Bridger Plant Materials Center

Year 2012 Progress Report of Activities

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What is the Bridger Plant Materials Center?

The Natural Resources Conservation Service (NRCS) Bridger Plant Materials Center (BPMC) is one of 27 Centers nationwide using 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 numerous Farm Bill programs. The development of new conservation technologies, training, plant testing and selection, and Foundation seed production are the primary products of the program. The BPMC serves Montana and Wyoming.

Program Emphasis

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

- soil health
- woody plant selection and establishment
- pollinator- and wildlife-friendly plantings
- native habitat restoration and enhancement
- critical area re-vegetation
- plant cultural trials
- plant testing and selection
- training and outreach

This document presents an overview of Year 2012 activities at the BPMC. For detailed information, contact the BPMC staff or Montana-Wyoming Plant Materials Specialist.

Soil Health

Furrow irrigated, cool and warm season cover crop trials were established at the BPMC in 2012. Individual species, as well as mixes, were compared. Included were radish (3), turnip, pea (2), vetch (2), cowpea, canola, flax, sweet clover, white clover, soybean, safflower, sunflower, oriental mustard, yellow mustard, corn, lentils, barley, winter wheat, sorghum x sudangrass, Siberian millet, and proso millet. Soil analyses for nitrogen, phosphorus, potassium, and microbial activity, were conducted before planting to establish a baseline. The top yielding forage mix was composed of radish, turnip, vetch, sweet clover and barley in the cool season trial. Of the

A WARM SEASON COVER CROP MIX

warm season trials, the mix of radish, turnip, soybean, vetch, sunflower, safflower and sorghum x sudangrass was the top performer. The trial area will be planted to hay barley in 2013 to determine if individual plots affect subsequent forage yield. One important observation was the absence of earthworms in the soil before the trial was planted, in contrast to the large population increase after the trial was

terminated in mid-August. Research in 2013 will focus on cover crop mixes and crop rotations that will function well between rotations of Foundation seed crops.

Woody Plant Selection and Establishment

The BPMC strives to improve the performance of woody plants used in conservation practices in order to maximize benefits to the environment and consumers. This work includes the maintenance of seed orchards of released selections, the continued testing of promising seed sources for potential release, and the testing of novel establishment techniques.

The plains cottonwood deep pot study installed in 2011 at the ARS Livestock and Range Research Laboratory at Fort Keogh in Miles City, Montana, was again evaluated in 2012. The study aims to

PLAINS COTTONWOOD DEEP POT STUDY AT FORT KEOGH

determine if long narrow seedling containers effect the early survival and establishment of this species. Second year results continue to demonstrate a positive survival and growth response with increasing pot depth. A second cottonwood deep pot study was installed at the BPMC in 2012 on a dryland site. Additionally, a

PLAINS COTTONWOOD TEST PLOT AT BRIDGER

deep pot study investigating the effect of rooting depth on early plant height growth of bur oak was also installed at the BPMC in 2012.

BUR OAK DEEP POT SEEDLING FOR BRIDGER STUDY

Pollinator- and Wildlife-Friendly Plantings

In cooperation with the Wyoming Bureau of Land Management, seed collections were made of native wildflowers that are critical sources of food and cover for sage grouse. The objective of the study was to evaluate performance for potential habitat enhancement in re-vegetating disturbed environments. There were 34 entries of 16

species evaluated over a period of 4 years. The best performers were prairie thermopsis, larchleaf penstemon, and tanseyleaf tansyaster.

COOPERATING PARTNERS DISCUSS PLANT PERFORMANCE

In 2012, the BPMC seeded pollinator-friendly demonstration plantings in May and November. The spring planting established well and was visited by a wide variety of native and non-native pollinating insects. Antelope white prairie clover and Maple Grove prairie flax consistently attracted the most pollinators. Several species in the fall planting require a cold chill to break seed dormancy. The native wildflowers and grasses will be evaluated next summer on their ease of establishment and ability to attract insects.

WILDFLOWERS FOR POLLINATOR HABITAT

Native 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:

Since 1985, the BPMC has assisted the National Park Service with the collection, propagation, and re-establishment of native indigenous plant materials along re-constructed roadsides. The Parks have utilized native plants to reduce soil erosion, compete with invasive plants, and improve the aesthetics on these disturbed sites. What began with a single cooperative effort with Yellowstone National Park has expanded to include projects with Glacier, Devils Tower, Craters of the Moon, and Grand Teton National Parks.

SEED PRODUCTION FOR GLACIER NATIONAL PARK

In 2008, the BPMC became involved in a new Yellowstone National Park project aimed at improving critical wildlife habitat by re-vegetating disturbed land near the Northern Boundary. In addition to seed increase at the Center, two study

EVALUATING SLENDER WHEATGRASS AT CINNABAR

sites near Gardiner, Montana, were evaluated to examine the effects of seed coating treatments on the establishment of eight native grasses. Grass establishment was very low in the treated and non-treated plots due to extremely hot, dry weather conditions. The best performers were slender and bluebunch wheatgrass, and needle and thread.

A new cooperative agreement was established in 2010 with Craters of the Moon National Monument. Containers of rubber rabbitbrush, limber pine, antelope bitterbrush, and mountain big sagebrush were delivered in mid May. The BPMC continues to process wildland seed collections for use in various restoration projects within park boundaries.

NATIVE PLANT PROPAGATION FOR CRATERS OF THE MOON NATIONAL MONUMENT

For the first time in 2011, the BPMC began working with Grand Teton National Park to propagate four native species for use in various restoration projects within the park.

Critical Area Re-vegetation

A. Anaconda (DATR) Project

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. Since 1995, the BPMC has been partnering with the Deer Lodge Valley Conservation District and the State of Montana to collect, test, increase, and release plant materials adapted to the acid and heavy metal contamination resulting from historic smelting operations in the Anaconda and Butte areas. To date, six accessions collected at the

OLD WORKS FUZZYTONGUE PENSTEMON, SILVERLEAF PHACELIA, AND OPPORTUNITY GERMPLASM NEVADA BLUEGRASS (FRONT TO BACK)

Anaconda Smelter Superfund Site in western Montana have been released to the commercial seed market. Selections include Washoe Germplasm basin wildrye, Old Works Germplasm fuzzytongue penstemon, Prospectors Germplasm common snowberry, Copperhead Germplasm slender wheatgrass, Opportunity Germplasm Nevada bluegrass, and Mill Creek Germplasm silver buffaloberry.

Additional promising accessions are still being tested and increased, and include silverleaf phacelia, Woods' rose, and horizontal juniper.

As plants are released to commercial seed/plant producers, they will then be available to reclamationists for the seeding and planting of mined land sites in the Anaconda-Butte area, as well as other types of disturbances in locations with climatic conditions similar to the Rocky Mountain foothills. The BPMC represents a necessary and integral part of the seed-source production of these valuable conservation plant materials.

B. Re-vegetation After Russian Olive Removal

Installation of a post Russian olive removal study was completed in 2012 at the Fort Keogh Livestock and Range Research Laboratory in Miles City, Montana. This ARS, Miles City Area Office, and Custer County Conservation District collaborative effort investigates strategies to establish both herbaceous and woody cover after

Russian olive removal. In 2012, hundreds of tree and shrub seedlings were planted and nearly five acres of test plots seeded with grasses and forbs.

STUDY INSTALLATION AT FORT KEOGH ALONG THE YELLOWSTONE RIVER AFTER CLEARING RUSSIAN OLIVE

Plant Cultural Trials

How to grow, culture, and establish plants 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

INDIAN RICEGRASS SEED GERMINATING IN THE GREENHOUSE

propagation protocols for seed dormancy-breaking and vegetative propagation of numerous native species each year.

A. Indian Ricegrass Study

Irregular stand establishment problems with 'Rimrock' Indian ricegrass fields resulted in the initiation of seed dormancy-breaking trials in 2011 in order to identify the optimum amount of moist:chilling required, and to determine if scarification actually increases germination. Results in 2012 indicate a combination of light seed coat scarification and 189 or more days of moist:chilling maximized germination of 'Rimrock' Indian ricegrass.

B. Conservation Effects Assessment Project/ (CEAP)

The BPMC is participating in a project being conducted in the western region of the United States. The project measures and quantifies plant growth parameters collected at eight PMCs for input into the Agricultural Research Service's Agricultural Land Management Alternative with Numerical Assessment Criteria (ALMANAC) computer model. The model will predict the effects of conservation practices applied through Farm Bill programs. In 2012, the BPMC used a Decagon ceptometer to sample the amount of light penetrating a plant canopy, and harvested biomass to determine leaf area index and forage quality. Evaluations were conducted every two weeks throughout the growing season on Antelope Germplasm white prairie clover, Meriwether Germplasm blanketflower, and Stillwater Germplasm upright prairie coneflower. Preliminary results indicate the three wildflower species produce an adequate number of leaves that are moderately efficient at intercepting light and protecting soil and water resources.

CEPTOMETER SAMPLING IN MERIWETHER BLANKETFLOWER

C. Grass and Legume Salinity Tolerance Study

This project was initiated by a request from the Montana Salinity Control Association to assist them and NRCS Field Offices in the prevention and reclamation of saline seeps. In the fall of 2011, four alfalfa varieties and four grass varieties were strip-planted at the BPMC on a salt-affected site with a natural salinity gradient site. Data will be collected for three years on seedling vigor, plant vigor, and forage yield, and then correlated with soil salinity level.

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 2011, Montana field staff contributed 20 forb, nine grass, and five tree collections. Wyoming field staff contributed 22 forb and four grass collections. Every five years an Initial Evaluation Planting (IEP) is assembled to evaluate performance of the new collections.

The current IEP was installed November 2008. In 2012, there were nearly 200 phenological observations recorded on the 100 wildflower plots. Several of the entries show potential for re-vegetating disturbed environments and enhancing wildlife habitat, including prairie thermopsis, American vetch, oneflower sunflower, narrowleaf milkvetch, and waxleaf penstemon.

HAND WEEDING WILDFLOWER EVALUATION PLOTS

B. Off-Center Field Plantings (FP)

Off-center FPs test plant materials and technology developed at the BPMC throughout our service area of Montana and Wyoming. In 2012, our program had 63 active field plantings with cooperators in both states. Six of these plantings are replicated studies. The Rim Country replicated planting tests the effects of three herbicide treatments on the establishment of a native seed mix on a cheatgrass dominated rangeland with the goal of increasing native plant diversity and improving wildlife habitat. Half of the plots were established in 2011. The Bales replicated planting established in 2011 tests four seed-bed preparation treatments on the establishment and production of winterfat or forage kochia with the goal of improving winter forage quality. This planting also addresses the cheatgrass resource concern. The Bales planting design was used for two plantings established in 2012 in crested wheatgrass to improve diversity with potential application to CRP renovation. The Riverton, Wyoming planting tests seeding method and irrigation management on the establishment of a native mix on three soil types and in two precipitation zones. The objective is to maintain wildlife habitat in areas of intensive gas exploration and extraction.

C. Off-Center Field Evaluation Plantings (FEP)

The third production year of four grass forage variety trials were harvested in 2012 at the Montana State University (MSU) Havre and Moccasin Experiment Stations. The studies are grown under both dryland and irrigated conditions. Both the Havre and Moccasin areas received normal amounts of precipitation this last spring, which made forage yields more in line with county averages. All the trials are harvested once in June, but only the irrigated trial at Havre produced enough re-growth to harvest after a killing frost in the fall. The second harvest simulates a crop livestock could harvest by grazing the re-growth. The dryland and alternate-row grass/alfalfa trials that were dormant planted at the University of Wyoming's Sheridan Research and Extension Center did not receive enough moisture to establish. The trial will be replanted in the early spring of 2013. Thirty-two grass accessions are in the dryland trials, 17 in the irrigated trials, and 12 in the alternate-row trials. Results will assist NRCS Field Office

FORAGE HARVEST AT THE HAVRE DRYLAND TRIAL, 2011

personnel, farmers and ranchers, and private reclamationists in choosing grass species for their conservation needs and improved pastures.

Training and Outreach

Demand for plant materials training for field staff, as well as the public, continues to increase each year. In March 2012, BPMC staff and the Plant Materials Specialist travelled to the Great Falls area to provide training on a variety of subjects including creating pollinator habitat, developing seed mixes, and planting trees and shrubs.

PLANT MATERIALS TRAINING IN GREAT FALLS

On June 12, the Xerces Society and Montana NRCS partnered to hold a pollinator workshop at the BPMC attended by over 45 field staff, university, agency, and public participants.

XERCES SOCIETY TRAINEES IN A FIELD OF MERIWETHER GERMPLASM BLANKETFLOWER

From May 21 through 23, the BPMC hosted staff training for the Bozeman Area Office covering plant materials topics such as plant identification, developing a seed mix, reading seed tags, re-vegetation of salt-affected and Russian olive sites, drill calibration, pollinator plantings, weeds and herbicides, farming equipment, and more.

PLANT MATERIALS TRAINING SESSION AT BRIDGER

On July 25, David Lamm, National Soil Health and Sustainability Team Leader, Greensboro, North Carolina; Henry Ferguson, Soil Data Quality Specialist, Lincoln, Nebraska; and Montana NRCS staff led 30 NRCS employees through various soil health building exercises. Cover crop research plots were inspected, individual species rooting depths in the soil observed, a rainfall simulator demonstrated, and soil test kits used to evaluate water infiltration, soil bulk density, and other soil quality characteristics.

NRCS INSTRUCTORS DEMONSTRATE THE RAINFALL SIMULATOR

Training was given on post-fire re-vegetation on December 2 at the Recovery After Wildfire Symposium sponsored by the Northern Great Plains Section of the Society of Range Management and Agricultural Research Service (ARS). More than 75 participants from natural resource management agencies and the public attended the session.

BURNED FOREST ON CUSTER NATIONAL FOREST, 2012

Connecting with traditionally underserved groups has always been part of the BPMC program. We have a long history of working with local school systems, small farm operations, and Native American tribes. In 2012, we continued this tradition by participating in the regional Career fair in Billings, local Science Fair contest (advising), judging FFA and 4-H agricultural projects, and hosting a water-wise garden planting with the local elementary school.

In 2011, a collaborative project was initiated between Chief Plenty Coups State Park, the Hardin Field Office, the Crow Indian tribe, and the

A FEW OF THE COTTONWOOD PROJECT MEMBERS

BPMC. The project finished in 2012, with the delivery and planting of 140 cottonwood trees at several sites on tribal land. The cottonwoods were propagated from cuttings taken from trees planted by the famous Chief Plenty Coups at his homestead and state park outside Pryor, Montana. The BPMC also provided sprigs of Spirit sweetgrass to the Park.

On May 15, a third grade class from the Bridger Elementary School spent the day at the Center learning about plant materials, pollinator-friendly plantings, and water conservation. The kids toured the Center and installed a water-wise garden in front of the office.

BRIDGER ELEMENTARY SCHOOL THIRD GRADE CLASS AT THE BRIDGER PLANT MATERIALS CENTER

WATER-WISE GARDEN PLANTED BY BRIDGER ELEMENTARY SCHOOL THIRD GRADE CLASS AT THE BRIDGER PLANT MATERIALS CENTER

A local Bridger Elementary School student, under the guidance and assistance of BPMC staff, built her own seed separator as a science fair experiment to test if air can be used to separator good seed from empty seed and chaff.

SCIENCE FAIR SEED SEPARATION EXPERIMENT AT THE BRIDGER PLANT MATERIALS CENTER IN 2012

2012 was the third year of production of 'YouTube' videos of conservation plants and technologies developed by the BPMC. The videos are intended as a quick reference for field office personnel when developing conservation plans, and to show producers how various plant materials and technologies can help their operations. The videos are intentionally brief, about a minute or less long. You can find and view them on our web site; http://www.mt.nrcs.usda.gov/technical/ecs/plants/bridgerpmctv.html

Seed Production

Maintaining Foundation seed for use by commercial seed growers to establish fields of certified seed for retail is a large part of every PMC program, and is especially true for the BPMC since we maintain 31 releases. Potential future releases include silverleaf phacelia and Wood's rose. The seed harvest season at the BPMC extends from mid-June with alpine bluegrass until late December with Rocky Mountain juniper. Foundation seed is distributed through the Montana and Wyoming Seed

HARVESTING A FOUNDATION SEED PRODUCTION FIELD

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, Bureau of Land Management (BLM) and Deer Lodge Valley Conservation District (acid/heavy metal-tolerant project) involves seed production and associated research.

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. Monoculture plots of 10 grasses were established in 1998 and mixture plots of seven grasses were established in 2005. To date, the bi-annual mowing treatment has reduced percentage basal cover in six monoculture plots and all the mixture plots. Rhizomatous grasses tend to be dominant when mixed with a bunch-type grass. The warm-season grasses, blue grama and buffalo grass, rated highest in turf suitability. This study remains one of the most popular demonstrations at the Center.

14-YEAR OLD XERISCAPE® TURF DEMONSTRATION AREA

Culturally Significant Plants

The BPMC continues to provide technical assistance on the culture and propagation of sweetgrass. We maintain vegetative material of Spirit Germplasm for distribution to commercial nurseries through MSU's Foundation Seed Program in Bozeman. It has been distributed to researchers, growers, and American Indian Reservations across the western United States and Canada. To learn more about growing Spirit sweetgrass, see the Montana NRCS website to access a short 'YouTube' video.

SPIRIT SWEETGRASS PRODUCTION FIELD

Need More Information?

There are several ways to obtain plant materials assistance and information in Montana and Wyoming. Begin by calling your local NRCS field or area offices, or the Plant Materials Specialist in Bozeman, Montana. For project specific, Foundation seed, or other Center information, call (406)-662-3579. Much of the BPMC and Montana-Wyoming plant materials program information is available on-line. Access the BPMC links at the Montana NRCS homepage at http://www.mt.nrcs.usda.gov/ or the national Plant Materials Program website at http://plant-materials.nrcs.usda.gov/.

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