low elevation grass seed.

Wetland and Wet Prairie Species for the Bureau of Land Management

In 2002, the Corvallis Plant Materials Center 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 propagation techniques from seed for these species and to evaluate their potential for agronomic seed increase. The agreement has been renewed every year since 2002 and since its inception, the Center has successfully produced over 70 lbs of 80 species. Most of them have little if any published data on germination or production. New harvesting techniques, such as planting annuals in fields covered with weed fabric, have been developed for small scale seed increase. These new techniques have increased yields while reducing collection time for difficult-to-collect species such as hairy Indian paintbrush (*Castilleja tenuis*). This project contains many

small, highly managed plots. These techniques have shown that, with some species, this approach often has higher yields than larger fields using a one-time harvest technique. Species that are promising for larger scale seed increase are then are passed on to local private seed growers.



Hairy Indian paintbrush (*Castilleja tenuis*) growing with host plant Cascade calicoflower (*Downingia yina*) in a seed increase plot.

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 once endangered, but now delisted, Columbian white-tailed deer. The PMC entered an agreement with the BLM in 2007 to produce seeds of native grasses, legumes, and forbs. In 2008, there were over 3 acres in production of four forbs, three legumes and four grasses. This year was the first growing season for most of the expanded fields so seed production was minimal, but a total of 185 lbs was produced. Approximately 100 lbs of seed was delivered to the BLM in early September.



Hooker's silene (*Silene hookerii*) plants grown for a seed increase project with the Roseburg BLM.

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 fires. The PMC agreed to work with certain native grasses and forbs that are seldom grown by large-scale seed producers. Approximately 210 lbs of seed of three grasses, five forbs, and one legume were harvested in 200. Both BLM contracts are renewed on a yearly basis.

Research and Development of Forb Species for the United States Forest Service

In 2008, the PMC and the US Forest Service began an agreement focusing on research and development of forb species that are not currently being grown for seed production by private growers. This agreement included projects with three National Forests. This year the PMC researched germination protocols for nine species and created trial seed increase plots of seven of those species. They will be monitored for winter survival, pests and diseases, and seed increase potential.

SPECIAL ASSISTANCE PROJECTS

Early Blue Violet Propagation for Oregon Silverspot Butterfly Recovery

The PMC has the opportunity to assist with the recovery of Oregon silverspot butterfly (*Speyeria zerene hippolyta*). The silverspot

was declared a federally 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.

The adult butterflies feed on flower nectar of yarrow (*Achillea millefolium*), pearly everlasting (*Anaphalis margaritacea*), Canada goldenrod (*Solidago canadensis*), and Douglas aster (*Aster subspicatus*). These herbs are part of the coastal meadow plant community which the butterfly inhabits. The larvae of the silverspot butterfly prefer to feed on the leaves of the early blue violet (*Viola adunca*). The female lays her eggs in close proximity to this larval food source.

Habitat conversion, elimination of fire, and the introduction and increase of weedy invasive species have all contributed to a decline of the violets and, subsequently, rearing habitat for the larvae. In 2005, the PMC and Anne Walker of the U.S. Fish and Wildlife Service began a collaborative effort to develop a long-term seed source for habitat restoration. In 2008, the PMC produced 3 lbs of violet seed, 12 lbs of fescue seed, and 15 lbs of yarrow seed. Over 4,000 violet plants were also grown to establish a large seed increase field. Forb seed increase fields were also planted this year.

The PMC also hosted an open house and planning meeting for all parties interested in seed and plants for the butterfly. This group included individuals from three federal agencies, two state agencies, three non-profits, two universities, and the Oregon Zoo. The goal of the meeting was to talk about the best use of resources for the recovery of the butterfly. With funding from the USFW, USFS, and the US Army, the PMC will produce seeds of all nectar species, violets, one sedge and one grass for two seed zones along the Oregon and Washington coast. This seed can then be dispersed to all the agencies, non-profits, and private individuals through the USFW.



Rock Creek restoration area, north of Florence, OR. Circles were planted densely with plugs of violets or nectar species. Area in between was hydro-mulched with fescue, yarrow, and violet seed.

In late fall of 2007, Oregon Department of Transportation finished construction of a new bridge over Rock Creek. This bridge is within the critical habitat for the butterfly and an acre of land was restored using plant plugs and seed produced by the PMC. Seed of yarrow and sand fescue were hydro-mulched across the site and over 10,000 plugs of aster, pearly everlasting, goldenrod, violets, and sand fescue will be transplanted there as well.

Willamette Valley Seed Increase Program

In 2005, NRCS entered into a memorandum of understanding (MOU) with the Institute for Applied Ecology (IAE). IAE goals are to develop an ecologically appropriate supply of native seed for restoration of Willamette Valley wetland and upland prairie ecosystems. Over the last two years they have developed a focus list of species that will be targeted for seed increase, identified and mapped for quality collection sites throughout the Willamette Valley. Wild seed will be collected from as many populations as possible to capture genetic diversity. To ascertain genetic variation and any corresponding geographic trends across the collection areas, the PMC began common garden studies of five high priority forbs in 2006. Five more were added in 2007 and another two were started in 2008. Data collection has been completed on seven of the gardens in 2008 and reports should be available in the spring of 2009.

Common Gardens in 2006:

- big leaf lupine (*Lupinus polyphyllus*) (completed in 2008)
- slender cinquefoil (*Potentilla gracilis*) (completed in 2008)
- common self-heal (*Prunella vulgaris* ssp. *lanceolata*) (completed in 2008)
- Oregon saxifrage (*Saxifraga oregana*) (completed in 2008)
- narrow-leaf mules ears (*Wyethia angustifolia*)

Common Gardens in 2007:

- barestem biscuitroot (*Lomatium nudicaule*)
- meadow checkerbloom (*Sidalcea campestris*) (completed in 2008)
- denseflower willowherb (*Epilobium densiflorum*) (completed in 2007)
- common woolly sunflower (*Eriophyllum lanatum*) (completed in 2008)
- Puget Sound gumweed (*Grindelia integrifolia*)

Common Gardens in 2008:

- Hall's aster (*Symphotrichum halliana*)
- Rose checkermallow (*Sidalcea virgata*)

Breeding System Study of Willamette Valley Daisy

Erigeron decumbens var. *decumbens*, the Willamette Valley daisy, is an endangered, endemic grassland species of the Willamette Valley of western Oregon. Although this species has been listed since 2000 and is known to be extremely rare since the mid 1990s, very little information that might be pertinent towards the conservation of the species has been gathered. Basic information like knowledge of the breeding system and genetic divergence between the existing populations remains unknown. Knowledge of the breeding system and the impacts of inbreeding will help direct recovery and increase the chances of success in recovery efforts. A series of hand pollination treatments were performed by PMC staff to determine the breeding system for the Willamette Valley daisy to see if there is any "penalty" for inbreeding on seed set and vigor and fitness of the seedlings that resulted from the various crosses.



Willamette Valley daisy (*Erigeron decumbens* var. *decumbens*) breeding system study in the PMC greenhouse.

TECHNOLOGY TRANSFER

The PMC regularly produces publications and makes technical and popular presentations in order to disseminate technology to NRCS, SWCD, and other partners, as well as the general public. Seventeen presentations, training sessions, and tours on various PMC activities and technology development topics were given in 2008. A Field Day was also held. Customers were directly assisted at least 128 times during the year (Oct. 1, 2007 through Sept. 30, 2008).

Papers include technical and progress reports, news articles, technical notes, brochures, plant guides, and fact sheets summarizing work, current events, and plant releases. A total of 29 documents were produced in 2008. Major titles and contributions included:

- 4 "Plant Fact Sheets" on native shrubs and grasses (NRCS PLANTS database)(2 pages each).
- Corvallis Plant Materials Center Technical Report 2008 (271 pages plus appendix),
- "Evaluating, Increasing, and Releasing Populations of a Native Upland Grass: Roemer's fescue"(4th Pacific Northwest Native Plant Conference Proceedings) (NRCS, USFS, IAE).
- "Supporting Documentation for Release of Jackson-Frazier Germplasm Meadow Barley"(33 pages).
- "Field Guide for the Identification and Use of Common Riparian Woody Plants: Intermountain, Great Basin, and Pacific Northwest" (joint with the NRCS Aberdeen PMC) (73 pages).
- "Genecology of *Holodiscus discolor* (Rosaceae) in the Pacific Northwest, USA" (Restoration Ecology, in press) (USFS, NRCS).
- "Construction of a Grassed Waterway: Establishing Native Grass Trials" (News article in Linn Co., OR, SWCD Annual Report) (1 page).
- "Pacific Plants and Propagules" (PMC Newsletter, Vol. 2, No. 1) (8 pages).
- "Partnering for Plant Solutions" (PMC brochure) (6 pages).
- "The Other Bees" Oregon Agricultural Progress (Vol. 53, No. 2) (3 pages).
- "Plant Guide: California Oatgrass" (17 pages).
- The 2007 US Fish and Wildlife Service Annual Report: Willamette Valley Seed Increase Project (8 pages).
- The 2007 US Fish and Wildlife Service Annual Report: Oregon Silverspot Butterfly Seed Increase Project (4 pages).
- The 2007 Federal Highways Administration Annual Report: Fort Hill Nelson's Checkermallow Seed Increase (3 pages).
- The 2007 Federal Highways Administration Annual Report: Rock Creek Bridge Replacement (6 pages)
- The 2007 Olympic National Park Annual Report: Elwha River Ecosystem and Fisheries Restoration (7 pages)
- The 2005 and 2006 Olympic National Park Report: Hurricane Ridge Road Revegetation Project (6 pages)
- "Progress Report of Activities, Corvallis Plant Materials Center 2006-2007" (12 pages)
- The 2007 Mount Rainier National Park Annual Report: State Road 123 Revegetation Project (3 pages).
- The 2007 Mount Rainier National Park Annual Report: Steven's Canyon Road Revegetation Project (3 pages).
- The 2007 United States Forest Service Annual Report (4 pages).
- The 2007 Bureau of Land Management Annual Report: Medford District (10 pages).
- The 2007 Bureau of Land Management Annual Report: Roseburg District (7 pages).
- The 2007 Bureau of Land Management Annual Report: West Eugene Wetlands (9 pages).

- The 2007 Lassen Volcanic National Park Annual Report: Kings Creek Revegetation Project (5 pages).
- The 2007 Lassen Volcanic National Park Annual Report: Visitors' Center Landscape Project (3 pages).

Oregon NRCS Management Staff Tour

On May 28th the PMC was pleased to host the NRCS Oregon State Office Management Staff to a "Down on the Farm" tour and barbeque. A brief overview of the Plant Materials Program and tour of the PMC office, greenhouse and demonstration garden started everything off. Everyone then loaded up and headed over to the PMC's Schmidt Farm for a hay wagon tour of the production fields, farm equipment and seed cleaning facilities. A barbeque lunch followed to end the enjoyable day.



Participants in PMC tour for NRCS management staff.

FACILITIES and EQUIPMENT

New PMC Equipment Cleans and "Vacuums" Fields

A new piece of equipment for the PMC is really working wonders when it comes to weed control and reduced burning of our production fields. In 2008, the PMC purchased a Hiniker 5700 Flail Forage Harvester. The Hiniker Flail Mower/Shredder is an ideal piece of equipment for mowing and shredding residue in our operations. This piece of equipment uses a 32-knife flail that can cut standing crops from 2-10 inches high as well as "vacuums" all residue laying on the ground surface. The Harvester and a wagon are pulled through the fields by a tractor and the harvested material is then dumped off site to later be burned or left to decompose.



Hiniker Flail Mower/Shredder similar to the one purchased by the PMC. The wagon collects the material.

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