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## Bridger Plant Materials Center

### Year 2014 Progress Report of Activities



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98 South River Road, Bridger, MT 59014; Tel: 406.662.3579; Fax: 1-855-510-7028; Web Site: [http:// Plant-Materials.nrcs.usda.gov](http://Plant-Materials.nrcs.usda.gov)

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**AERIAL VIEW OF THE BRIDGER PLANT MATERIALS CENTER (BPMC) (MARTY METZ PHOTO, USDA-NRCS, CONRAD, MT)**

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 and degradation, 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 and use of cover crops
- training, technology transfer, and outreach
- pollinator- and wildlife-friendly plantings
- woody plant establishment and selection
- native habitat restoration and enhancement
- critical area re-vegetation
- plant cultural trials

This document presents an overview of Year 2014 activities at the BPMC. For detailed information, contact the BPMC staff or Montana-Wyoming Plant Materials Specialist. All photos in this Progress Report were taken by BPMC employees unless otherwise noted.

#### Soil Health and Cover Crops

Cover crop studies continued in 2014 at the BPMC with a new warm season cover crop study, and trials investigating potential species for salt-affected sites and upland gamebird food and cover. Preliminary results from the warm season study suggest species performance differences that will be used in advanced studies in 2015. A new off-Center study in 2015 will investigate the use of cover crops for supplemental, early- and late-season grazing.



**COVER CROP MIX FOR SALT-AFFECTED SITES STUDY**

#### Training, Technology Transfer, and Outreach

In order to serve a high number of new Montana NRCS employees, and deliver rapidly changing plant materials technologies, an emphasis was placed on training and outreach in 2014. A total of 367 NRCS field staff and conservation district employees attended some type of Plant Materials training in 2014 including Plant Materials I (introductory), Plant Materials II (advanced),



**PLANT MATERIALS TRAINING AT THE BPMC (ANGEL ROSARIO PHOTO, USDA-NRCS, KALISPELL, MT)**

5-part seeding webinars, on-site training in Stanford and Havre, Montana, tame pasture management training in Lander, Wyoming, and numerous webinars and slide shows on sage-grouse, pollinator plantings, forages, and salt-affected sites.



**DRILL CALIBRATION TRAINING FOR THE GREAT FALLS AREA AT THE MONTANA STATE UNIVERSITY, NORTHERN AGRICULTURE EXPERIMENT STATION, HAVRE, MONTANA**

Written technology transfer, summarizing studies and other information into forms useable for NRCS field staff and other audiences, is an important function of all PMCs. In 2014 at Bridger, the staff produced four quarterly newsletters with articles on a variety of subjects including seasonal tree problems, cover crops, pollinator plantings, salt-affected sites, acid and heavy-metal reclamation, and much more. In addition, Technical Notes on yarrow, meadow brome, peas, Rocky Mountain beeplant, hybrid

wheatgrass, dotted blazing star, sainfoin, Russian wildrye, Sandberg bluegrass, prairie coneflower, seeding rates for conservation species, and alternate-row seedings were developed and posted on the Montana NRCS and Plant Materials web sites.



**SAINFOIN FLOWER**

BPMC Outreach efforts provided nearly 1,700 asexually propagated cuttings of nine woody species to the Special K Ranch, whose mission is to provide special needs individuals the opportunity to live, learn, and work in an agriculture setting. The cuttings originated from a variety of sites in Montana and Wyoming, including state record-size “champion” trees, as well as plants from along the Jim Bridger Trail. Residents at the Special K Ranch will care for the plants until they are large enough to transplant in an urban forest or at their original collection site.



**CUTTINGS FOR THE SPECIAL K RANCH PROJECT**

## Pollinator- and Wildlife-Friendly Plantings

Enhancement and establishment of pollinator-friendly plantings is an important NRCS conservation concern. Numerous demonstration plantings, trials, and studies have been installed at Bridger.

In 2014 a new pollinator study was planted to determine the effect of grass composition and seed carrier on forb establishment. In preliminary results, the grasses, in the proportions tested, did not appear to impact forb establishment, and, the mixes treated with a seed carrier did not appear to establish differently than mixes seeded without a carrier. Weed control is an issue in pollinator plantings and problems can be avoided through proper site preparation and timely maintenance such as mowing, or swathing and baling to remove the debris and minimize shading of small seedlings.



FORB:GRASS POLLINATOR STUDY

In the spring-seeded planting trial, the most-to-least pollinator-friendly wildflowers (bloom season in parenthesis) were white prairie clover (mid-summer), followed by blanketflower (late spring), prairie coneflower (early summer), yarrow (mid-spring), black-eyed Susan (mid-summer), and Lewis flax (early- to late-spring). The flower mixtures dominated the grass, Sandberg bluegrass. In the late fall-seeded dormant trial, the most-to-least pollinator-friendly wildflowers (bloom season in parenthesis) were silverleaf phacelia (mid-spring), Maximilian sunflower (mid- to late-summer), fuzzytongue penstemon (mid-spring), echinacea (summer), dotted blazing star (mid-summer to early fall), and numerous volunteers of the annual, Rocky Mountain beeplant that flowered in mid-summer.

The grass component, Indian ricegrass, developed suitable pollinator habitat for shelter and ground nesting.



SEASON OF PLANTING POLLINATOR TRIAL

## Woody Plant Selection and Establishment

Tree and shrub testing continued at the BPMC in 2014 with the maintenance of seed orchards of released selections, and the development and testing of new establishment techniques. The plains cottonwood deep pot study installed in 2011 at the Agricultural Research Service (ARS), Livestock and Range Research Laboratory



SOIL POTENTIOMETERS IN COTTONWOOD STUDY (ROBERT KILIAN PHOTO, USDA-NRCS, MILES CITY, MT)

at Fort Keogh in Miles City, Montana, was again evaluated in 2014. The study aims at determining if long narrow seedling containers effect the early survival and establishment of this species. After three years, survival of plants in conventional pots was substantially less than the deep pots. Although growth of plants in conventional pots was initially slower, plant growth, size, and vigor

in all pots sizes was similar after three years. Similar studies with bur oak and plains cottonwood installed at the BPMC in 2012 were evaluated in 2014, and will be finalized in 2015.



**DEEP POT SEEDLING STUDY**

In 2014 a Russian olive seed depth study was completed and summarized in Technical Note MT-107 titled, *Russian Olive Elaeagnus angustifolia L. Effect of Seed Burial Depth on Seedling Emergence and Seed Viability*. This study compared the germination, emergence, and viability of Russian olive seeds planted at 1, 3, and 5 inches deep in containers in a greenhouse. Although nearly 66.5% of Russian olive seeds planted at 1 inch germinated, only 0.001% and 0% germinated, respectively from 3 and 5 inches. These findings suggest that most reintroduction of Russian olive from seeds probably occurs from seed deposited on the soil surface and that seeds buried by sediment from flooding may not persist in the seed bank and germinate later if they remain buried for any length of time.

A plant selection study comparing numerous seed sources (lines) of native riverbank grape was again evaluated in 2014 with the ultimate goal of releasing an additional species for riparian restoration.



**RIVERBANK GRAPE STUDY**

### **Native Habitat Restoration and Enhancement**

Habitat restoration involves the reclamation of disturbed sites with an emphasis on increasing species diversity and the development of healthy plant communities. Many of the previously described aspects of the BPMC program contribute to native habitat restoration. Collaborative efforts with the National Park Service have involved the collection, propagation, and re-establishment of native indigenous plant



**SEED INCREASE FOR THE NATIONAL PARK SERVICE**

materials along re-constructed roadsides. This work has resulted in the development of many new propagation, planting, seed increase, and restoration strategies. Many of these new techniques lend themselves to other conservation practices useful to landowners.

Parks utilize 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.

### Critical Area Re-vegetation

#### A. Anaconda (DATR) Project

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 Anaconda Smelter Superfund Site in western Montana have been released to the commercial seed market.



SILVERLEAF PHACELIA

In 2014, Joe LeFebvre, the new DATR Project Leader, focused on analyzing and summarizing years of DATR data and results and presenting the results in three Technical Notes. The first Plant Materials Technical Note, MT-97, *Acid and Heavy Metal Tolerant Plants for Restoring Plant Communities in the Upper Clark Fork River Basin*, provides information on each selection, including a general description, its origin, conservation uses, and stand establishment techniques. It has useful information that can be used by the land manager to select plants for critical area restoration.



STUCKY RIDGE TEST PLANTING

The second Plant Materials Technical Note, MT-98, *A Summary of the Results of the Mill Creek Woody Comparative Evaluation Planting*, summarizes the performance of seven woody species consisting of 19 different accessions planted in a study plot severely impacted by past smelter emissions fallout. The results could be applied to other critical areas and serve as the basis for future plant selections, as well as determining if off-site seed sources are appropriate for use on metal-affected sites.

The third Plant Materials Technical Note, MT-99, *Seed Mixes for Acid and Heavy Metal Contaminated Sites in the Anaconda, Montana Area*, describes appropriate seed mixes for the re-vegetation of disturbed sites, such as Stucky Ridge. Species, seed source selection, and their relative proportions in the mix are discussed. This Technical Note also provides the reader with the basic decision-making tools when developing custom seed mixtures. All three technical notes are posted on the Montana NRCS and Plant Materials web sites.

## B. Re-vegetation After Russian Olive Removal

Installation of a post Russian olive removal study installed in 2012 at the Fort Keogh Livestock and Range Research Laboratory in Miles City, Montana, was again evaluated in 2014. This ARS, NRCS 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 2014, all trees and shrubs were evaluated for survival, height, and vigor. Data will be analyzed after the 2015 evaluation.



RUSSIAN OLIVE REMOVAL AND RESTORATION STUDY AT FORT KEOGH (ROBERT KILIAN PHOTO, USDA-NRCS, MILES CITY, MT)

### **Plant Cultural Trials**

How to grow, culture, and establish plants, from seeds, containers, and cuttings, is an integral part of nearly every aspect of operations at the BPMC.

A new study was installed in 2014 to examine the effects of seed age on field establishment of four differently-aged seed lots of thickspike wheatgrass, slender wheatgrass, basin wildrye, western wheatgrass, bluebunch wheatgrass, and Nevada bluegrass. Each test plot was evaluated in 2014 and data will be statistically analyzed to determine whether or not seed age plays a factor in field establishment.



SEED AGE STUDY

### **Off-Center Field Plantings (FP)**

A flood irrigated planting near Worland, Wyoming was drill seeded onto a plowed and packed seedbed on May 6, 2014. Results indicate that 'Goldar' (6 plants/row foot) and 'Anatone' (8 plants/row foot) bluebunch wheatgrasses, and 'Discovery' (7 plants/row foot) and 'Secar' (5 plants/row foot) Snake River wheatgrasses, had statistically similar establishment. Flood irrigated wildflower plantings testing seeding rates near Worland and Basin, Wyoming, drill seeded onto plowed and packed seedbeds on May 23, 2014, failed to establish or had very poor establishment regardless of the species and seeding rate. A similar planting near Bozeman, Montana, drill seeded on November 11, 2013 on a plowed and packed seedbed, failed to establish or had poor establishment regardless of seeding rate or species. Also near Bozeman, a planting on a smooth brome/Kentucky bluegrass pasture sprayed with 1 quart per acre of glyphosate and drill seeded on May 28, 2014, found doubling the seeding rate from 25 to 50 seeds/foot improved establishment of purple prairie clover from 6 to 18 plants per square foot, respectively. Doubling the seeding rate of 4 other wildflower species did not show a statistically significant increase in establishment. Slender white prairie clover had 6 and 10 plants per square foot, Lewis flax had 9 and 10 plants per square foot, Maximilian sunflower had 4 and 8 plants per square foot, and upright prairie coneflower had 6 and 6 plants per square foot for the 25 and 50 seeds per row foot rates, respectively. We hypothesize in intact soil and litter cover of the glyphosate seedbed improved wildflower establishment compared to the plowed and packed seed beds.

## 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. Maintaining a steady seed supply, equitably allotted, regardless of market demand, ensures commercial growers can quickly increase end-user supplies should demand spike, such as after a severe wildfire season. The seed harvest season at the BPMC extends from mid-June with alpine bluegrass until late December with Rocky Mountain juniper. Potential future releases include silverleaf phacelia and Wood's rose. Foundation seed is distributed through the Montana and Wyoming Seed Certification



**HARVESTING A FOUNDATION SEED PRODUCTION FIELD**

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 increase and associated research.



**SEED PRODUCTION FIELD AT THE BPMC**

## 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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