



NRCS

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Natural Resources Conservation Service

Pullman Plant Materials Center Progress Report of Activities - 2004

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Stewardship Challenges of Washington & Oregon East of the Cascades

Basalt flows, Ice-age floods, glacial advances, and volcanic ash created the landscape and soils of Washington and Oregon east of the Cascade Mountains. Dryland winter wheat farming and irrigated farming in the Columbia Basin are large and important enterprises. Unfortunately, several hundred thousand acres of cropland go into the winter with insufficient cover to protect the soil. Winter winds strip unprotected topsoil and create dust clouds that degrade air quality for people living downwind. Melting snow erodes unprotected soil that pollutes receiving waters.

Many of the region's streams are important for salmon and steelhead trout spawning and rearing. Our riparian areas frequently lack desirable vegetation that provides shade and woody debris for fish habitat. Streambank revegetation with desirable plants is hindered by invasive plants.

Annual weeds have replaced native rangeland vegetation in many areas, and noxious weeds such as spotted knapweed are invading our forested areas. These undesirable plants greatly impede natural revegetation and threaten wildlife that depends on a healthy environment.

We have featured a few of our many studies in the *Progress Report of Activities – 2004*, and we hope they give a glimpse of our efforts at the Pullman PMC and the Washington state Plant Materials Specialist.

Objectives

In order to combat the ever-changing stewardship challenges that the region faces, the Pullman PMC is currently:

- Developing conservation buffer technologies that are appropriate for protecting the region's cropland
- Developing plant technology that are appropriate for revegetating stream banks and other natural areas
- Developing techniques to enhance stands of desirable plants



Washington and Oregon east of the Cascades lie in a rain shadow.
Annual precipitation is as low as 6" in some areas.

Riparian Plantings: Is Shading Detrimental to Root Development of Hardwood Cuttings?

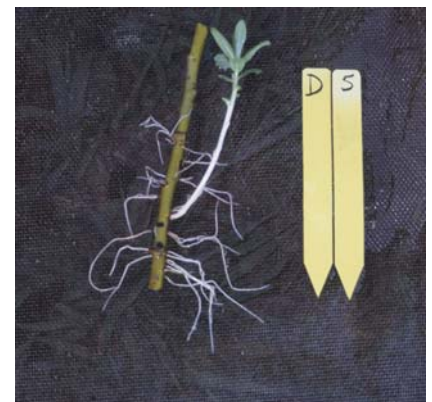
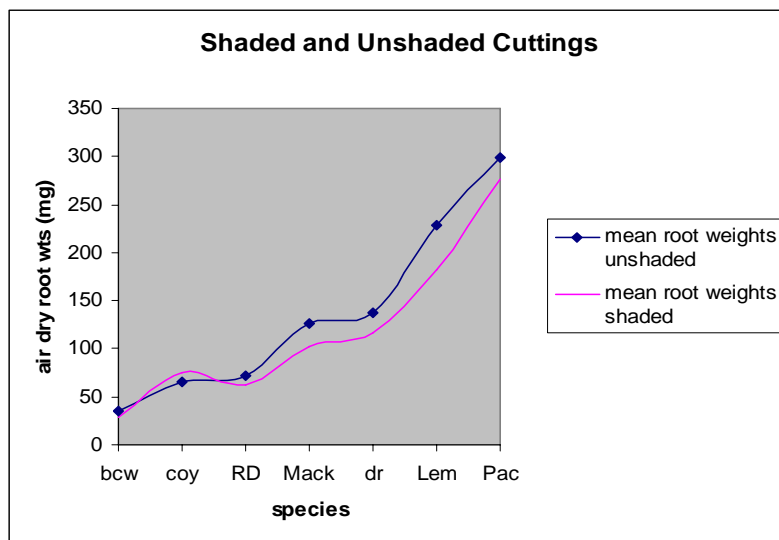
Planting hardwood cuttings is a very common technique for revegetating streambanks. There is a question as to whether hardwood cuttings develop roots as rapidly (or develop less roots) in shaded versus unshaded conditions. The PMC undertook a study to attempt to resolve the question.

Five replications of hardwood cuttings of Drummond, coyote, Lemmon's, Mackenzie and Pacific willow; black cottonwood and Redosier dogwood were planted in screened Ritzville silt loam soil in 40 cubic inch containers. Containers were buried to the tops in a raised plant bed. The planting was made on March 23, 2004 at the Pullman PMC. Half the cuttings were shaded 50% with lath while the other half were not shaded. Also, the Redosier dogwood cuttings were wounded with a 1 inch slit at the bottom of each cutting.

On May 17 the containers with cuttings were pulled from the plant bed, soil rinsed off roots, roots were placed in paper envelopes and air dried. Once dry, root weights were taken.

Conclusions: Cuttings total root weight increases ranged from 8.5 to 23% in unshaded versus shaded conditions. Gains were Lemmon's 25%, Mackenzie 23%, black cottonwood 18%, Drummond 18%, Redosier dogwood 14% and Pacific willow 9%. Coyote willow had a negative response to unshaded versus shaded conditions (-14%) consistently across all 5 replications.

Wounding of Redosier dogwood cuttings did not positively impact rooting in this study.



Drummond willow

bcw	Black cottonwood	coy	Coyote willow	RD	Redosier dogwood
Mack	Mackenzie willow	Dr	Drummond willow	Lem	Lemmon's willow
Pac	Pacific willow				

Suppression of aggressive perennial grasses along stream banks

Many years ago reed canarygrass and smooth brome were commonly planted in riparian areas to provide forage for cattle and draft animals. Most riparian areas that were pastured are no longer used for this purpose, and these grasses have grown unchecked for several decades. Trees and shrubs provide better soil protection and wildlife benefits but are unable to colonize in these aggressive grass species.

Pilot studies conducted by the Pullman PMC and others have shown that killing the grass can be a poor option for preparing a site for woody revegetation. Weeds such as thistles and mustards quickly invade the killed sod, and these weeds are just as objectionable. The Pullman PMC initiated a project to determine the feasibility of suppressing, not killing, these grasses for preparing a site for woody revegetation. Low rates of glyphosate Roundup™ (glyphosate) and Embark™ (mefluidide) were applied to smooth brome and reed canarygrass stands in the spring. Embark™ is a growth suppressant that is being used by the turf industry to reduce mowing.

Low rates of Rounduptm (10 oz/acre and 15 oz/acre) resulted in unexpectedly high levels of grass kill. Canada thistle, field bindweed, and mullein quickly colonized these plots. Embarktm effectively halted growth of the grass and weeds did not take over the plots. Moisture conditions in the upper 20 cm of soil of the check plots (no grass suppression) were lower than the Embark plots and glyphosate plots until mid-June. After mid-June, no rainfall occurred and excessive drying occurred regardless of treatment. Further study of grass suppression is slated in 2005-2007.

Buffers for the Dryland Wheat Areas

“Long-term average annual precipitation at the experiment site is 152 mm (6-inches), which we believe is the lowest for any nonirrigated wheat region in the world.” This is a quote taken from the Agronomy Journal (96:1182-1187), and it pertains to the Horse Heaven Hills of south central Washington. The Horse Heaven Hills soils are largely composed of volcanic ash that has almost no soil structure so they have a very high potential to erode. Conservationists and local producers believe buffers might be an important tool in lessening the wind erosion hazard in this arid region.

The Pullman PMC initiated several studies in 2004 to evaluate plants for buffers in the Horse Heaven Hills. The first study is evaluating the potential of weed barrier to improve growth and survival of shrubs. Caragana, Rocky Mountain Juniper, Big Sage, Gray Rabbitbrush and Fourwing Saltbush were planted. First year survival was excellent and most doubled or tripled their height.

A second study is evaluating tall grasses for adaptation to 6-inches of average annual precipitation. ‘Alkar’ tall wheatgrass, ‘Magnar’ basin wildrye, ‘Bozoisky’ Russian wildrye, and ‘Volga’ mammoth wildrye were planted along the edge of a wheat field in early spring. First year survival was excellent but time will determine if wide-row spacing will be adequate to ensure good growth of these grasses in this exceedingly dry region.

The third study is planted along Highway 221, a highway notorious for closure due to blowing dust. Conservation grasses were fall-dormant seeded in November 2004 and experimental treatments will be applied in 2005-2007. The Pullman PMC, WSU researchers, conservation district employees, and local producers are collaborating on this study that will provide information on proper management of arid-land grass buffers.



A juvenile plant of ‘Volga’ Mammoth wildrye. This drought tolerant, rhizomatous species might have potential for stabilizing cropland soils in the Horse Heaven Hills. Note the rhizome development after 8 months growth.

Living Snow Fences for Eastern Washington

Drifting snow causes accidents, closes roads, and can almost bankrupt county road departments. It is not uncommon to plow a road and have it drift closed within a few hours. Standard wood-lath snow fences are effective but installation costs may run as high as \$1000.00 per mile, and this does not include maintenance costs for replacing broken posts and other parts.

The NRCS, Lincoln County Conservation District, and the Washington Dept of Transportation installed a living snow fence along a stretch of Highway 25 that experiences snow drifting problems. Living snow fences are composed of rows of shrubs planted upwind to catch drifting snow.

Rocky Mountain Juniper that originates from genetic stock developed at the Bridger, MT PMC was selected for the job and planted in 2003. Twin paired-rows were planted along 900 feet of cropland upwind of the highway. Weed barrier was placed over the rows to control competing vegetation and hard fescue was planted between the paired rows.

One hundred percent survival was recorded in 2004 and many of the shrubs were already over 2-feet high. Additional living snow fences are slated for other locations in eastern Washington and Oregon.



Twin Paired rows of Rocky Mountain Juniper. These shrubs will be 8' tall in a few years and effectively and economically control drifting snow.

Palouse Prairie Restoration Project: Are early seral grasses beneficial for establishing late seral grasses?

The Palouse Prairie Restoration Project is in its 8th year. There are a lot of unknowns about how to restore the Prairie. For example, Palouse Prairie restoration plantings might be improved by including early seral grasses in a seed mix with late seral. Early seral grasses establish quickly, compete well with weeds, and should diminish in stand after a few years time. This should allow the slower developing late seral grasses to fill in behind the early seral grasses.

A study was established at the PMC in 1998 to compare stand development of mixes of native grasses. Two late seral grasses, 'Whitmar' beardless wheatgrass and 'Joseph' Idaho fescue, were seeded to 15 replicated plots. Most plots also included an early seral grass: blue wildrye, Sandberg bluegrass, 'Bromar' mountain brome, or prairie junegrass.

Permanent transects were established in each plot to accurately monitor plant stands. Populations of late seral species peaked three years after establishment, and the presence of early seral grasses has had no significant effect on late seral grass stands. However, our data indicate that 'Bromar' may dominate the site eventually. Head smut may have kept mountain brome in check in natural settings but the use of seed treatments seems to have increased the competitiveness and persistence of this early seral grass.



Phlox speciosa - an early flowering forb under study at the Pullman PMC.
Photo courtesy of Brother Alfred Brousseau, St. Mary's College of California

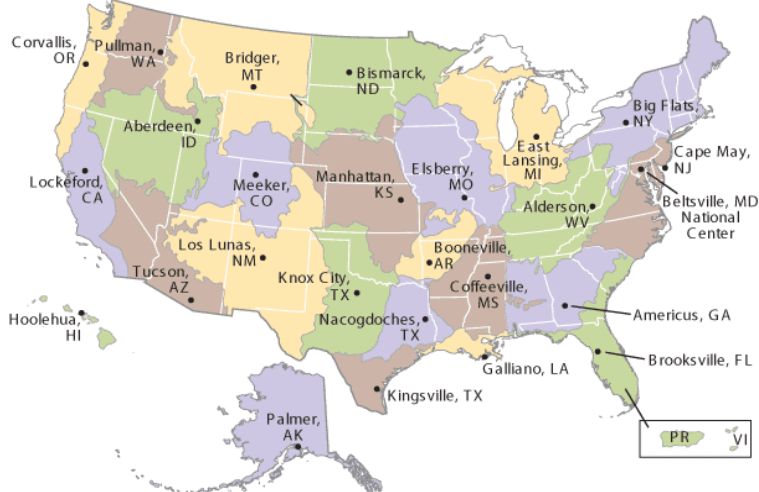
Who We Are

The Pullman Plant Material Center is one of 26 Plant Materials Centers (PMC) that are scattered across the Nation and are charged with developing cost effective vegetative solutions for soil and water conservation problems. The Pullman PMC lies in the heart of the Palouse Hills region of Eastern Washington.

To obtain seed, plants, or information on conservation uses for PMC plant releases, contact your local NRCS office or us at:

USDA – NRCS
Pullman Plant Materials Center
P.O. Box 646211
Pullman, WA 99164-6211
Phone: (509) 335-7376
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To learn more about these and other PMC activities, visit our website: <http://Plant-materials.nrcs.usda.gov>.



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