USDA NRCS United States Department of Agriculture
Natural Resources Conservation Service

Pullman Plant Materials Center
Progress Report of Activities - 2005

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P.O. Box 646211, Pullman WA 99164 Tel: 509-335-7376 Fax: 509-335-2940 E-mail: pmc_nrcs@wsunix.wsu.edu

70 Years of Finding Vegetative Solutions to Conservation Problems

Four Clydesdale horses and a team of dedicated scientists planted the first plant evaluation plots at the Pullman Plant Materials Center in 1935. Thousands of plots later, the Pullman Plant Materials Center continues to develop vegetative solutions. Stewardship challenges of the 1930's and 1940's were largely farm ground related. Plants were needed to reduce soil erosion, plants were needed to replace soil nutrients, and plants were needed to improve forage production.

Some of the early successes of the Plant Materials Center included the development of 'Bromar' Mountain brome for green manure plantings, 'Latar' orchardgrass for forage production, 'Sherman' big bluegrass for erosion control, and alternate-row seeding technology of legumes & grasses that improved stand establishment and growth.

Stewardship challenges in 2005, and for the next several years, are more environmentally related. Riparian areas need better protection, invasive species infest our rangelands and forests, and fugitive dust caused by wind erosion lowers the air quality in several communities.

We have featured a few of our many studies in the *Progress Report of Activities – 2005*, and we hope they give a glimpse of our efforts at the Pullman PMC and the Washington State Plant Materials Specialist.

A group inspection of a field planting on the Pullman Nursery Unit (Plant Materials Center), June 7, 1937.

Foreground: W.A. Rookie, Regional Conservator; and Dr. A.L. Hafenrichter, Regional Nursery Director. Standing: P.C. McGrew, Associate Regional Conservator; G.R. McDole, State Coordinator for Washington; M.M. Hoover, in charge of Grass Unit, Section of Conservation Nurseries; and E.C. Hill, State Coordinator for Oregon.

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
- Updating land managers on new plants and plant technologies that will improve their stewardship

Buffers for the Dryland Wheat Areas

Growers in central Washington and Oregon are ever aware of the issue of wind erosion. Concern about fugitive dust, closed highways due to blowing dust, weed seed movement, and the economics of adopting cropland systems that offer greater wind erosion protection are paramount. Growers reported that lifting their tillage implements out of the soil and turning outside of the field rather than in the field helped conserve residue on field borders. One erosion control practice that has created a great deal of grower interest is grass buffers because grass buffers could be used for equipment turning areas.

The Pullman Plant Materials Center seeded a 700-foot long grass buffer trial in November 2004 in the Horse Heaven Hills. The north half of the planting is comprised of a mixture of 'Nordan' crested wheatgrass, 'Sherman' big bluegrass, 'Secar' Snake river wheatgrass, and 'Schwendimar' thickspike wheatgrass. The south half is a mixture of only 'Nordan' and 'Sherman'. Two extreme-velocity wind events occurred in March and April, and as much as 2 inches of soil was lost in an adjacent area of over-tilled, bare soil! The 2-inch tall grass seedlings were "sand blasted" but survived. Stand counts were conducted periodically in 2005 and plant densities exceeded 8 plants per square foot. Future studies will evaluate the persistence of the grass covers under various levels of disturbance.

There is a general consensus that grass buffers could be improved if tall statured plants could be grown in association with the buffer. Data collected in 2005 in a nearby PMC planting indicated that shrubs, while adapted to this very low rainfall area, were a poor choice. As many as 24 tumbleweed carcasses were counted in a single fourwing saltbush plant in June 2005. Tumbleweeds (mustards and Russian thistle) grow prolifically in the area and shrubs would simply collect tumbleweed carcasses. Tall grasses did not collect tumbleweed carcasses but in order to achieve appreciable height, the grasses needed little competition.

A study has been designed to determine if twin grass rows (herbaceous wind barrier) in combination with a grass buffer strip might reduce surface wind velocities and reduce soil particle saltation. A specially designed split-wheel packer was constructed at the PMC to prepare the planting. The grass rows will be winter-dormant seeded in January 2006.

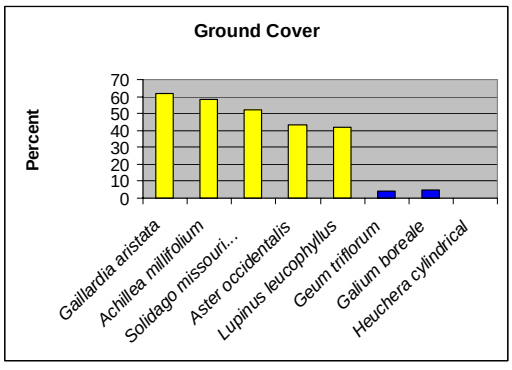
Palouse Prairie Restoration Project: The ins-and-outs of seeding native species

The Palouse Prairie Restoration Project is in its 9th year. There are a lot of unknowns about how to restore the Prairie. For example, which species are a "slam dunk" to establish from seed, which species are problematic to establish, and what environmental factors are important to establishment.

A study was established at the PMC in 2002 to evaluate stand development of 18 Palouse Prairie native species. The species include:

Achillea millifolium	*Agroseris grandiflora*	*Aster occidentalis*
Gaillardia aristata	*Galium boreale*	*Geum triflorum*
Haplopappus liatriformis	*Heuchera cylindrical*	*Helianthella uniflora*
Lomatium dissectum	*Lupinus leucophyllus*	*Penstemon confertus*
Potentilla arguta	*Potentilla gracilis*	*Sidalcea oregona*
Solidago missouriensis	*Festuca idahoensis*	*Pseudoroegneria spicata*

These species have been seeded twice each fall (early and late fall) and once each spring since 2002 and will continue to be seeded for a few more years. Five species have been easy to establish and averaged over 40 percent ground cover. The most difficult species to establish have been *Heuchera cylindrical*, *Geum triflorum*, and *Galium boreale*.



Early fall seedings have provided excellent stands if moisture arrived soon afterwards. If early fall rains did not occur, the stands were comparable to the seedings made later that fall. Spring seedings have been the more "hit-and-miss". Our observations indicate that crusting can be a problem with spring seedings.

Lactuca serriola, a winter annual and sometimes biennial weed, is the most common weed pest in the study. A satellite study is being superimposed over a portion of the seeding study to evaluate the effect of 3 herbicides on weed control and injury to the seeded species.

Geum triflorum

Photo courtesy: Dave Skinner, WAPMC

Gaillardia aristata

Photo courtesy: J.S. Peterson, NPDC

Canada Milkvetch

Canada milkvetch (*Astragalus canadensis*) was first collected on September 15, 1804 by Lewis & Clark on their outward journey. It occurs in the drier portions of the Intermountain Pacific Northwest and shows great promise for improving dryland native plantings. Currently, there is a lack of availability of native legumes for eastern Washington and eastern Oregon that receive less than 15 inches annual precipitation. An accession, 9033982, collected near Summer Lake, Oregon by Mark Keller of the Hines, Oregon Field Office has been selected for release by the Pullman PMC. It spreads slowly from rhizomatous roots, and it also germinates rapidly, which is a desirable attribute for dry areas.

Most native milkvetches contains toxic levels of alkaloids and/or nitro-toxins which affect livestock. Tissue samples of Canada milkvetch under evaluation at the Pullman PMC tested positive for the presence of the nitro-toxin, 3-NPA, therefore we are not recommending this species for livestock forage plantings.

9033982 Canada milkvetch has been placed into additional plantings for further evaluation. Mature plant size is about 27" tall by 31" canopy width. Plants on a 6-foot row spacing have yielded 147 pounds of clean seed per acre. Closer row spacing is expected to double that yield. Seeds per pound run about 300,000. For comparison, alfalfa seed is about 250,000 seeds/pound. Seed needs to be scarified before planting.

First year transplant observations of yellow sweetclover, 'Ladak' alfalfa, North Dakota Canada milkvetch selection (9069117), and the Pullman selection (9033982) indicate that 9033982 tended to have more height growth and canopy size than 9069117, but less growth in both areas than 'Ladak' alfalfa and yellow sweetclover. 9033982 flowered and produced seed in 18 of 30 plants while 9069117 only produced seed on 1 of 30 plants. The sweetclover and alfalfa had more plants flowering than either milkvetch. The Pullman selection had about double the amount of stems per plant as 9069117, but less than either sweetclover or alfalfa.

The PMC established a seed increase field of 9033982 in spring of 2005. Hopefully this will provide needed seed for larger scale seedings, beginning with 2006 harvest. Release of this plant is planned for 2007 or 2008.

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L.E.A.P.

The timber industry of north Idaho, eastern Oregon, and eastern Washington has been in existence for over one hundred years. Forest practices and equipment are constantly changing. The Cooperative Extension Service manages a program entitled LEAP (Logger Education to Advance Professionalism) to annually update the timber industry on issues such as safety, economics, tree improvement, and environment protection. The Pullman Plant Materials Center and the Idaho NRCS state forester participated at five LEAP workshops. Over 400 loggers attended the workshops in 2005.

Sediments degrade water quality and impact fish habitat.

Proper species selection and planting technique are key to stabilizing forest soils.

A major concern in logging is erosion control and post-logging vegetation management. Road building is one of the most costly practices in a logging operation. Improper road design and failure to vegetate bare ground result in massive erosion problems, weed encroachment, and road failures. Improper post-logging vegetation management can severely impact reforestation practices.

We provided them with information on which revegetation species to use, which species not to use, and how to plan & implement a planting.

Feedback after the workshop indicated that the timber industry was very concerned with suppression of invasive species such as knapweeds, and very interested in vegetative techniques to prevent sediments from entering streams.

Living Snow Fence for Anatone, Washington

On the road again. Only if travelers are able to actually get down the road. That is the premise of “Living Snow Fences,” allowing the use of a highway during winter blowing and drifting snow periods.

The NRCS and National Agroforestry Center installed a living snow fence along Washington State Route 25, north of Davenport, WA a few years ago. Because of the great success of that effort, another living snow fence was installed in Asotin County. The NRCS, Washington Department of Transportation, Washington Department of Fish and Wildlife, Blue Mountain RC&D, and most importantly, Rod Hostetler, landowner, teamed together and installed a living snow fence along Washington State Route 126 near Anatone, WA. The stretch of roadway between Field Springs State Park and the town of Anatone is notorious among WA DOT snow removal folks as a stretch of highway that needs constant attention during the winter. A piece of snow removal equipment has to be constantly on hand at this stretch of roadway during winter months to keep it open for travelers.

Mr. Hostetler prepared the 1500-feet of soil parallel to SR 126 for the planting. The Washington Department of Fish and Game installed 3 rows of weed barrier fabric on April 28, 2005. Approximately 250 oak leaved sumac, 250 Rocky Mountain juniper, and 125 ponderosa pine were hand planted the following week.

Living Snow Fence installation along Washington State Route 126 near Anatone, WA.

Initial survival of the trees and shrubs was outstanding. However "Murphy's Law" dealt an ugly hand to the planting. A large herd of hungry elk camped on the planting in 2005. They dined, sampled, nosed, and pulled up many plants. Rocky Mountain juniper was less to their liking and suffered the least impact. The sumac was heavily impacted by the elk. Efforts in 2006 will involve replacing lost plants with Rocky Mountain juniper and lodgepole pine, protecting these plants from elk (and other herbivores), and seeding the inter-row areas to a mixture of 4 perennial grasses.

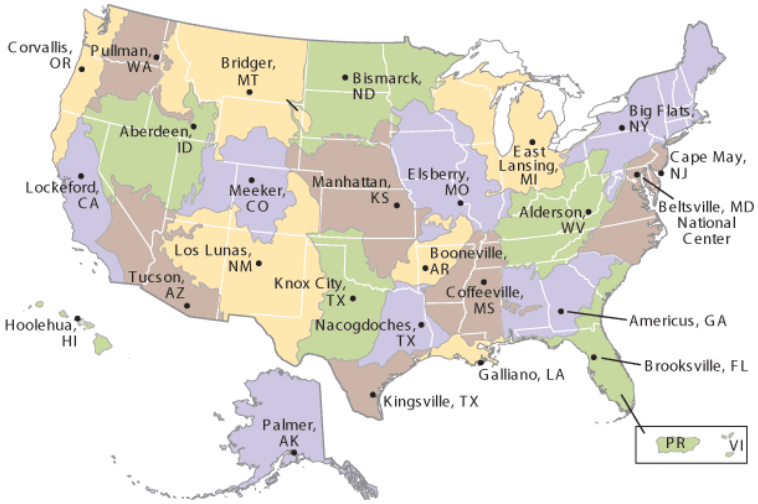
Who We Are

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

To learn more about these and other PMC activities, visit: **http://Plant-materials.nrcs.usda.gov.**
or
http://www.wsu.edu/pmc_nrcs/



Locations of 26 USDA NRCS Plant Materials Centers and their respective service areas.