Bridger Plant Materials Center

Year 2010 Progress Report of Activities

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What is the Bridger PMC?

The USDA-NRCS Bridger Plant Materials Center (BPMC) is one of 27 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 NRCS 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
- woody plant selection and establishment
- habitat restoration and enhancement
- plant cultural trials
- plant testing and selection
- pollinator-friendly plantings
- outreach

This document presents an overview of Year 2010 activities at the BPMC. For detailed information, contact the BPMC staff or Montana Plant Materials Specialist.

SEED PRODUCTION

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

COMBINING ROSANA WESTERN WHEATGRASS

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

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.

SUB-IRRIGATION TUBE STUDY

Evaluations continued in 2010 of two replicated studies, installed in 2005, comparing the effects of sub-irrigation tubes and ground cover type on the survival and growth of four woody conservation species. Plants with and without sub-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. Dramatic differences in growth were recorded between the fallow and vegetated sites over the course of the study. Also, green ash trees with tubes on the fallow site grew taller and had better vigor rating than trees without tubes. Results of this study are provided in Technical Note MT-66 posted on the Montana NRCS and Plant Materials websites.

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

The project is being conducted in cooperation with the Montana Conservation Seedling Nursery, the Bismarck PMC, PMS, and North Dakota State Staff Forester. Data collection from the study will be completed in 2011 and results available shortly thereafter.

Several new woody plant studies were initiated in 2010 related to revegetation after Russian olive removal along riparian corridors. Efforts initiated by the Miles City, Montana, NRCS Area Office in cooperation with the Agricultural Research Service at Ft. Keogh Livestock and Range

PLAINS COTTONWOOD ROOT DEPTH STUDY

Experiment Station will investigate strategies to establish both herbaceous and woody cover after Russian olive removal. Another study at Ft. Keogh will test long narrow seedling containers to determine if root depth is critical in the early survival and establishment of plains cottonwood.

A third study at the BPMC will compare plains cottonwood plants grown from seed versus vegetative cuttings in terms of plant form and anatomy, as well as long-term survival and function.

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. Restoring 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.

GLACIER CAREX SEED PRODUCTION

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

BLUEBUNCH WHEATGRASS SEED PRODUCTION FIELD AT BPMC FOR YNP's NORTHERN BOUNDARY

A new cooperative agreement was established in 2010 with Craters of the Moon National Monument. The BPMC is processing seed and growing plants indigenous to the park for use in various restoration projects within park boundaries.

NATIVE PLANT PROPAGATION FOR CRATERS OF THE MOON NATIONAL MONUMENT

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.

In 2010, the Development of Acid/Heavy Metal-Tolerant Releases Project/DATR (Deer Lodge Valley CD) promoted a new release of silver buffaloberry named Mill Creek Germplasm silver buffaloberry. Silver buffaloberry is widely used for windbreaks, shelterbelts, wildlife plantings, riparian restoration projects, and in salt-affected locations. The new twist is that Mill Creek was

MILL CREEK GERMPLASM SILVER BUFFALOBERRY

originally collected from plants growing near Anaconda, Montana, on soils impacted by smelter emissions. Mill Creek has exhibited tolerance of, and adaptation to, acid (pH range 4-5) and heavy metal contaminated soils when compared to non-local seed sources. Mill Creek is growing well and producing bountiful seed crops in an orchard at the BPMC where soils are slightly alkaline, so it is anticipated the selection will provide conservation benefits over a large geographic area.

Five other species including Washoe basin wildrye, Copperhead slender wheatgrass, Opportunity Nevada bluegrass, Old Works fuzzytongue penstemon and Prospectors common snowberry were collected at the Anaconda Smelter Superfund Site in western Montana and released to the commercial seed market. These selections continue to be increased as pre-varietal releases at the Bridger PMC. These releases have been included in various restoration prescriptions on disturbed lands in Anaconda and other areas. Field evaluation data continues to prove these releases as superior-performing selections.

Evaluation of trees and shrubs continued in 2010 at the Mill Creek site. The study compared the response of 19 indigenous and non-indigenous woody plant collections to low pH and metalliferous soils near Anaconda, Montana. Superior woody species include silver buffaloberry, Woods' rose, wax currant, ponderosa pine, and snowberry.

Several other non-Foundation accessions of plants collected as part of the DATR project are also being increased at the BPMC. Wild flowers include silverleaf phacelia and woolly cinquefoil. Additional grasses include western wheatgrass, bluebunch wheatgrass, and the grass-like Baltic rush. Woody plant seed orchards include horizontal juniper, common chokecherry, Woods' rose, and western snowberry.

SILVERLEAF PHACELIA IN FLOWER

As plants are released to commercial seed/plant producers, they then become available to reclamationists for the seeding and planting of mineland and other sites in areas with similar climatic conditions. The BPMC represents a necessary and integral part of the seed-source production for these valuable conservation plant materials.

CULTURAL TRIALS

Conservation Effects Assessment Project/CEAP

The BPMC is participating in a pilot project conducted in the western US. The project measures and quantifies plant growth parameters collected at eight PMCs for input into the Agriculture Research Service's ALMANAC (Agricultural Land Management Alternative with Numerical Assessment Criteria) computer model. The model will be used to improve accuracy and predictability of conservation effects applied through Farm Bill programs. In 2010, 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 Critana thickspike wheatgrass, Rimrock Indian ricegrass, Rosana western wheatgrass, and Trailhead basin wildrye. Preliminary results indicated the four species produce an adequate number of leaves that are moderately efficient at intercepting light and protecting soil and water resources.

CEPTOMETER SAMPLING IN RIMROCK INDIAN RICEGRASS

PLANT TESTING AND SELECTION

1. Collection & 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 2010, Montana field staff contributed ten forbs and seven grass collections, whereas Wyoming field staff contributed three forbs and two grass collections. Every five years an Initial Evaluation Planting (IEP) is assembled to evaluate performance of the new collections.

The IEP installed in November 2008 has several wildflower entries that show potential for revegetating disturbed environments and enhancing wildlife habitat. They are prairie thermopsis, American vetch, oneflower sunflower, silverleaf phacelia, narrowleaf milkvetch, and waxleaf penstemon.

ONEFLOWER SUNFLOWER IN STUDY

2. Field Evaluation Plantings (FEP)

Field Evaluation Plantings are established off-center to examine plant performance at remote locations. The Shell Field Evaluation Planting in Pinedale, Wyoming, was established in 2006 with a variety of native grasses, shrubs, and wildflowers that provide food and cover for sage grouse and other wildlife. The study compared the effect of seeding method and seeding rate in

EVALUATING WILDFLOWERS AT THE SHELL STUDY

single-species and mixture plots. The study was completed in 2010. Superior performing grasses included collections of basin wildrye, bluebunch wheatgrass, and bottlebrush squirreltail. Superior wildflowers included western yarrow, Palmer penstemon, Stillwater prairie coneflower, Maple Grove and 'Appar' flax, and the Richfield Selection of firecracker penstemon. Densities of 'Wytana' and Snake River Plains fourwing saltbush and Gardner's saltbush were greater than other shrubs.

BIG SAGEBRUSH PERFORMANCE IN THE BROADCAST SEEDING TREATMENT

In the mixture plots, there were greater densities of larger-seeded grass species in the drilled treatments. The small-seeded shrub species performed better in the broadcast treatments. Relatively low establishment of forbs and shrubs indicate more work is needed to develop these plant materials and technologies.

Four grass forage variety trials were harvested for the first time in 2010 at the MSU Havre and Moccasin Experiment Stations. The plots are maintained under both dryland and irrigated conditions. In addition, irrigated pasture and alternate-row, grass/alfalfa trials were established at Bridger in April. Thirty-two grass accessions are compared in the dryland trials, 17 in the irrigated trials, and 12 in the alternate row trials. Results will assist NRCS Field Office personnel, farmers, ranchers, and reclamation professionals in choosing the optimum grass species for their particular conservation needs and improved pastures.

FIRST OF TWO HARVESTS OF IRRIGATED GRASS TRIALS NEAR HAVRE, MONTANA

3. Wildlife Habitat Restoration and Enhancement

In cooperation with the Wyoming Bureau of Land Management, seed collections are being made of native wildflowers critical for food and cover for sage grouse. The objective of the study is to evaluate performance for potential habitat enhancement in revegetating disturbed environments. Recent collections were included in the IEP and are being evaluated for phenological development, and seed production.

A BUMBLE BEE VISITS A BEARDSTONGUE

4. Low-Maintenance Landscaping

Introduced dryland forage and native reclamation grasses are finding new uses--*xeriscaping*. These hardy, drought tolerant species have lower maintenance and energy requirements than typical turf grasses. The greatest basal cover in

the warm-season grasses was Bad River bluegrama, and in the cool-season species was

XERISCAPE DEMONSTRATION PLOTS

'Covar' sheep fescue. The best performers in the mixture plots were Bad River bluegrama combined with Cody buffalograss. Plants in the un-mowed treatment generally maintained greater basal densities than plants in the mowed treatment. The study remains one of the most popular demonstrations at the Center. The brochure 'Creating Native Landscapes' has been reprinted several times with more than 120,000 copies distributed.

Initial construction began in 2010 of a rain and pollinator garden at the BPMC. The intent of the planting is to demonstrate how to utilize roof water runoff to maintain beds and gardens of

RAIN AND POLLINATOR GARDEN AT THE BPMC

various plants. Grading and installation of sedge plugs was completed last summer, and additional seedlings and installation of water delivery and storage features is planned for this coming spring.

5. Culturally Significant Plants

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

SPIRIT GERMPLASM SWEETGRASS PRODUCTION FIELD

POLLINATOR RESEARCH

A graduate research project titled, *Pollinators of Slender White Prairie Clover,* was co-sponsored by the BPMC and completed in 2009. Results of the study led to two important insights on pollinator behavior. The first is an accounting of feral leaf-cutting bee populations in, "Annals of the Entomological Society of America", 2010, vol. 103, no. 5, pg 775-784. The second is an examination of the dynamics of predatory insects on a beneficial pollinator in, "Pyche", vol. 2009, pg 1-4. These reports are valuable contributions toward better understanding the ecology of pollinating insects.

INSECT TRAP NEST IN SLENDER WHITE PRAIRIE CLOVER

SCIENCE FAIR PARTICIPANT COLLECTING DATA

OUTREACH

Making an effort to reach underserved and non-traditional audiences has always been part of the PM program. In the 2010, the BPMC participated in numerous outreach activities with local schools including Center tours for elementary children from Red Lodge and Bridger schools, participation in Science Fair programs, and the annual Career Fair.

Reaching our primary audience of farmers, ranchers, and conservationists is accomplished through newsletters, tours, and trainings sessions, including our bi-annual Field Day. Our Field Day in 2010 resulted in the turnout of nearly 100 people interested in BPMC operations and the Plant Materials program. Similarly, over 60 attendees of the Montana Association of Conservation Districts Annual Convention toured the facility this fall as part of their program activities.

BRIDGER ELEMENTARY SCHOOL TOUR

BRIDGER PMC STAFF AT 2010 FIELD DAY

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