



United States Department of Agriculture
Natural Resources Conservation Service

Corvallis Plant Materials Center Corvallis, Oregon

Progress Report of Activities Year 2000 Issued March 2001

3415 NE Granger Avenue, Corvallis, OR 97330, Tel: 541-757-4812, FAX: 541-757-4733, Web site: Plant-Materials.nrcs.usda.gov

Responsibility for the development of vegetative solutions for conservation problems is a primary function of the USDA NRCS Plant Materials (PM) program. The Corvallis (OR) Plant Materials Center (PMC) is one of 26 centers nationally and serves western Oregon, western Washington, and northwestern California. The Corvallis PMC's primary mission is to develop new technology in the fields of native plant propagation and establishment, seed production, revegetation, and erosion control, and new plants or sources for restoration of riparian areas, wetlands, and uplands. The principal customers of the program include:

- NRCS field offices, who in turn serve both rural and urban land owners and managers,
- Public agencies, universities, and private conservation related affiliations that utilize technology developed by the program, and
- Commercial seed and plant producers who receive seed and plants of selected species.



Corvallis Plant Materials Center

PLANT DEVELOPMENT

Plants are collected and/or selected for their potential or documented performance from a series of evaluations aimed at addressing conservation

needs. Once a plant is selected and propagation or increase methods are determined, the material is made available to commercial growers. They in turn produce the material on a much larger scale and make it available to the public for various conservation needs.

Release of California Oatgrass

Fourteen cultivars of grasses, forbs, and shrubs, of which 11 were native species, have been released through the PMC for addressing priority conservation needs. In 2000, the Corvallis PMC summarized many years of data and finalized the release of "Baskett Slough Selection" (germplasm) of California oatgrass (*Danthonia californica*) (below) in 2000. Cooperators are the Oregon State University Agricultural Experiment Station and the US Fish and Wildlife Service (Western Oregon Wildlife Refuge Complex). This species is a key



component of native upland and transitional wetland plant communities in western Oregon and elsewhere. It is useful for erosion control, wildlife, and other amenity planting where native species are desired. "Baskett Slough Selection" originated from the Baskett Slough National

Wildlife Refuge in Polk County, Oregon. It is intended for use at low elevations in the Willamette and Umpqua Valley watersheds of Oregon, as well

as parts of southwest Washington. Seed may be commercially available as early as the fall of 2001.

Selecting and Releasing Native Plants to Address Resource Needs

Commercial sources of native plants of “local” genetic origin are needed for wetland and riparian revegetation and other resource needs on an ecoregion or Major Land Resource Area basis. One good way for the PMC to address this need is to provide prevarietal releases of species from specific areas for use in the same or similar area. Prevarietal release is a process whereby a plant (individual, group, or whole population) from a specific location is identified (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). Depending on the amount and intensity of evaluation work, the plant is released and certified as a “source-identified”, “selected”, or “tested” class. This process is ideally suited to native species where limited testing is done and the plant is not bred or hybridized. It also allows for a quicker turnaround time, instead of going through the lengthy and more detailed requirements of a “cultivar” release. Certification of the seed, seedlings or cuttings helps insure the quality (purity, germination) and proper identity (genetic origin, integrity) of the commercial seed lot or other material.

The Corvallis PMC is in the process of evaluating and increasing a significant number of native species for source-identified and selected class releases during the next 1-10 years. For woody plants targeted for riparian and wetland restoration, selected class releases are likely to include sitka alder (*Alnus viridis* spp *sinuata*), Pacific serviceberry (*Amelanchier alnifolia* spp *semiintegrifolia*), oceanspray (*Holodiscus discolor*), and vine maple (*Acer circinatum*). Probable source-identified releases will be made of black twinberry (*Lonicera involucrata*), common snowberry (*Symphoricarpos albus*), Pacific ninebark (*Physocarpus capitatus*), and salmonberry (*Rubus spectabilis*).

Native grasses for lowland and upland projects are another major focus of the PMC. Selected class

releases of tufted hairgrass (*Deschampsia cespitosa*) are planned for 2001-2002. Source-identified releases are likely to include western sloughgrass (*Beckmannia syzigachne*), meadow barley (*Hordeum brachyantherum*), Roemer’s fescue (*Festuca roemerii*), tall mannagrass (*Glyceria elata*), Pacific bluejoint (*Calamagrostis canadensis*), weak alkaligrass (*Torreyochloa pallida* var. *pauciflora*), and possibly others.

Prior to their release, the propagation and establishment techniques for these species are evaluated. Seed germination trials, rooting trials, and containerized stock production and field increase methods are evaluated. This information is provided to the grower, usually in the form of a technical note or plant guide.



Rooting Trial/Mist Bench

PMC Shadehouse

Containerized Stock Production

PLANT TECHNOLOGY

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

- Much of the plant technology developed by the program is incorporated into the Field Office Technical Guide (FOTG) and becomes standards for conservation practices implemented on public and private lands.
- The National PM program maintains a web site, which contains useful information such as plant fact sheets and guides, publications developed by the PM program, sources of plant materials, and related websites. The website address is <http://Plant-Materials.nrcs.usda.gov>.
- The PM program supports other NRCS computer applications such as Grazing Lands Application (GLA), Revised Universal Soil

Loss Equation (RUSLE), and PLANTS database.

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

- evaluating and increasing plant materials for use in soil bioengineering techniques;
- evaluating monitoring and maintenance needs of sites restored through soil bioengineering;
- assessing flood inundation tolerance of select native grass, forb, and woody species;
- determining vegetative propagation, seed production, and establishment methods of plant materials (mostly native shrubs and grasses) for restoring riparian areas, wetlands, and uplands, primarily at low to mid elevations;
- increasing and testing plant materials for revegetation of high elevation areas in Crater Lake and Mount Rainier National Parks; and
- assisting Native American tribes with collection, propagation, and establishment of culturally significant plants.

Overall, 45 new or ongoing studies and increases were conducted in 2000. Technology produced by the staff during the year included 14 written documents and 17 oral presentations. Other significant work completed was a Field Day for NRCS, SWCD staff and others.

Soil Bioengineering Studies in Progress at the Corvallis PMC

Soil bioengineering involves the use of plant materials with or without traditional engineering structures to stabilize streambanks. Studies demonstrating some of the simpler soil bioengineering techniques, such as live stakes, fascines, pole plantings, and brush mattressing were initiated in 1994. Objectives included the evaluation of suitability and effectiveness of plant materials, particularly the Corvallis PMC cultivars of willow (*Salix* spp.), redosier dogwood (*Cornus sericea* spp *occidentalis*), and Douglas spirea (*Spiraea douglasii*), at several locations within the PMC service area. Since that time, five of these studies have been established and evaluated at least annually. Photos of one of these sites before

treatment, during installation, and after treatment are shown below.



Mill Creek Site
Before Treatment

Installation of Brush Mattress
in November 1997

Results of these studies have been informative. Effectiveness of technique, species/ecotype varied with site. Access to soil moisture during the first growing season is critical to survival of plant materials, particularly live stakes and fascines. Competition from herbaceous species, particularly reed canarygrass (*Phalaris arundinacea*), greatly reduces survival and growth of live stakes and stem density in the brushmattress. Browsing by mammals and rodents also affects survival and growth of plant materials. Lastly, even with appropriate design, excellent site preparation, quality plant materials, and proper installation, an effective maintenance and monitoring plan is key to the continued success of soil bioengineering practices.



Mill Creek – February 1998
After Installation of Live Fascines (foreground), Brush Mattress, and Live Stakes with Erosion Control Fabric

Besides testing existing PMC cultivars, Corvallis is also evaluating a number of additional native shrubs common to our service area for their potential use as live stakes and fascines, as well as their general ability to root in a greenhouse or field from dormant, hardwood cuttings. One demonstration planted in March 1999 is underway along Schneider Creek near Olympia, WA using eight species. Another, located along Minnehaha Creek in Lane County, OR was installed in cooperation with the US Forest Service in November 1998. It includes a different combination of eight species. Beginning in 1998, the PMC has screened 15 common shrubs for their rooting ability from cuttings by conducting three large and three medium sized rooting trials, as well as one additional study in partnership with the WACD Lynn A. Brown Plant Materials Center at Bow, WA. This data is a direct benefit to commercial native plant nurseries.

So far, results indicate that in addition to willows, redosier dogwood, and Douglas spirea, common snowberry and black twinberry root the easiest and have the greatest potential for soil bioengineering, followed by Pacific ninebark and salmonberry. Other species with minor potential may include red elderberry (*Sambucus racemosa*) and mock orange (*Philadelphus lewisii*) under special, limited circumstances. Given the right genetic stock and quality of material, Indian plum (*Oemleria cerasiformis*) and red flowering currant (*Ribes sanguineum*) can root moderately well from hardwood cuttings but appear to offer little promise for live stakes or fascines. Results for all species can vary greatly between planting sites, genetic sources, age of wood, handling methods, and stock quality.

Flood Inundation Studies Help Determine Hydrologic Adaptation of Native Species

The inundation tolerance for many plant species and ecotypes is not known. This information is essential for developing planting plans for riparian and wetland restoration projects. Thus, the effect of inundation depth (saturated to 18") and spring duration (45 days, 30 days) on shoot growth and flowering of transplants (plugs of herbaceous native grasses and sedges) in constructed wetland cells was examined in 1996 and on survival, regrowth, and flowering in 1997 and 1998 (see photos below).

The effect of treatment varied with year, plant species, and plant ecotype. However, the information gained was quite useful. For example, the grass species generally performed best at less than 6" inundation for 30 days, while the sedge species exhibited excellent shoot growth and flowering at 12" inundation for 45 days.



Flood Inundation Study – 1996 (top) and 1997

Two additional flood inundation studies were established in the PMC constructed wetland cells in 2000. One study was established to evaluate the inundation tolerance of additional herbaceous species, including a forb, and the other study was established to evaluate the inundation tolerance of cuttings of the PMC willow, redosier dogwood, and Douglas spirea cultivars, and containerized stock and/or cuttings of other native woody species with potential for use in soil bioengineering or other restoration projects. Evaluation of survival and growth performance of plants will begin in May 2001.

Seed Production, Germination and Establishment Studies Benefit Commercial Growers

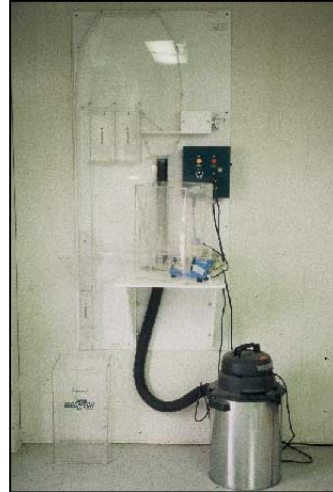
The major challenges facing the widespread increase and availability of native grasses and forbs are unknown seed production techniques and low seed yields. To try and address this bottleneck, the Center conducts studies and demonstrations to evaluate seed production and establishment techniques.



Seed Increase Field of California Oatgrass

Recent trials have examined row spacing, residue management (propane field burning), nitrogen fertilization, seeding rate, carbon banding, and herbicides for annual grass control. Blue wildrye (*Elymus glaucus*), tufted hairgrass, and western sloughgrass have been studied the most to date. As an example, the Center has found that ideal row spacing varies widely between species. Blue wildrye, despite being a large, tall grass, does best in 10-18 inch wide rows, while tufted hairgrass prefers 24-30 inch rows for maximum seed yields without irrigation.

Besides field production, the PMC searches for the best ways to enhance seed germination and improve seed quality. Nearly each year one or more germination studies are conducted either in the PMC lab. or in conjunction with the Oregon State University Seed Testing Laboratory. Seed stratification (moist chilling) and scarification (seed coat abrasion or dehulling) requirements are typically the first seed germination treatments tested. Surprisingly, some native herbaceous species including California oatgrass and big deervetch (*Lotus crassifolius*), appear to require, or at least perform better with, not one BUT BOTH type of treatments!



In addition to germination work, significant amounts of time and funds have been put into obtaining and evaluating seed cleaning and conditioning equipment. The goal is to define and perfect seed processing methods for PMC releases to maximize seed quality and ease of planting. The latest acquisition in 2000 was an air density separator (above). This machine utilizes negative pressure (vacuum) and is easily adjusted to draw off lighter seed, weed seed, or unwanted particles. Four levels of separation are made. It is well suited to many sizes of seed and seed lots, from a few grams of tiny seed to several pounds of large seed. A nice feature is that all airborne dust is self-contained by the system.

Plant Materials Center Partners with National Park Service and Forest Service

The Corvallis PMC has developed cooperative agreements with the National Park Service since 1989, involving Olympic National Park, Mount Rainier National Park, and Crater Lake National Park. This cooperative work was initiated to share technical expertise and to develop indigenous native plant materials for use in park revegetation programs. As a result, the Corvallis PMC has had the opportunity to collect, increase and test more than 50 native plant species, produce several hundred pounds of native grass/forb seed and



thousands of containerized stock, and investigate revegetation techniques onsite in Crater Lake and Mount Rainier National Parks. High standards of seed quality and genetic integrity are guaranteed by isolating fields for each species. Information on collection, field establishment and management, and seed production and processing techniques for grasses and forbs, propagation and containerized stock production of herbaceous and woody species, and results of tests or trials are compiled and published in annual reports and presented at professional meetings and workshops. Currently the Corvallis PMC is in its second year of a two-year cooperative agreement with Mount Rainier National Park and has recently completed negotiations in the development of two separate agreements with Crater Lake National Park for fiscal year 2001.

Since the 1960s, the Corvallis PMC has partnered with the US Forest Service in Oregon and Washington on various critical area revegetation and wildlife habitat improvement projects, including logging road and other forestland erosion control seeding trials. Most recently, from 1997-1999 with the Mt. Hood National Forest, and in 2000 with the Siuslaw and Willamette National Forests, the PMC collaborated on intensive studies to evaluate the adaptive genetic variation in broadleaf lupine (*Lupinus latifolius*) and big deervetch, respectively. The PMC determined germination protocols and conducted seedling emergence and early development studies while producing over 4000 seedlings of broadleaf lupine from 86 populations (1997) and over 6000 seedlings of big deervetch from 141 populations (2000). Using the same lupine plants, two common garden studies (sites) were also jointly evaluated by the PMC and USFS through 1999. In 2000, the USFS began the evaluation of two common garden plantings of big deervetch from stock first produced and evaluated by the PMC. Information gathered on propagation, growth, genetic variation in relation to environmental factors, and risks of seed transfer will provide both agencies and their cooperators a better opportunity to utilize these important native legumes for erosion control and ecological restoration in the Pacific Northwest.



Big deervetch

Corvallis PMC Works With Tribes

Cooperative work between the Confederated Tribes of the Warm Springs Reservation of Oregon and the Corvallis PMC continued in 2000 with the conclusion of two studies investigating the establishment and growth of hardstem bulrush (*Scirpus acutus*) at Johnson Lake on the Reservation. Bulrush or tule is an important cultural resource plant used for mat making, funeral and name giving ceremonies, lodge and floor coverings, traditional garments, and even a food source at certain times of the year. Experimental factors were two seed sources and three propagule types. Observational factors included spacing and time of planting (fall vs. summer). Container stock generally performed best, followed by rhizomes with soil, and lastly, rhizomes without soil (bareroot). Over 500 propagules were grown or processed, transplanted, and evaluated at the Lake for two years. Cattle damage forced discontinuation of the studies last summer.

Additionally, the PMC has worked with representatives of the Confederated Tribes of Grande Ronde, the Native Plant Society, and volunteers to collect seed of common camas



(*Camassia quamash*) (above) and great camas (*Camassia leichtlinii*) for evaluating germination techniques, conducting several establishment studies underway on a WRP site, and investigating seed/bulb production at the Center. After salmon, camas may have been the next most important food and trade

commodity for Tribes in the Pacific Northwest. The bulbs were baked in rock ovens and processed into camas cakes or a sweetener for other foods.

Technology Transfer at Corvallis includes PMC Field Day/Training and Technical Notes

One of the major activities of the PMC in 2000 was planning, preparing for, and conducting a field day for NRCS and SWCD employees in August. The class received an overview and tour of the PMC, then was divided up and rotated through six different training stations. The topics were seed collection/harvest; preparation of hardwood cuttings, stakes and fascines; seed processing, testing and labeling; transplanting trees and shrubs; recordkeeping/permits for collection, and field office plant materials technical assistance. Handouts for each station were written and provided and each participant received a field day binder containing over 200 pages of Plant Materials technical publications for future reference. In addition to preparing the binder, two posters and a seed sample collection were developed for the session.

Technical Notes are an important product written and distributed by the PMC. They provide the field offices and others with up-to-date literature reviews in the plant sciences, plant guides, or summaries of specific studies or projects. Three were produced in 2000:

“Producing Northwest Native Trees and Shrubs in Hardwood Cutting Blocks or Stooling Beds”. Plant Materials Technical Note No. 24 (Oregon).

“Plant Guide for Common Camas: Ethnobotany, Culture, Management, and Use. PM Technical Note No. 25. (Oregon).

“Growth Performance of ‘Mason’ and Other Select Cultivars and Wild Ecotypes of Western Redosier Dogwood Under Low Maintenance Conditions”. PM Technical Note No. 27 (Oregon).

For further information on the PM Program, staff, activities, plant guides, and other technical

products, please visit the PM website at Plant-Materials.nrcs.usda.gov.



Vine Maple Providing Natural Bank Stabilization

Prepared by Theresa R. Flessner and Dale C. Darris, Conservation Agronomists, Corvallis PMC

All photos by PMC staff except camas flower by Steve Northway, Native Plant Society of Oregon

The U. S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202)720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202)720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.