Bridger Plant Materials Center

Year 2008 Progress Report of Activities

Issued April 2009

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What is the Bridger PMC?

The USDA-NRCS Bridger Plant Materials Center (BPMC) is one of 27 Centers nationwide that develop plant materials to address 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
- mineland reclamation
- 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 2008 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 (MSU) 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. Established seed increase fields and blocks at the BPMC during 2008 are as follows:

Category	No. Accessions	Pounds
Foundation	24	2,446
Breeders/Initial Increase	2	26
YNP Reimbursable	8	226
GNP Reimbursable	7	19
Acid/Heavy-Metal Project	7	33
Total	48	2,750

Graduate Projects

Two graduate projects funded in-part through the Foundation Seed graduate account were conducted in cooperation with the BPMC in 2008.

Jessie Wiese, 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. Preliminary results in a controlled greenhouse post-emergence herbicide screening trial indicate pendimethalin is the chemical all the species tolerate, while imazapic and halosufuron were the most injurious. The test species are fuzzytongue penstemon, prairie coneflower, silverleaf phacelia, common blanketflower, and white prairie clover.

MAINTAINING WILDFLOWER HERBICIDE PLOTS

April Pearce, working with MSU entomologist Dr. Kevin O'Neill, is investigating insect pests that destroyed a stand of Antelope white prairie clover at the BPMC by over-wintering as larvae in the root crown. Results of preliminary studies on the root-feeding moth will be used to help manage the pest. Additional conclusions show the BPMC harbors a diverse population of native bees that provide pollination services as well as solitary wasps that play beneficial roles in the local ecosystem.

HONEYBEE POLLINATING PRAIRIE CLOVER

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. In 2004 final selections were made of superior families and individual trees from our bur oak seed source study. Adequate seed production for release began occurring in 2007, with a planned release of Ekalaka Germplasm bur oak scheduled for 2009. Bur oak is a hardy, native tree providing a long-lived, strong-wooded alternative for windbreaks and shelterbelts. Look for conservation seedlings from state and commercial nurseries beginning in 2010.

SELECTED BUR OAK TREE

Evaluations continued in 2008 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 fallowed and vegetated sites in order to determine the potential range of application of this new technology. 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.

SUB-IRRIGATION TUBE STUDY

Dramatic differences in growth occurred between the fallow and vegetated sites. Green ash trees with tubes on the fallow site grew taller and had better vigor than trees without tubes. Look for a technical note summarizing these results on the Montana NRCS and National Plant Materials web sites in 2009.

In May 2006, 18 different species of conservation trees and shrubs were installed at the BPMC to test their tolerance to varying levels of soil salinity and sodicity. 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 Montana Conservation Seedling Nursery, the Bismarck PMC, North Dakota Plant Materials Specialist, and North Dakota State Staff Forester. Results will be available in 2010.

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:

1. Restoration of Disturbances in National Parks

Since 1985, the BPMC has assisted Yellowstone (YNP) and Glacier (GNP) 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.

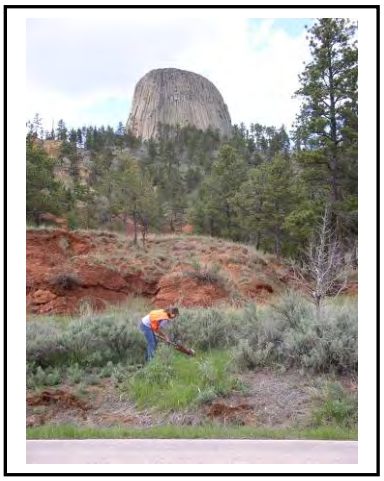
GNP ASTER SEED PRODUCTION

In 2008, the BPMC became involved in a new YNP project aimed at improving critical wildlife

COLLECTING NATIVE SEED NEAR
YNP NORTHERN BOUNDARY

habitat by revegetating disturbed land near the Northern Boundary. In addition to seed increase at the Center, a study will be installed in the Park to evaluate the effectiveness of different weed control methods and seeding techniques.

In addition to seed production, the BPMC occasionally grows plants and even assists Park



PLANTING NATIVE SPECIES AT DEVILS TOWER

staff by demonstrating proper handling and installation techniques. In 2008, seedlings of silver sage, rubber rabbitbrush, and western wheatgrass were grown for Devils Tower National Monument and installed with Park staff in order to restore an area damaged by erosion.

2. Rangeland and 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.

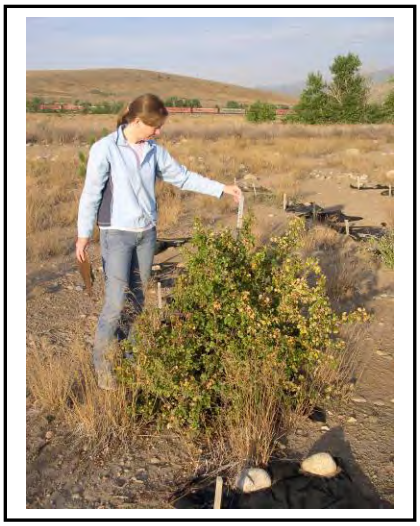
a. <u>Development of Acid Tolerant Releases Project (DATR), Deer Lodge Valley CD.</u>

Five 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, Old Works Germplasm Source-Identified Class fuzzytongue penstemon, Prospectors Germplasm Selected Class common snowberry, Copperhead Germplasm Selected Class slender wheatgrass, and Opportunity Germplasm Selected Class Nevada bluegrass. Opportunity Germplasm Selected Class Nevada bluegrass is the most recent Development of Acid-Tolerant Releases selection (2007) and continues to perform exceptionally well in field evaluations.

Releases and promising accessions are being further tested at the Stucky Ridge Comparative

OPPORTUNITY GERMPLASM NEVADA BLUEGRASS

Evaluation Planting (CEP) installed in May 2003 on a lime-amended upland site near Anaconda, Montana. The objective of the study is to release additional 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 the response of 19 indigenous and non-indigenous woody accessions to low pH and metalliferous soils at another acidic and heavy-metal contaminated



EVALUATING THE MILL CREEK WOODY CEP

site near Anaconda. Superior woody species include silver buffaloberry, Woods' rose, wax

currant, ponderosa pine, and snowberry. The objective

of this CEP is to identify, and subsequently release, native woody plants that demonstrate superior performance on acidic and metalliferous soils.

As plants are released to commercial seed/plant producers, they will then be available to reclamationists for the seeding and planting of not only mineland sites, but other areas that resemble the climatic conditions of the Rocky Mountain foothills. The BPMC represents a necessary and integral part of the seed-source production for these valuable conservation plant materials.

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

OAK SEED PRODUCTON AND VIABILITY RESEARCH

and vegetative propagation of numerous native species each year. In 2008, research was conducted on production and viability of bur oak seed by family and individual tree. Data from this research will help the Plant Materials program predict the amount and quality of seed production, the number of orchard trees required to produce target amounts of Foundation seed, and at what age seed production becomes dependable.

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 with six native wildflowers examines the effects of seven chemical treatments. Preliminary results in 2008 indicate broadleaf weeds were best controlled with S-metolachlor in the blanketflower, fuzzytongue penstemon, and prairie coneflower. Broadleaf weeds were best controlled with linuron in dotted gayfeather. Imazapic best controlled broadleaf weeds in white prairie clover. The long-term goal is to determine application rates and develop recommendations for controlling annual weeds in forb seed production fields.

TESTING POST-EMERGENT HERBICIDES FOR BROADLEAF WEED CONTROL IN FORBS

An irrigated weed control trial in winterfat began in 2008 using three herbicides at various rates to control broadleaf and grassy weeds. Data were taken regarding winterfat herbicide injury and percentage of weed control. The trial will continue for the next three years.

Plant Testing and Selection

a. Collection and Evaluation of Forbs

Field office seed collections are the fundamental backbone of the plant materials program and the driving force behind all conservation germplasm released to the commercial seed industry. In 2008, Montana field staff contributed 16 collections from ten counties with a combined weight of 1.2 pounds. Wyoming field staff contributed 13 collections from 3 counties with a combined weight of more than five pounds. Every 5 years an Initial Evaluation Planting (IEP) is assembled to evaluate performance of the new collections.

Testing was concluded, in the IEP established in 2004, of 22 grass (nine species), 19 legume (seven species), and 62 forbs (16 species). Top performing grasses included ‘Rodan’, ‘Rosana’, ‘Whitmar’, ‘Secar’, and Canada wildrye. The best forbs were several entries of silverleaf

phacelia, a sawsepal penstemon, and prairie thermopsis. Several accessions moved to the next phase for advanced evaluation.

Two new dormant-seeded plantings were installed: an IEP with 44 entries of 11 native legume species and 35 entries of 19 native wildflower species; and 44 entries in a CEP of scarlet globemallow.

NEW EVALUATION PLANTINGS

b. Field Evaluation Plantings (FEP)

The Shell-Pinedale FEP in Wyoming was evaluated for the third year for establishment of native species that provide food and cover for sage grouse and other wildlife. In the 288 replicated plots, grasses with the greatest biomass production were L-46, Washoe and 'Trailhead' basin wildryes, and 'Critana' thickspike wheatgrass. Forb densities were greatest in 'Appar' blue flax, Richfield Selection of Eaton's penstemon, and Old Works fuzzytongue penstemon. Densities of 'Wytana' and Snake River Plains fourwing saltbush and Gardner's saltbush were greater than other shrubs.

SHELL FEP REPLICATED PLOT EVALUATION

Establishment of the broadcast-seeded Shell and Bridger mixtures were 140,923 and 78,309 plants/ha, respectively. Establishment of the drill-seeded Bridger and Shell mixtures were 45,865 and 34,706 plants/ha, respectively. The Shell mixture hydro-seeding was unsuccessful. Short-term results provide recommendations for native plant restoration. Relatively low establishment of forbs and shrubs indicate more work is needed to develop these plant materials and technologies.

SHELL FEP MIXTURE PLOT EVALUATION

A biofuel ICEP composed of four tall wheatgrass varieties was planted in the spring of 2008 using three American accessions and one accession from Hungary. The 16 plots will be measured for forage production from two annual harvests.

TALL WHEATGRASS ICEP

3. Wildlife Habitat Restoration and Enhancement

In cooperation with the Wyoming Bureau of Land Management, seed collections are being made of native forbs that are primary sage grouse forage species. Recent collections were included in the new IEP and will be evaluated for potential seed and plant production.

GREATER SAGE GROUSE

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. The greatest basal cover in the warm-season grasses occurred with Bad River bluegrama and Bismarck buffalograss; and in the cool-season species with 'Covar' sheep fescue and Rosana western wheatgrass. The best performers in the mixture plots were Bad River bluegrama combined with either 'Covar' sheep fescue or 'Cody' buffalograss. This study remains one of the most popular demonstrations at the Center. The brochure *Creating Native Landscapes* has been reprinted several times with more than 100,000 copies distributed.

XERISCAPE DEMONSTRATION PLOTS

5. Culturally Significant Plants

The PMC continues to provide technical assistance on the culture and propagation of sweetgrass. It maintains vegetative material of Spirit Germplasm for distribution to commercial nurseries through the MSU Foundation Seed Program in Bozeman. It has been distributed to researchers, growers, and American Indian Reservations across the western United States and Canada.

SPIRIT SWEETGRASS

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: For a second consecutive year, the BPMC offered a 1-day tree care workshop titled *Pruning Native Trees and Shrubs for Plant Health.* The two-part training offered classroom instruction in the morning followed by hands-on pruning in the afternoon. A mature stand of apple trees at the BPMC was thinned by participants with the goal of improving tree structure and enhancing fruit production.

Presentations: The BPMC staff made numerous presentations in 2008 including:

♦*Development of Acid/Heavy Metal Tolerant Releases* – Butte, Montana.
♦*Plant Selection and Release for the Anaconda Superfund Site* – Butte and Missoula, Montana.
♦*Tree and Shrub Salinity Research* – Missoula, Montana.
♦*Tree and Shrub Selection and Establishment for Anaconda, Montana* – Butte, Montana.
♦*Bridger PMC Tree and Shrub Establishment Research* – Bozeman, Montana.
♦*Trees and Shrubs for Salt-Affected Soils* – Cody, Wyoming.
♦*Selecting and Establishing Trees and Shrubs for Xeriscapes* – Worland, Wyoming.
♦*Evaluating Seeding Techniques and Native Plant Establishment in Restoration of the Pinedale Anticline* - Fort Collins, Colorado.

♦*Plant Materials in the Greater Yellowstone and Beyond* – Red Lodge, Montana.
♦*Revegetating Disturbance in the Pinedale Anticline* – Missoula, Montana.
♦*Noah's Ark in the Belly of the Jonah* – Butte, Montana.
♦*Ecological Approach to Plant Materials in the Northern Rocky Mountains* – Missoula, Montana.

Written Materials: These cover 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.

♦Native Plants Journal--*The Effects of Five Pre-Emergent Herbicides on Four Native Wildflowers.*
♦18th High Altitude Revegetation Workshop (Manuscript)--*Evaluating Seeding Techniques and Native Plant Establishment in Restoration of the Pinedale Anticline.*
♦Barnyards and Backyards--*Native Grasses Play an Important Role in Wyoming Agriculture*.
♦*Notice of Release of 'Continental' Basin Wildrye.*
♦Native Plants Journal--*Release Notice of Opportunity Germplasm Nevada Bluegrass.*
♦MSU-Bozeman--*Wildflower Seed Production* (poster).
♦Bridger PMC 2006-2007 Technical Report.

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

Outreach

The BPMC continued Outreach efforts in 2008, working with MSU and Montana NRCS Public Affairs to develop a film about the Montana Plant Materials Program with an emphasis on the DATR Project. Copies of the DVD titled, *Cultivating Conservation with the Bridger Plant Materials Center* is available through the Montana NRCS State Office in Bozeman.

BPMC staff continued outreach to school-aged children in 2008, giving presentations to the local elementary and junior high school on the experimental process, assisting with science fair judging, and giving presentations at the After-School Enrichment Program on seed cleaning and propagation.

STUDENTS FROM BRIDGER SCHOOLS

In 2008, the BPMC also hosted a tour of the Center for about 20 Vocational Agriculture students from the Bridger and Harlowton High Schools. The students learned about the Plant Materials program, the focus of the BPMC, and potential career opportunities in agriculture.

The BPMC cooperated with Teresa Cohn, graduate student at the MSU Big Sky Institute, to educate elementary students at Fort Washakie on the Wind River Indian Reservation in Wyoming. The project's primary focus was to teach native language, with a secondary goal to promote the knowledge and use of culturally significant plants. The BPMC provided the expertise and materials for growing sweetgrass in the school's greenhouse. The Little Big Horn College near the Crow Indian Reservation in Montana was advised on the proper function and maintenance of a greenhouse. They received sweetgrass propagules to grow as a local source for tribal and other community members.

In 2008, the BPMC offered a field day complete with presentations, tours, and a barbecue for landowners and cooperators. The event was very well attended (more than 115 attendees) and received, being described by many as "informative" and "extremely valuable." The BPMC hopes to offer a field day every other year so that the conservation community, and especially Conservation Districts, can stay abreast of BPMC activities and accomplishments.