2009 Progress Report of Activities
Bridger Plant Materials Center

USDA-Natural Resources Conservation Service

Using Plants to Solve Conservation Problems in Montana and Wyoming

In a landscape as varied and vast as Montana and Wyoming, the conservation challenges are daunting. It is a region characterized by everything from high plains deserts to alpine meadows, droughty basins to moist dense timberlands, pristine national parks to drastically disturbed mined lands, intact native plant communities to ecosystems dominated by invasive species. The Bridger Plant Materials Center, in conjunction with Conservation Districts, field office staff, universities, other federal and state agencies, non profit groups, and private landowners, continued its tradition of using plants to solve conservation problems this past year. With the continuity of experienced staff and established projects, and the fresh perspective of new employees and promising research, Center staff worked on a variety of resource concerns over the 2009 calendar year. This report contains an over view of some of the major activities in 2009. Please contact the Center at 406.662.3579 for additional information on our program or visit our websites at http://plant-materials.nrcs.usda.gov or http://www.mt.nrcs.usda.gov/.

The plains meet the mountains near the Plant Materials Center, Bridger, Montana.

January 2010

New Staff Members

The Bridger Plant Materials Center hired several new key employees in 2009. Ross Oyler is our new Biological Technician assisting with general field activities, as well as grass seed production and processing for Glacier National Park.

Robert "Bob" Fisher has also joined the Bridger team, working primarily on activities related to our Bureau of Land Management agreement, but assisting with everything from seed harvesting to data collection. If it's broken, Bob can fix it!

Marlene Kinney joined the Center this year through the Experience Works Program and has been an invaluable asset potting plants, cleaning seed, collecting data, and organizing our references.

Anaconda, Montana

Restoration and Recovery After Natural Resource Exploration and Extraction

The Bridger Plant Materials Center has a long tradition researching ways to revegetate lands disturbed by mining and other extraction activities. The Development of Acid/Heavy-Metal Tolerant Releases project was initiated in 1995 by the Deer Lodge Valley Conservation District in cooperation with NRCS and the Center. Through extended funding by the Montana Natural Resource Damage Program, the project continued in 2009 testing native plant tolerance to low soil pH and contamination from heavy metals, as well as Foundation seed increase of superior selections. To date, the Development of Acid/Heavy-Metal Tolerant Releases project has resulted in the release of five species for use in the reclamation of the

Restoration and Recovery After Natural Resource Exploration and Extraction (continued)

Anaconda Superfund Site and similar environments. These include Copperhead slender wheatgrass, Washoe basin wildrye, Old Works fuzzytongue penstemon, Prospectors common snowberry, and Opportunity Nevada bluegrass. The next planned release is silver buffaloberry, a native salt-tolerant shrub widely adapted to the Anaconda area and heavily utilized by wildlife.

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. The study looks at the effect of seeding method and seeding rate in single-species and mixture plots. To date, the best wildflowers for revegetating areas disturbed by natural gas exploration activities are western yarrow, Palmer penstemon, Stillwater prairie coneflower, Maple Grove and 'Appar' flax, and the Richfield Selection of firecracker penstemon.

In cooperation with the Wyoming Bureau of Land Management, seed collections are being made of native wildflowers that are critical sources of food and cover for sage grouse. The objective of the study is to evaluate performance for potential habitat enhancement in revegetating disturbed environments. Several wildflowers were seeded in the fall of 2008 and were monitored throughout the following summer for plant growth and development. Newly received collections were seeded in the plot at the end of 2009. The best performer was a prairie thermopsis from Washakie County. A primary goal at the end of the project in 2012 is to recommend a species for release to the commercial seed and/or plant production industry.

Native Wildflower Initial Evaluation Planting for the Bureau of Land Management

"Real World" Testing of Tree/Shrub Salinity Tolerance

One of the most frequently asked questions we receive at the Plant Materials Center is, "what tree/shrub will grow on my salty soil?" That's a loaded question with a complicated answer, and many of the recommendations that are given are based on anecdotal observations. In order to provide better "real world" recommendations for establishing woody plants on saline impacted sites, a tree and shrub salinity tolerance study was installed at the Center in May 2006 in cooperation with the North Dakota PMC, PMS, and State Forester.

The study consists of 30 plants each of 18 different species planted across a salinity gradient. Test species include natives, non-natives, and even potentially invasive woody species.

After 4 years of data collection, some patterns have emerged. Nearly all of the desirable native species have lower salinity tolerance when planted in a sub-irrigated site than commonly reported. In many cases, results from greenhouse studies or field plantings in well-drained soils are incorrectly being extrapolated to heavy textured soils in severe environments.

Our goal is to correlate plant survival, height growth, and vigor rating to salinity level, and specific salts. Although the study is still in progress, some better performing species include silver buffaloberry, silverberry, green ash, skunkbush sumac, golden currant, Siberian peashrub, and blueleaf honeysuckle. Our hope is to develop new guidelines for selecting trees and shrubs for heavy-textured, salt-affected sites. This information is timely as control and removal of Russian olive and salt cedar in Montana and Wyoming gears up.

> ***"....results from greenhouse studies or field plantings in well drained soils are incorrectly being extrapolated to heavy textured soils ...."***

Testing Forages—Determining the Best Choices for Montana and Wyoming

There is a continual need for current forage grass production information by livestock producers in Montana and Wyoming. To satisfy that demand, four cool-season grass variety trials were established in early May of 2009 at Montana State University— Central Agricultural Research Center (CARC) at Moccasin, Montana, and the Northern Agricultural Research Center (NARC) at Havre, Montana. At Havre, a dryland/rain-fed trial was planted consisting of 17 species comprised of 32 varieties. In addition, an irrigated variety trial was established consisting 12 species and 17 varieties. There were two grass/legume mixes in the trial as well. At the Central Agricultural Research Center, the same dryland trial was planted and an alternative row, grass/alfalfa trial was planted. It was composed of 12 species of grass and Shaw alfalfa planted on alternate rows. This means there is a row of grass, then a row of alfalfa, a row of grass, a row of

Willow Creek Winter Wheat Cover

Testing Forages—Determining the Best Choices for Montana and Wyoming (continued)

alfalfa and so on. Percentage stand measurements were taken in early August on all four of these trials and several significant differences were noted between the varieties of the same species in the dryland trial at Moccasin and the irrigated trial at Havre.

Future plans are for forage harvests to be taken at both locations in early June and late September, 2010 through 2014. In 2015, the dryland trial at Havre will be fenced for observing sheep preference and palatability of these cool-season grasses. Appreciation is extended to the cooperators of the trials: Superintendent Dave Wichman at Montana State University— Central Agricultural Research Center; and Dr. Darrin Boss (Animal Scientist) and Julia Dafoe (Technician) at Montana State University -Northern Agricultural Research Center. Interested central and northern Montana producers will have the chance to view these trials at Field Days in 2010.

There will also be alternative-row grass/ alfalfa and irrigated grass variety trials established at the Bridger Plant Materials Center with a dormant planting in November 2010.

Want to see what the latest and greatest conservation species? The Bridger Plant Materials Center maintains several demonstration gardens of plants used for conservation applications. Visit the Center and walk the demonstration plantings and grounds. Make an appointment, attend a field day, or enroll in a training session and have staff discuss plant traits and uses.

Helping Protect Our Natural Resources on Public Lands

The Bridger Plant Materials Center has maintained cooperative agreements with Yellowstone and Glacier National Parks since the mid-1980s. These agreements facilitate the collection, increase, and establishment of indigenous plant materials, and the development of technologies for the restoration of disturbances resulting from road construction and other projects within Park boundaries.

The Bridger Plant Materials Center now has three interagency agreements with Yellowstone National Park. The umbrella agreement has been in effect since 1986 and continues to guide the majority of Yellowstone Park reimbursable activities at the Plant Materials Center. The products include processing and inventory of wildland seed collections and seed and plant production for revegetating federal highway and non-highway projects.

The newest Yellowstone Park agreement is aimed at improving critical wildlife habitat by revegetating disturbed land near the Northern Boundary. In 2009, the Plant Materials Center was instrumental in securing a mechanical seed harvest permit from the Bureau of Land Management to assist Yellowstone Park with seed collection efforts over a 4-year period. A new, innovative seed-stripping machine, the Native Seedster™, was used to collect bluebunch wheatgrass and needle and thread at the Carbella site. In addition, seed produced at the Plant Materials Center will be used to plant test plots in the Park to evaluate the effectiveness of different weed control methods and seeding techniques.

In cooperation with Glacier National Park, the Plant Center continued producing seed and plants of native species for various restoration projects within the Park. Over 200 wildland seed collections were processed and inventoried in 2009 for Glacier Park. Spearheaded by Joe Little of the Montana NRCS State Office, the Center and Glacier are developing an electronic labeling system that will be capable of saving and sending important seed and plant collection data electronically without the need for transposing the information by hand. If the prototype proves successful, it could have broad applications to other Centers, Parks, and agencies.

Yellowstone National Park

A new cooperative agreement was initiated in 2009 with Craters of the Moon National Monument in Idaho. The cooperative agreement facilitates the processing, inventorying, and production of native plants for restoration projects within Park boundaries.

Sub-Irrigation Tubes to Improve Tree/Shrub Establishment and Growth

In 2005, the Plant Materials Center, in cooperation with the Miles City Area Office , the Little Beaver Conservation District, and the Montana Conservation Seedling Nursery, began a research project investigating the use of plastic pipe to deliver water directly to the developing roots of tree seedlings. Two test plots were installed, one maintained fallow, one installed in a thickspike wheatgrass cover. Four species were tested: green ash, bur oak, ponderosa pine, and Rocky Mountain juniper. Half the seedlings received supplemental water on top of the soil surface; half the seedlings were irrigated via 36-ich long tubes buried approximately 30 inches in the soil. The 4-inch diameter pipe had 2-inch horizontal slots every 2 inches along the 30-inch section buried in the soil. A solid 30-inch extension was later added above ground to increase total storage capacity from 1.9 gallons to 3.7 gallons.

So what have we learned after 4 years of field testing? The difference in height growth and vigor rating between the fallow and vegetated plots is startling, with tremendously more growth and better vigor on the fallow plot. As for the effects of sub-irrigation tubes, only green ash in the fallow plot demonstrated statistically superior height growth and vigor when irrigated with the tubes. We theorize that the fast growing roots of green ash grew over to the tubes and accessed the supplemental water more quickly than the other species tested.

Subirrigation tubes offer potential seedling establishment benefits, but success will depend on how the tubes are designed and installed; their proximity to the seedling; the species planted; type of container the seedlings are grown in; the local climate, soils, and irrigation management; and other factors. Most importantly, control competing vegetation 1 year prior to planting and then for the life of the planting, or at least until seedlings are well established. For more detail on this project, visit the Montana NRCS website for *Effects of Water Delivery Method and Herbaceous Competition on Seedling Survival, Height Growth, and Vigor Rating: Four-Year Summary Results* at http://www.mt.nrcs.usda.gov/technical/ecs/plants/technotes/.

Green Ash Tree In Fallow Test Plot

Drought Tolerant Plants For Backyard Conservation

The Bridger Plant Materials Center maintains four demonstration gardens with more than 140 plots of native and introduced forbs and grasses. The most popular is a xeriscape of introduced dryland forage and native reclamation grasses in a lawn-type setting. These hardy, drought-tolerant species have lower maintenance requirements than typical turf grasses. Homeowners can see firsthand the benefits of lower inputs of water, fertilizer, and mowing. After 10 years, the greatest basal cover is in Bad River bluegrama and 'Rosana' western wheatgrass. The mixture plot of Rosana western wheatgrass and 'Critana' thickspike wheatgrass most resembles a traditional lawn, with the exception of the blue-and-green coloration. The brochure *Creating Native Landscapes* has been reprinted several times with a distribution of more than 110,000 copies.

Xeriscape Demonstration Planting

Preserving Our Signature Cottonwoods

The beauty of towering cottonwoods along Montana's riparian areas and major tributaries has been noted and appreciated before the time of Lewis and Clark. For several reasons, the regeneration of cottonwood stands along Montana waterways is decreasing. Control of flooding limits scouring of stream and river banks down to mineral soil-a seedbed that is necessary for cottonwood germination and establishment. Wildlife and livestock heavily browse this species, and in many areas, invasive species occupy sites where cottonwoods might otherwise grow.

Developing cost efficient techniques for the re-establishment of cottonwoods is the goal of new studies initiated in 2009. Seed collected last year by staff in the Miles City Area Office and affiliated field offices was used to grow seedlings at the Plant Materials Center. The seedlings will be compared to rooted cuttings to determine the establishment and growth benefits of each propagation technique. Seedlings will be planted in field plantings comparing various types of establishment treatments including herbaceous plant competition, nursery production techniques, and timing of planting.

Developing cottonwood re-establishment techniques for Montana and Wyoming is increasingly important as we increase the removal of invasive Russian olive and salt cedar.

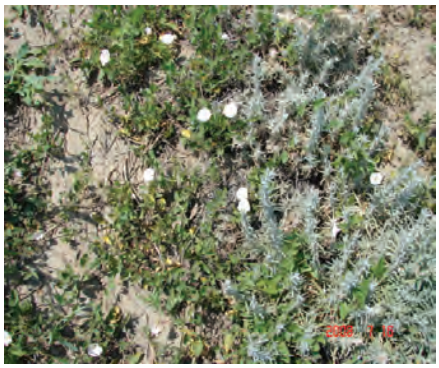
Mature Plains Cottonwood Tree

Field Bindweed Control in Winterfat Seed Production Fields

Winterfat, *Krascheninnikovia lanata,* is a native half-shrub highly valued as winter forage for livestock and wildlife ungulates in the western United States. Crude protein levels remain between 7 to 11 percent at that time and the plant is also high in calcium, phosphorous, and potassium. Other uses for winterfat are mineland reclamation, in seed mixtures for range renovation, and wildlife habitat improvement. The Bridger Plant Materials Center has a tested class germplasm release named Open Range. We are responsible for producing and maintaining Foundation seed stock on hand for sale to interested certified seed growers in Montana and Wyoming.

One problem with many forb/shrub seed production fields is the invasion by broadleaf weeds, such as field bindweed (*Convolvulus arvensis*). Due to winterfat's broadleaf habit of growth, many common herbicides are not labeled for use on the plant. A second problem involves field bindweed seeds attaching to the fuzzy outer covering of winterfat seed, thus making separation very difficult during seed cleaning. To solve these problems, a study to determine the effect of various broadleaf herbicides on field bindweed and subsequent winterfat seed production was initiated in July 2008. The study was organized in a randomized complete block design with three replications. Milestone®, Paramount® and Plateau® were broadcast sprayed in three formulations each. Field bindweed was in the flowering stage of growth. Plots were rated in July 2008 and again in June 2009.

Study results indicated all herbicide treatments negatively suppressed winterfat seed production and there were no differences among herbicide treatments for that effect. However, Milestone at 6 ounces of active ingredient per acre was significantly higher in field bindweed control than Paramount at the same rate. The difference may be attributed to application timing as Paramount is normally sprayed later in the fall for optimum control.



Managing weeds and improving soil health is a large part of farm management here at the Plant Materials Center. We face the same challenges as all producers and homeowners. In 2009 the Center instituted some new farming practices in an attempt to control weeds, improve soil health, and increase efficiency. Forage radishes are being planted in various trials in an attempt to improve soil structure and increase soil aeration. Tests are also being conducted with midsummer sowing of seed production fields. This allows staff to control early flushes of weeds prior to planting and reduces establishment stress for newly emerging seedlings.

Enhancing Diversity With Wildflowers

Species diversity in a native seed mix is an important factor to consider when planning a revegetation project. Proper establishment of a diverse number of plant species is necessary for ecosystem function, structure, and suitable wildlife habitat. There are many facets of study that begin years before recommending a native species seed mixture, the first of which is to identify conservation issues and the plants appropriate for solving the problems. Seed collection lists are distributed to NRCS Field Offices and the resultant materials are planted in common garden studies. Over the past 10 years, the Bridger Plant Materials Center has received more than 225 wildland seed collections, many of which are wildflowers. The wildflower seed is planted and evaluations are conducted to compare plant growth and development among the entries. The most recent studies established at the Bridger Plant Materials Center monitored 211 plots of 35 native wildflowers.

Improving Wildflower Seed Production

The commercial release of a wildflower contains information on how to successfully establish and maintain seed production under agronomic conditions. Seed growers need to know when to plant, the proper seeding rate and depth, amount of supplemental irrigation, time of harvest and type of equipment, techniques to clean and process seed, and weed control. The Bridger Plant Materials Center initiated a series of greenhouse and field trials to evaluate the effect of using herbicides to control broadleaf weeds in wildflower seed production fields. In addition, a cooperative project to test more herbicides was conducted with a graduate student at Montana State University in Bozeman. So far, the precautionary lessons from these results are to be careful how herbicide chemistries are combined and to document where herbicides with long residual activities are applied. Care must be taken in production fields to avoid unintended injurious herbicide interactions. The goal is to eventually supply a chemical company with supporting data to allow supplemental labeling in accordance with EPA guidelines.

Wildflower Herbicide Study

Outreach

The Bridger Plant Materials Center cooperated with Teresa Cohn, graduate student at the Montana State University 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 Bridger Plant Materials Center provided the expertise and materials for growing sweetgrass in the school's greenhouse. Spirit sweetgrass is a selected class release maintained at the Plant Materials Center for distribution to tribal and other educational interests, and as foundation vegetative material to qualified nursery growers.

The Bridger Plant Materials Center provides educational opportunities in the proper identification and use of wildflowers. Demonstration plots are open to the public to aid in selecting appropriate plant material for residential and business landscapes, recreation areas, reclamation projects, roadsides, and theme gardens. Visitors can expect to see wildflowers in bloom from mid-May to early October.

Spirit Sweetgrass Field

The Center also continued working with local schools helping establish a small water-wise garden, offering tours and presentations, assisting with Science Fair experiments and judging, and giving presentations during after school programs.

Ekalaka Germplasm Bur Oak—Our Newest Release

A Selected Class pre-varietal release of bur oak designated as Ekalaka Germplasm bur oak was released in 2009 for use in the northern Great Plains and intermountain west for windbreaks, shelterbelts, riparian forest buffers, wildlife habitat plantings, Xeriscapes®, and other conservation plantings. This selection is a bulk of 9 indigenous seed sources from Montana, North Dakota, and South Dakota selected for superior percentage survival, rate of height growth, and vigor rating compared to other seed sources tested at Bridger, Montana.

Ekalaka Germplasm bur oak has numerous potential conservation applications. It can be used as a medium- to tall-stature tree in windbreak and shelterbelt systems. It provides food for numerous forms of wildlife, as well as nesting, loafing, and roosting sites for many species of birds including turkeys. It can be used in combination with other species in riparian forest buffers, creating shade and providing soil stabilization via an aggressive taproot. Ekalaka bur oak may be used as an alternative for Russian olive in riparian forest buffers when soil salinity is low and prolonged soil saturation does not occur. It may also be used as a replacement for green ash should ash species become threatened in the Northern Great Plains and Intermountain West by emerald ash borer.

Ekalaka bur oak seedlings are available through the Montana Conservation Seedling Nursery in Missoula, Montana. Nursery growers can call the Plant Materials Center for seed availability.

Ekalaka Germplasm Bur Oak

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FREQUENTLY ASKED QUESTIONS?????

Can I purchase seeds and plants of Bridger Plant Materials Center releases directly from the Center?

Foundation Seed Field at Bridger

No. The Plant Materials Center assembles, tests, selects, and releases plants for conservation uses, but does not sell anything directly to the public. We do maintain Foundation seed and plants used by commercial growers to produce more seeds or plants for sale to the public. Commercial seed growers and nurseries can obtain Foundation seed by contacting their State Crop Improvement Association, the Foundation Seed Program at Montana State University-Bozeman, or calling the Bridger Plant Materials Center. Private landowners can obtain seeds and plants of Center releases by contacting commercial seed growers and nurseries. Need help finding something? — Call us!

When may I visit the Bridger Plant Materials Center and look around?

During the regular work week, the doors of the Center are always open to visitors. If you would like staff to show you around and answer questions, we suggest you call the Center in advance to make sure someone is available to assist you that day. Groups and organizations are always welcome, just call to schedule a visit. We offer both in-house and off-site training and presentations, and have a Plant Materials Center Field Day (open house) each year for public visitation.

I am a landowner interested in testing some Bridger PMC releases on my land—how do I get started?

You can, of course, always go to a commercial seed grower or nursery and secure the desired plant materials and test them on your own. Another possible option is to request a Field Planting trial. This process begins at the NRCS Field Office level. Go to your local USDA Service Center, NRCS office and discuss your needs. If your proposal involves plant materials that our program is interested in testing, your request is sent to our Plant Materials Specialist for consideration.