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NRCS Natural Resources Conservation Service

Corvallis Plant Materials Center
2001 Progress Report of Activities

Plant Materials Program

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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.

Corvallis Plant Materials Center

The principal program customers include:

- ✓ NRCS field offices, who in turn serve both rural and urban land owners and managers,
- ✓ Public agencies, universities, Tribes, 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.

PLANT EVALUATIONS AND RELEASE

Plants are collected and/or selected for their physical attributes, area of adaptation, potential performance, or documented capabilities 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 conservation, reclamation, or restoration purposes.

Prevarietal 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). Prevarietal releases may be "source identified", "selected", or "tested class", depending on the amount of testing and evaluation they undergo.

March 2002

Release of Two Tufted Hairgrass Natural Ecotypes (pre-varietal, selected class)

After two decades of evaluation and seed increase, the Corvallis PMC finalized the release of two native ecotypes (natural populations) of tufted hairgrass (*Deschampsia caespitosa*) in 2001. They are: Willamette Germplasm (9019737) which originated from Linn Co., OR (elev. 250 ft.), along the Calapooya River, and Tillamook Germplasm (9019731), which came from an estuary of the Miami River in Tillamook Co., OR (elev. 10 ft.). The releases are cooperative with the Oregon Agricultural Experiment Station. Tufted hairgrass is a facultative wetland plant common on poorly drained, seasonal wetlands and floodplains. Prior to European settlement, this species once dominated many similar sites throughout western Oregon.

Willamette Germplasm is suitable for riparian revegetation, shoreline erosion control, wildlife cover, herbage, and freshwater wetland plantings primarily in western Oregon (Willamette Valley) and secondarily in western Washington below an elevation of 1500 ft. Tillamook Germplasm (pictured) has similar uses, but is also suggested for planting brackish estuaries or high tidal marshes near the Coast of OR and WA. Neither is intended to replace local or onsite seed sources for restoration, if such seed or material exists. Seed of Willamette Germplasm will be commercially available in the fall of 2002, and Tillamook Germplasm in 2003. Seed is being certified through the Oregon State Seed Certification Service.

Tillamook Germplasm tufted hairgrass

Future Woody Plant Releases

Studying and releasing native shrubs are also major activities at the Corvallis PMC. Future native shrub targeted for prevarietal release within the next one to five years include an ecotype of Sitka alder (Beacon Rock Germplasm) (*Alnus viridis* spp *sinuata*) from the west end of the Columbia Gorge, two ecotypes of Pacific serviceberry (*Amelanchier alnifolia* spp *semiintegrifolia*) from western Oregon, and five ecotypes of oceanspray (*Holodiscus discolor*) which will be ecoregion specific.

Oceanspray

All three are important native shrubs for riparian revegetation and wildlife habitat in western Oregon and western Washington. Ecotypes were chosen from common garden studies comprised of 40 or more populations originating from wild seed collections made within the PMC service area during the 1980s.

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, nearly 50 new or ongoing studies and increases were conducted in 2001. Technology produced by the staff during the year included more than 13 written documents and 17 oral presentations. In terms of production, nearly 12,000 plants, close to 6000 linear feet of cuttings, and 325 pounds of seed were produced in 2001. Twenty-five NRCS field offices and 49 partners (mostly other agencies), were assisted, along with many other individuals from the general public.

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, four of these studies (Mill Creek, Dean Creek, West Fork Dairy Creek, Columbia River dredge spoils) have been established and evaluated at least annually.

Western redosier dogwood leaves and fruit in fall.

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.

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. Results from four of these trials (sites) are described below:

Site 1: Schneider Creek

The purpose of this demonstration is to evaluate the ability of eight native shrubs to perform as parallel and perpendicular fascines along a streambank. The planting is located along Schneider Creek on the Wynne Farm in Thurston County, WA. Installed March 17, 1999, in a silty clay loam on a gentle slope, trenches were back filled with non-native top soil, fencing was used in 2000, and deer repellent was applied once in 1999. No fertilizer or supplemental water has been applied.

Third year (2001) mean data are shown in Table 1. Despite substantial deer browse and grass competition, sprouting and growth after three growing seasons has been fair to excellent for all species except red elderberry (*Sambucus racemosa*) which failed to establish (1 shoot left alive). Perpendicular fascines are outperforming the parallel ones, possibly because of better moisture or soil quality. Pacific ninebark (*Physocarpus capitatus*), salmonberry (*Rubus spectabilis*), black twinberry (*Lonicera involucrata*), and redosier dogwood are roughly similar in performance.

Table 1. Schneider Creek fascines – 2001

Species	Vigor[1]	Ht. (cm)	Wth. (cm)	Stems/ Meter
Sitka willow 'Plumas'	9.0	150	150	33
Sitka willow (local)	9.0	154	147	40
Redosier dogwood	6.0	70	59	10
Douglas spirea	6.0	60	49	43
Black twinberry[2]	6.7	88	50	12
Pacific ninebark[2]	5.7	63	60	11
Salmonberry	6.5	70	58	16
Red elderberry	1.0	40	18	0.5

[1]1=lowest, 10=highest. [2]Mean of 3 plots (fascines).

As expected, growth and vigor was the highest for both Sitka willows (*Salix sitchensis*), although Douglas spirea produced more stems per meter than all other species.

Pacific ninebark (left) and black twinberry (w/ deer browse), in early 3rd growing season at Schneider Creek.

Site 2: Minnihaha Creek

At a streambank site on the Willamette National Forest (Minnihaha Creek, 2:1 side slopes, elev. 3100 ft.), fascines of nine different shrubs were installed in a droughty, cobbly sand on November 9, 1998. Each fascine was replicated twice, once on a lower tier and once on an upper tier. The lower tier was installed with coir fabric and the upper tier was fertilized at planting (14-14-14 slow release). Trenches were back filled with native soil. A single application of deer repellent was made in 1999. Supplemental water was applied only once each summer. The area was sown to blue wildrye and mulched.

After three growing seasons, mock orange (*Phildelphia lewisii*) and salmonberry are unexpectedly the best performing species (Table 2.). Their potential on coarse soils merits further evaluation. Snowberry (*Symphoricarpos albus*) is alive but in poor condition, as are single fascines of Indian plum (*Oemlaria cerasiformis*) and Pacific ninebark.

Red flowering current (*Ribes sanguineum*) failed to sprout and redosier dogwood, and Scoulers willow (*Salix scouleriana*) died by August of the second growing season. The lower tier (rep. 2) is performing slightly better than the upper tier (rep. 1). Low fertility and poor soil moisture holding capacity are probably the major limiting factors at this site, not weed competition.

Table 2. Minnihaha Creek fascines – 2001 results

Species	Vigor[1]	Ht (cm)	Deer Brws[1]	Stems/ Meter
Mock orange[2]	6.3	45	4.3	5.8
Salmonberry	6.5	42	4.0	3.5
Redosier dogwood	1.0	--	--	--
Sitka willow	4.0	58	3.0	2.8
Scouler willow	1.0	--	--	--
Pacific ninebark[3]	3.0	27	2.0	1.3
Snowberry	2.5	17	5.0	8.5
Indian plum	2.5	49	2.0	0.5
Red flwr currant	1.0	--	--	--

[1]1=lowest, 10=highest. [2]Mean of 3 plots (fascines). [3]One plot.

Site 3: Frazier Creek

The objective of this study is to evaluate salmonberry, snowberry, redosier dogwood, and Pacific ninebark as both fascines and live stakes. Live stakes of black twinberry are also being evaluated. The plots were installed along Frazier Creek (PMC, Benton Co., OR, elev. 225 ft., 42 inch precip. zone) in a clay soil on February 9 and 12, 2001. Fascines were approximately 6 inches in diameter, 5 feet long, and replicated three times. Live stakes were 2 feet long and replicated twice (5 stakes per plot). Trenches were back filled with a non-native sandy loam. Slow release fertilizer (14-14-14) was used during installation and supplemental water was applied five times. The soil has a high shrink-swell capacity. First year results (June, Oct.) are in table 3:

Table 3. Frazier Creek fascines– 2001 results

Species (Fascine data only)	Vigor[1]		Ht.(cm)		Wth.(cm)		Stems/m	
	Jun	Oct	Jn	Oc	Jn	Oc	Jn	Oc
Snowberry	8.0	5.3	42	36	31	36	37	34
Redosier dogwd	5.3	1.7	31	38	24	38	10	2
'Salmonberry	4.7	2.3	33	10	21	10	6	1
Pacific ninebark	3.3	1.0	14	--	19	--	6	--

[1]1=lowest, 10=highest. Note: live stake data not shown.

Initial performance (June) was initially fair to good for all species except ninebark. Vigor, survival, and stems/meter substantially declined by October. At the end of one growing season, snowberry fascines are performing the best:

Snowberry fascine along Frazier Creek, PMC, middle of 1st growing season.

Because of their construction, they may have had better soil/stem contact and fewer air pockets compared to the other three species. Snowberry may also root more rapidly or is more drought tolerant. Redosier dogwood fascines rank second in performance, followed by salmonberry. Both showed signs of severe drought stress by early October. Only one of three Pacific ninebark fascines produced an acceptable number of shoots (15/meter) in the spring. It may have completely died from drought by fall. While live stakes of redosier dogwood initially survived and grew the best (June), twinberry had the highest survival by October, followed by redosier dogwood, and snowberry. Soil "cracks" at the insertion points, compaction, and grass competition may have reduced survival during the dry summer.

Site 4: Boyce Creek

A fourth installation consisting of salmonberry and sikta willow fascines was made along Boyce Creek in Kitsap Co., WA, in mid-September of 2000 (elev. <100 ft). This work was accomplished by the Kitsap County, WA, Soil and Water Conservation District and local NRCS office as part of a WHIP project. The site consists of two planting areas with silt loam soils and 2.5:1 or flatter slopes. Area 1 has both parallel and perpendicular fascines and is shaded. Area 2 contains over 30 feet of fascines. Leaves were stripped prior to planting. Trenches were back filled with native soil and no fertilizer or supplemental water has been used. At least initially, results suggest that salmonberry (vigor=7.4, ht= 79cm, stems/m= 24) may perform as well or better that sitka willow (vigor=6, stems/m= 21, ht=58cm), on moist, shady banks where, unlike willows, it often thrives (see photos).

sitka willow (left) and salmonberry (right) fascines after less than 1 growing season. Note superior growth.

Ease of Rooting Select Native Shrubs From Hardwood Cuttings of Older Wood Demonstrates Their Potential for Live Stakes.

Besides most native willows (*Salix* spp.), previous work has demonstrated satisfactory application of western redosier dogwood (*Cornus sericea* var. *occidentalis*) and Douglas spirea (*Spiraea douglasii*) as live stakes for soil bioengineering and streamside revegetation. While cuttings of one year old wood are often too thin or fragile to perform as “stakes”, these species root readily from dormant sections of sturdy, older wood. If other native shrubs have similar capabilities, this would enhance their use in habitat restoration and streambank planting, while improving habitat diversity. Therefore, as a follow up to earlier studies, greenhouse rooting trials were conducted in 2001 using hardwood (dormant) cuttings taken from 1, 2 and 3 year old wood of salmonberry, black twinberry, Pacific ninebark, and common snowberry. These species were chosen for their high rooting potential. Results of the studies indicate:

- ✓ While common snowberry, black twinberry and Pacific ninebark root easily (as expected), they surprisingly do so as well or better from dormant cuttings of 3 year old wood versus younger wood. This suggests they have good potential as live stakes.
- ✓ Salmonberry roots best from dormant cuttings of one year old wood and may not do well as live stakes.
- ✓ Under typical greenhouse conditions it appears unnecessary to use bottom heat (at 75°F) for all four species. Rooting performance may actually decline.
- ✓ Wood’s Rooting Compound (a liquid mixture of two plant rooting hormones or plant growth regulators that is similar to Dip ‘N Grow) at the recommended dilution rate did not improve rooting in any of these species.
- ✓ Ninebark primarily roots from the nodes (bud locations) and along some internodes (the area between the buds), snowberry roots well from the nodes and base of the cutting, and twinberry roots primarily from the internodes and the base. Age of wood did not appear to be a factor in the location of roots.
- ✓ Salmonberry will root from all 3 positions, but internodal rooting diminishes with older wood. This may partially explain the decline in performance with age of wood.

Pacific ninebark (left) and black twinberry rooting readily from hardwood cuttings taken from 3 yr old wood.

Finally, it should be cautioned that results can very depending on stock quality, genetic or ecotype differences within each species, handling techniques, time of collection or harvest (November through early March), and experimental or site conditions.

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.

For example, in 2001 a study was initiated to evaluate the effect of several herbicide treatments on control of annual bluegrass (*Poa annua*) in tufted hairgrass, California oatgrass (*Danthonia californica*), meadow barley (*Hordeum brachyantherum*) and American sloughgrass (*Beckmannia syzigachne*). Results will be presented in 2003.

Beside these species, other native grasses were increased and their production or propagation methods evaluated in 2001. They include rice cutgrass (*Leersia oryzoides*), Pacific bluejoint (*Calamagrostis canadensis*), and tall mannagrass (*Glyceria elata*) which are wetland or marsh grasses, and Roemers fescue (*Festuca roemeri*), an upland grass. Seed of these species is made available for field scale testing on private and public lands.

In addition to 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. In 2001, a second germination study on California oatgrass and a second study with big deervetch (*Lotus crassifolius*) cooperative with the US Forest Service, were conducted.

Finally, significant amounts of time and funds have been put into obtaining and evaluating seed harvesting, cleaning and conditioning equipment. The goal is to define and perfect these methods for PMC releases in order to maximize seed quality and ease of planting.

For example, in 1999 the PMC started using a Flail-Vac seed stripper for harvesting certain native grasses. A large brush spinning at high speed strips the seed from the seed heads and deposits it in a hopper. The stripper works well for species that mature unevenly by allowing for multiple harvests of the same field. Also, the seed is immediately much cleaner (more free of stems and chaff) compared to other methods. Good examples of applicable species are meadow barley, tufted hairgrass, and the foxtails (*Alopecuris* spp.). However, the main disadvantage of this method over traditional windrowing and combining is the high percentage of seed that is lost out the front of the stripper during harvest. Furthermore, some species will not “strip” easily.

PLANT MATERIALS CENTER PARTNERS WITH NATIONAL PARK 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.

In 2001, the Corvallis PMC completed a two-year agreement with Mount Rainier National Park to produce seed and plants for revegetation purposes. The PMC produced and delivered about 1300 plants and 2000 g of field-produced seed from three grasses, three sedges, and two forbs to the Park in the fall of 2001. PMC staff and six NRCS volunteers visited the Park in September to collect seed from fifteen species. A total of 1590 g of seed were collected. The PMC also delivered a 79 lb inventory of stored seed to the Park in 2001.

Seed Collection at Mount Rainier

Two agreements were conducted with Crater Lake National Park for 2001. The PMC produced 1500 plants of eight species and delivered them to the Park in the fall of 2001 for revegetation purposes in the Vidae Falls Picnic Area. The three seed production fields at the PMC for the Mazama Dorm Project were maintained and harvested yielding 5 lbs of thick-headed sedge (*Carex pachystachya*) seed, 40 lbs of blue wildrye (*Elymus glaucus*), and 230 lbs of California brome *(Bromus carinatus*). The Park also requested that all remaining seed in storage be bulked by species and delivered to the Park; this included twenty-one species and a total of 32 lbs of seed.

Plants Delivered to Crater Lake in 2001.

CORVALLIS PMC WORKS WITH TRIBES

Cooperative work between the Confederated Tribes of the Warm Springs Reservation of Oregon and the Corvallis PMC has focused on bulrush or tule (*Scirpus acutus*). This species 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. Several experiments and demonstration plantings were conducted between 1997 and 2000. For the two largest studies (installed Oct. 1997 and July 1998), experimental factors were two seed sources and two or three propagule types. Observational factors included spacing and time of planting (fall vs. summer). Results are described below:

Lessons Learned on the Propagation and Establishment of Hardstem Bulrush (Tule) with the Confederated Tribes of the Warm Springs Reservation of Oregon.

1. Planting with live shoots extending above the water line can be important. In one demonstration trial, rhizomes planted in October without shoots failed to survive, while those with intact shoots did somewhat better (11% survival). Leave one or more good shoot intact where water levels are constant or likely to increase in the immediate future (i.e. fall).

2. A suggested minimum rhizome length is 4 inches. For the July 1998 study, survival and performance corresponded weakly if at all with rhizome caliper (width) and only slightly better with rhizome length. The number of buds (>1) and live shoots (>1) per rhizome section were poor predictors of performance. However, it is important to include at least one healthy bud (terminal or lateral "stem" bud) per rhizome, but caliper can be ignored. Also, preserving one or more live shoots may be more critical during other times (#1) or conditions.

3. If water levels and soil moisture are favorable, summer planting can work well, if not better than fall. Summer planting at Johnson Lake was far superior to fall planting (89% vs. 11% overall survival after 1 year), but expect results to vary widely from site to site and year to year.

4. If cost effective, use healthy containerized stock instead of other materials. Container grown stock (5 inch square pots) performed better than similar size rhizomes transplanted with soil intact, which in turn did better than bareroot (soil free) rhizomes. In the July 1998 planting, container stock survived an average of 22% better and spread 36% further than those from rhizomes after one year.

Leo Lucero of Warm Springs with a healhy tule transplant.

5. Genetic source (origin) can make a difference. The material originating from along the Warm Springs River outperformed those from Tule Lake in nearly all categories, regardless of stock type, method of propagation, time of planting, etc., suggesting the difference is truly genetic.

6. Propagation from seed (moist, chilled) produced more predictable, uniform, high quality stock than rhizome pieces. Always propagate tule under saturated soil conditions for fastest growth.

7. A period of 30 days cold moist stratification (chilling) of the seed in saturated peat moss at 34-37°F, followed by surface sowing on saturated media (soil), proved an excellent means of greenhouse propagation from seed.

Tule propagates easily from seed sown on the surface of saturated pots held in tubs.

8. Avoid the use of potting media with perlite or other porous, air filled amendments. Otherwise, plants inserted under water will "float" to the surface if not secured in place with landscape "staples" or by other means.

9. Planting rhizomes or container stock in water deeper than arms length or 18 inches is impractical.

10. Fall sowing on a mud flat failed completely, even though coir fabric was used to hold the seed in place. Water levels may have been too deep in spring or other factors may have contributed to the failure.

11. Even in a clay soil, rate of spread (from rhizomes) can easily average 1.5 ft per year (3 ft in diameter), suggesting that a 2 ft X 2 ft spacing can provide nearly complete coverage after one growing season.

Vigorous tule rhizome. At least one good shoot and bud (at base of stem) are required. Four inches is the suggested minimum length. Caliper is usually unimportant.

Rate of spread of tule can easily exceed 1.5 ft. per year (3 ft diameter) in clay soils.

Common and Great Camas

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*) 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. One seed/bulb increase study at the PMC and several restoration/ establishment studies at a WRP site near Corvallis, OR, continued in 2001.

TECHNOLOGY TRANSFER: TECHNICAL NOTES AND PUBLICATIONS FOR 2001

Technical Notes are a primary means by which new technology developed by the PMC is disseminated to NRCS, SWCD and other partners, as well as private cooperators. Technical reports, brochures, plant guides, and fact sheets summarizing work and plant releases are also produced. Major publications in 2001 included:

- "Tips for Planting Trees and Shrubs: Revegetation and Landscaping". Plant Materials Technical Note No. 3 (Oregon).
- "Description, Use and Establishment of Pacific Serviceberry". Plant Materials Technical Note. No. 28 (Oregon).
- "Corvallis Plant Materials Center Annual Technical Report: 2000". 203 pages.
- "Tillamook Germplasm Tufted Hairgrass". Fact Sheet.
- "Willamette Germplasm Tufted Hairgrass". Fact Sheet.
- " 'Arlington' and 'Elkton' blue wildrye". Brochure.
- "The 2000 Mount Rainier National Park Annual Report: Mather Memorial Parkway Project".
- "The 2000 Crater Lake National Park Annual Report: Mazama Dorm".

In addition to publications, presentations to groups and professional organizations included an abstract and poster paper entitled "Culture and Use of Camas in the Northwest", presented at the Society of Wetland Scientists, PNW Chapter Annual Meeting, Hood River, OR, May 2001.

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All Photos by PMC staff (Darris and Bartow)