
Bridger Plant Materials Center

Year 2006 Progress Report of Activities



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What is the Bridger PMC?



The USDA-NRCS Bridger Plant Materials Center (BPMC) is one of 26 Centers nationwide that use plants to solve natural resource problems. These problems include soil erosion, water quality deterioration, native habitat disturbance, mining and logging impacts, wildlife habitat loss, wetlands damage, and other conservation issues. Our work reflects the current needs of CRP, CSP, EQIP, WHIP, and other farm programs. Plant testing/selection and the development of new conservation technologies are the primary products of the program. The BPMC serves all of Montana and Wyoming.

Program Emphasis

Although the BPMC addresses many resource issues, our current program emphasis is in the following areas:

- seed production
- windbreak and shelterbelt improvement
- habitat restoration and enhancement
- native plant propagation and production
- cultural trials
- plant testing and selection
- increasing species' diversity

This document presents an overview of Year 2006 activities at the BPMC. For detailed information, contact the BPMC staff or Montana Plant Materials Specialist.

Seed Production

Seed harvest at the BPMC begins in mid-June with alpine bluegrass and continues until late December with Rocky Mountain juniper. Foundation seed is distributed through the



Montana and Wyoming Seed Certification programs, with proceeds supporting graduate research at Montana State University and the University of Wyoming. A large portion of our cooperative efforts with the National Park Service (Glacier, Yellowstone and Devils Tower Parks) and Deer Lodge Valley Conservation District (acid/heavy metal-tolerant project) involves seed production and associated research. New stand establishment, as well as seed production, was better in 2006 than the last several years, primarily because of good stand establishment in 2005 and large field size. Established seed increase fields and blocks at the Bridger PMC during 2006 are as follows:

Category	No. Accessions	Pounds
Foundation	15	6,200
Breeders/Initial Increase	15	142
YNP Reimbursable	19	506
GNP Reimbursable	11	60
Acid/Heavy-Metal Project	10	279
Total:	70	7187

Graduate Projects

Two graduate projects funded in-part through the Foundation Seed graduate account were conducted in cooperation with the BPMC in 2006.

Jessie Weiss, working with Dr. Fabian Menalled, MSU-Bozeman, is investigating the effects of pre- and post-emergence herbicides on weed control in native wildflower seed production fields. Her Masters degree program includes a field trial at the BPMC and at MSU-Bozeman's Post Farm. She also is conducting a post-emergence herbicide screening trial in a controlled greenhouse environment. The test species are fuzzytongue penstemon, prairie coneflower, silverleaf phacelia, common blanketflower, and white prairieclover. There will be 16 chemical treatments within each species.



INCORPORATING PRE-EMERGENT HERBICIDE

April Pearce, working with entomologist, Dr. Kevin O'Neill, is investigating two insects that have destroyed a stand of Antelope slender white prairieclover at the BPMC by over-wintering as larvae in the root crown. Chemical control studies will be established. The project is also examining beneficial insects/pollinators.

Windbreak and Shelterbelt Improvement

The BPMC strives to improve the performance of windbreak and shelterbelt plants in order to maximize benefits to the environment and consumers. This work includes the maintenance of seed orchards of released selections, and the continued testing of promising seed sources for

potential release. Little has changed since 2004 when final selections were made of superior families and individual trees from our bur oak seed source study. A third year of late spring frost damaged flowers and limited seed production in 2006. Bur oak is a hardy, native tree providing a long-lived, strong-wooded alternative for windbreaks and shelterbelts. Limited seed production in 2006 again delayed release another year or until an adequate seed supply is available. If a normal seed crop is produced in 2006, release of this selection is planned for 2008. Look for conservation seedlings from state and commercial nurseries.



BUR OAK-SEED ORCHARD

Evaluations continued in 2006 of two replicated studies, installed in 2005, comparing the effects of irrigation tubes and ground cover type on the survival and growth of four woody conservation species. Plants with and without irrigation tubes were planted on both fallowed and vegetated sites in order to determine the potential range of application of this new technology.



GREEN ASH - IRRIGATION TUBE

Irrigation tubes offer several water conservation benefits in semi-arid environments including reduced evaporation from the soil surface, potential encouragement of deep rooting, reduced weed invasion, and speed of supplemental watering. Differences between trees with and without tubes began to emerge in 2006.

In May 2006, 18 different species of conservation trees and shrubs were installed at the PMC to test their tolerance to varying levels of soil salinity

and sodicity. Thirty seedlings of each species were planted across a salinity gradient in order to determine the effect of soil salts on survival, height growth, vigor, and biomass production.



TREE AND SHRUB SALINITY TOLERANCE STUDY

This project is being conducted in cooperation with the Bismarck PMC, PMC, and North Dakota State Staff Forester. Results should be available within 3three to four years.

Habitat Restoration and Enhancement

Habitat restoration involves the reclamation of disturbed sites with an emphasis on increasing species' diversity and the development of plant communities to enhance wildlife habitat. Bridger PMC efforts in this arena include the following projects:

1. Restoration of Roadside Disturbances in Yellowstone and Glacier National Parks



YELLOWSTONE NATIONAL PARK RESTORATION

Since 1985, the BPMC has assisted Yellowstone and Glacier National Parks with the collection, propagation, and reestablishment of native indigenous plant materials along reconstructed roadsides. The Parks have utilized native plants to reduce soil erosion, compete with invasive plants, and improve the aesthetics on these

disturbed sites. In 2006, the BPMC cleaned 58 wildland seed collections from YNP and 113 collections from GNP. The BPMC produced 506 pounds of seed of 19 collections for YNP and 60 pounds of seed from 11 accessions were produced for GNP.



TRANSPLANTING CONTAINERIZED PLANTS FOR GLACIER NATIONAL PARK SEED PRODUCTION

In order to maximize production from several small seed lots, the BPMC frequently produces containerized stock for lining out for seed increase. In 2006, another 1,540 seedlings of bluebunch wheatgrass (*Pseudoroegneria spicata*), and large leaved avens (*Geum macrophyllum*) were grown for seed increase and then lined out in the field with a mechanical transplanter. Stand establishment was again nearly 100 percent.



LARGE LEAVED AVENS READY FOR TRANSPLANTING

2. Rangeland & Mineland Restoration--Increasing Species' Diversity

Since the BPMC was established in 1959, there has been an emphasis on the development of native plants for use on all disturbances on semi-arid grasslands and foothills of Montana and Wyoming. The BPMC continues to select native

grasses, forbs, and shrubs to add species diversity to reclamation mixes.

a. Development of Acid/Heavy Metal-Tolerant Plants Project (Deer Lodge Valley CD).

Four accessions collected at the Anaconda Smelter Superfund Site in western Montana have been released to the commercial seed market. Results from a greenhouse Comparative Evaluation Planting and Field Trials at Anaconda, Montana, provided data supporting the release of Washoe Selected Class Germplasm basin wildrye (*Leymus cinereus*), Old Works Germplasm Source-Identified Class fuzzytongue penstemon (*Penstemon eriantherus*), Prospectors Germplasm Selected Class common snowberry (*Symphoricarpos albus*) and Copperhead Germplasm Selected Class slender wheatgrass (*Elymus trachycaulus*). Opportunity Germplasm Selected Class big bluegrass (*Poa secunda*) is currently in review and scheduled for release later in 2007.

These releases and other promising accessions are being further tested at the Stucky Ridge Comparative Evaluation Planting (CEP) that was installed in May 2003 on an amended upland site near

Anaconda. The objective of the study is to release additional herbaceous plant materials that demonstrate superior performance on soils contaminated by heavy metals and to identify the best performing



seed mixtures. A second field research plot compares 19 woody indigenous and non-indigenous accessions' response to acidic and metalliferous soils at an acidic and heavy-metal contaminated site near Anaconda, Montana. Superior woody species include silver buffaloberry (*Shepherdia argentea*), Woods' rose (*Rosa woodsii*), wax currant (*Ribes cereum*), ponderosa pine (*Pinus ponderosa*), and snowberry (*Symphoricarpos* spp.). The objective

of this CEP is to identify, and subsequently release, native woody plants that demonstrate superior adaptations to low pH and metalliferous soils.

Native Plant Propagation and Production

Plant propagation research and production is an integral part of nearly every aspect of operations at the BPMC. In addition to growing plants for restoration, field testing, seed increase, and conservation applications, the BPMC develops propagation protocols for dormancy-breaking and



SEED DORMANCY-BREAKING RESEARCH

vegetative propagation of numerous native species each year. In 2006, research was conducted on seed dormancy in slender wheatgrass (*Elymus trachycaulus*) and western wheatgrass (*Pseudoroegneria spicata*). Vegetative propagation trials were conducted



ROOTED HARDWOOD CUTTINGS

with common snowberry (*Symphoricarpos albus*), western snowberry (*Symphoricarpos occidentalis*), and silverberry (*Elaeagnus commutata*), and various grape (*Vitis*) cultivars.

Cultural Trials

a. Chemical Trials

The PMC continues to test pre- and post-emergence herbicides to control broadleaf weeds in wildflower seed production fields. A field study established two areas in 2005 with seven native wildflowers to examine the effects of six chemical treatments. In 2006, mean seedling density of white prairie clover was highest in the DCPA treatment; S-metolachlor may have created favorable conditions for fuzzytongue penstemon; prairie coneflower and silverleaf phacelia densities were highest in the pendimethalin treatment; and dotted gayfeather and common blanketflower densities were highest with a treatment of prodiamine. The long-term goal is to determine application rates and develop recommendations for controlling annual weeds in forb seed production fields.



TESTING PRE-EMERGENT CHEMICALS FOR BROADLEAF WEED CONTROL IN FORBS

Plant Testing and Selection

a. Collection & Evaluation of Forbs

The annual seed collection list for Montana and Wyoming is made up of the following species: scarlet globemallow (*Sphaeralcea coccinea*), silverleaf phacelia (*Phacelia hastata*), American vetch (*Vicia americana*), Indian breadroot (*Pediomelum esculentum* and *argophyllum*), prairie thermopsis (*Thermopsis rhombifolia*), ground plum milkvetch (*Astragalus crassicaarpus*), penstemons (*Penstemon* spp.), slimflower scurfpea (*Psoraleidum tenuiflorum*), and milkvetches (*Astragalus* spp.). Every 5 years an Initial Evaluation Planting is assembled to evaluate the new collections.

The Initial Evaluation Planting established in 2004 continues to test 103 native species accessions for adaptation and performance under dryland conditions until 2008. The study contains 22 grass accessions (9 species), 19 legume accessions (7 species), and 62 forb

accessions (16 species). Weed barrier was installed between rows to reduce manual labor costs.



INITIAL EVALUATION PLANTING WITH WEED BARRIER

b. Field Evaluation Trials

An Irrigated Pasture Study with 156 sampling plots was harvested three times throughout the second growing season. There was no significant difference among the top performing grasses in a solid stand. The best forage producers include Oahe intermediate wheatgrass, Manska pubescent wheatgrass, McBeth meadow brome, and Manchar smooth brome. In the alternate-row (grass-alfalfa) plots, total biomass was much higher but not significantly different for 14 of the 18 entries. The highest amounts of alternate-row forage was produced in Oahe intermediate wheatgrass, Garrison creeping foxtail, Mix 1 (2 grasses), Mix 2 (5 grasses), and NewHy hybrid wheatgrass. The wildrye species and the warm-season grasses produced the lowest amounts of biomass.



Irrigated Pasture Trial

The Shell-Pinedale FEP in Wyoming, was evaluated for the first time on the adaptation and

performance of native species that provide food and cover for sage grouse and other wildlife. In the 288 replicated plots, the best-performing grasses were Copperhead slender wheatgrass, and Continental, Washoe, and Magnar basin wildryes, and P-24 bluebunch wheatgrass. The best performing forbs were Maple Grove prairie flax, silverleaf phacelia, Appar blue flax, Richfield Eaton's penstemon, and Old Works fuzzytongue penstemon. Wytana and Snake River Plains saltbushes, and Hatch winterfat were the top performing shrubs. Overall establishment was poor due to extreme drought. The land is owned by Shell Exploration and Production Company.



Shell-Pinedale FEP, WY

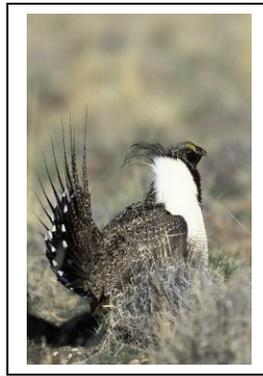
The Questar-Pinedale FEP in Wyoming, was established in October 2006. This study will evaluate the adaptation and performance of native shrub species that provide food and cover for sage grouse and other wildlife. There are 29 entries of 25 shrubs in the 116 replicated plots, and 5 broadcast-seeded treatments of bluebunch wheatgrass. The study area is located on BLM land leased by the Questar Exploration and Production Company. It site is in critical mule deer winter habitat that is presently under heavy development for oil and gas exploration.



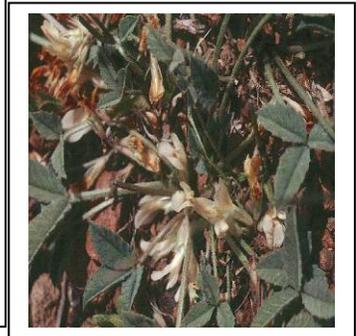
Questar-Pinedale FEP, WY

3. Wildlife Habitat Restoration and Enhancement

In cooperation with the Little Snake River Conservation District and the Bureau of Land Management, seed collections are being made of native forbs that are primary sage grouse forage species. The targeted species are hollyleaf clover (*Trifolium gymnocarpum*), false dandelion (*Agoseris glauca*), and tapertip hawksbeard (*Crepis acuminata*). Plants will be evaluated for potential seed and plant production.



GREATER SAGE GROUSE



HOLLYLEAF CLOVER

4. Low-Maintenance Landscaping

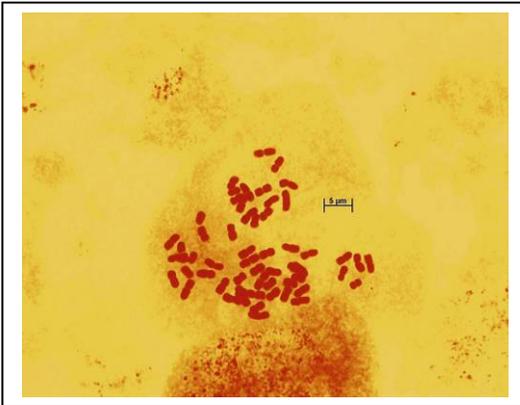
Introduced dryland forage and native reclamation grasses are finding new uses--*xeriscaping*. These hardy, drought tolerant species have lower maintenance requirements than typical turf grasses. There are 10 monoculture plots that were established in 1998 and five simple-mixture plots established in 2005. All plots were evaluated again in 2006 for growth and performance with and without mowing, as well as assessed for resilience to foot traffic. This study remains one of the most popular demonstrations at the Center. The brochure 'Creating Native Landscapes' has been reprinted several times with nearly 100,000 copies distributed.



Xeriscape Demonstration Plots

5. Culturally Significant Plants

The Sweetgrass Inter-Center Strain Trial established in 2002 was finalized after chromosome counts were conducted on the six different origins. Five *Hierochloa odorata* entries tested to be mostly octoploid $2n=56$, and the Colorado accession was an aneuploid $2n=86$. A report is expected in the near future to summarize the regional results.



Spirit Sweetgrass Chromosomes

Technology Transfer–Training, Presentations, Publications, and Technical Assistance

Technology transfer is all information that the Center provides through talks, tours, training sessions, written materials, technical assistance, and other forms of communication.

Training: On June 13-15, 2006, the BPMC conducted the first formal plant materials training



for NPS employees by hosting the “Native Plant

Propagation and Nursery Management Workshop.” A total of 30 participants from Glacier, Zion, North Cascades, Joshua Tree, Sequoia, Yellowstone, Rocky Mountain, and Lassen National Parks, as well as the Confederated Salish and Kootenai Tribes, and Salish Kootenai College attended. The three day workshop featured speakers from The Denver Service Center, Glacier National Park, the Bridger Plant Materials Center, private consultants, and Montana State University-Bozeman. Topics included restoration project planning; monitoring results, direct field seeding, Target Seedling Concept; breaking seed dormancy, managing greenhouse insects and disease; container crop fertility, asexual plant propagation, greenhouse lighting, nursery stock storage and handling, planting and maintenance. In addition, the Montana Department of Transportation conducted an afternoon tour of the massive revegetation efforts along the famous Beartooth Highway, a road that incurred extensive damage from mud and rock slides caused by heavy rains in the spring of 2005. Field demonstrations and exercises were also conducted over the course of the workshop.

Presentations: The BPMC staff made numerous presentations in 2006 including:

- ◆ *Effects of Erosion Control Blankets on Germination & Germinant Survival of Six Native Species & Potential Management Implications*, Billings, Montana
- ◆ *The Cultural and Establishment Trial of Colorado Butterfly Plant*, Helena, Montana
- ◆ *The Taming of Yellowstone’s Native Plants*, Billings, Montana
- ◆ *Ten Years of Testing Indigenous Plant Materials on Drastically Disturbed Lands in Western MT*, Ft. Collins, CO.
- ◆ Pinedale Cooperative Seeding Trials, Sheridan, WY.
- ◆ In addition, the *Conserving the Heritage of Native Plants* exhibit was displayed at:
 - Society for Range Management annual meeting, Vancouver, BC.
 - Montana Conservation Plant Conference, Helena, MT.
 - Dawson County Fair, Glendive, MT.
 - Wibaux County Fair, Wibaux, MT

Written Materials: Covering a variety of topics:

- ◆ The quarterly BPMC newsletter was published four times covering such topics as new releases and planting guides, field office seed collections

and field evaluation plantings, summary of new studies, State Conservationists Advisory Committee meeting, miscellaneous plant profiles, WACD award, and other information directed to NRCS field offices, Conservation Districts, and cooperators.

- ◆Plant Fact Sheet for western yarrow.
- ◆Plant Fact Sheet for upright prairie coneflower.
- ◆Plant Guide for western yarrow.
- ◆Bridger PMC 2004-2005 Technical Report.
- ◆Collection and Evaluation of Forage Germplasm Indigenous to Mongolia.
- ◆10th Billings land Reclamation Symposium (Abstract)--*Effects of Erosion Control Blankets on Germination & Germinant Survival of Six Native Species & Potential Management Implications.*

Technical Assistance:

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BPMC staff traveled in May and October to eastern Montana to assist the Miles City Area Office with irrigation tube study evaluations in Baker, Circle, and Bloomfield.

Outreach

The BPMC began assisting the Salish-Kootenai Native Plant Nursery with dormancy-breaking treatments of Rocky Mountain juniper (*Juniperus scopulorum*) in anticipation of helping the nursery propagate 1200 seedlings of this species for restoration of tribal lands.

- ◆Assisted Confederate Salish-Kootenai College with obtaining chromosome counts for 3 origins of sweetgrass.