PLANT MATERIALS TODAY

A newsletter from the USDA-NRCS Montana-Wyoming Plant Materials Program for those Interested in Plants and Conservation

Volume 20 Number 3 Fall 2014

For more information on Plant Materials or for electronic access to this and other documents, access our web sites, Montana NRCS at http://www.mt.nrcs.usda.gov or National Plant Materials Program http://plant-materials.nrcs.usda.gov/mtpmc/. Direct inquiries to USDA-NRCS, Plant Materials Center, 98 South River Road, Bridger, MT 59014, phone: 406-662-3579, FAX: 855-510-7028

Important Reminders

*Field Offices – Fall is an excellent time of year to take dormant hardwood cuttings and collect ripe berries of riverbank grape for the Bridger Plant Materials Center (BPMC) Initial Evaluation Study!

Feature Topic

Cover Crops for Salt-Affected Sites

Cover crop species are normally not considered for the reclamation of salt-affected sites and little information is available about their salinity tolerance. Therefore, with a natural salinity gradient on a site at the Bridger PMC, I decided

Cover crop mix planted in a salt-affected field at the Bridger Plant Materials Center

to test some individual crops in a mix for their salt tolerance (see photo above).

I first looked at Plant Materials Technical Note MT-26: *Plant Materials for Saline-Alkaline Soils*. The highest reported full-performance salinity tolerances are barley (~7.5 mmhos/cm), strawberry clover (~7), sugar beets (~6), wheat (~6), safflower (~6) and yellow sweet clover (~5). When I entered these crops into a commercial mix calculator, I had no problem reaching a salinity tolerance rating of 7 or 8 (10 is the best). If these crops were not used as the main components of the mix, a salinity rating of only 3 to 4 would be reached. With these crops as the foundation of my mixes, I added turnips, sunflowers, grain sorghum, berseem clover, Persian clover, red clover, buckwheat, yellow mustard, faba bean, rapeseed, and dwarf sorghum x sudangrass. Although these crops have lower salinity tolerances than my base mix, I hoped they might establish and grow well in localized areas having lower salinity (EC < 4).

The planted area was extremely wet from late spring and early summer moisture, so the cover crops could not be planted with a grain drill until July 31, 2014. The seeding rate ranged from 22.5 to 45 pounds per acre under furrow irrigation.

Weather in Bridger cooperated after planting, with warm growing conditions in August and September providing good conditions for cover crop establishment (see photo below). A low night-time temperature of 30.5° F on September 11, 2014 lightly frosted some sorghum x sudangrass plants, but other species in the mixes were not adversely affected.

Cover crops in an area of higher salinity

Current plans are to inspect the field in early October and record EM-38 soil salinity readings for each species.

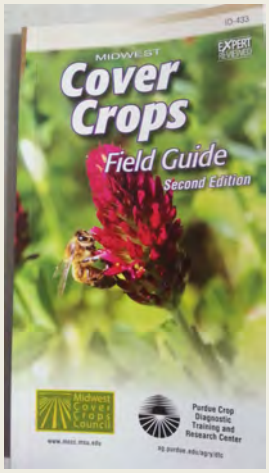
Visually, common sunflower performed better than expected in the lower salinity areas, and in some cases, established and grew even in higher salinity areas (see photo below). On a negative note, purslane (weed) is exhibiting some soil salinity tolerance, and developed in the understory of the cover crop mixes (see photo below). The field initially had an infestation of kochia, but a pre-plant herbicide application provided good pre-plant weed control.

Sunflower growing in lower salinity areas (September 22, 2014)

Purslane establishing in the cover crop understory

Additional Reading

The Midwest Cover Crops Council has published a handy pocket guide on cover crops. The booklet has excellent pictures of the main cover crop species, their many characteristics, and soil health benefits. It is available for $5 and can be ordered online at ag.purdue.edu/agry/dtc.



Midwest Cover Crops Field Guide, Second Edition

Roger Hybner – BPMC Research Agronomist

Feature Topic

New Pollinator Planting at the BPMC

In our ongoing efforts to provide guidance to field office personnel on developing seed mixtures for pollinator plantings, the Bridger Plant Materials Center (BPMC) installed a new study in spring 2014. Concerns over grass proportions in seed mixes and their effect on wildflower establishment are increasingly common from field staff. Presently, the guidance on the percentage of grass to include in seed mixes to create or enhance pollinator habitat on non-working land (Conservation Reserve Program – CRP) is approximately 25%, whereas, on working lands it is 70-75%. The over-riding question is, "at what point do grasses negatively impact wildlfower establishment?"

Information from previous pollinator plantings at the BPMC was used to develop three seed mixtures with different ratios of grasses to forbs. Because we had failures establishing yarrow without a carrier when drill seeding, we added a seed carrier treatment (with and without) to examine whether or not it improved the establishment of the wildflowers. The percentages of grasses in the mixes were 20, 40, and 60%.

Grass and wildflowers in test plot near Pinedale, Wyoming

The mixes were comprised of Opportunity Germplasm Nevada bluegrass *Poa secunda*, 'Pryor' slender wheatgrass *Elymus trachycaulus,* 'Goldar' bluebunch wheatgrass *Pseudoroegneria spicata*, Great Northern Germplasm western yarrow *Achillea millefolium* var. *occidentalis*, Antelope Germplasm white prairie clover *Dalea candida*, Meriwether Germplasm blanketflower *Gaillardia aristata*, Medicine Creek Germplasm Maximilian sunflower *Helianthus maximilianii*, 'Appar' prairie flax *Linum lewisii*, and Stillwater Germplasm upright prairie coneflower *Ratibida columnifera*. They were seeded on May 22, 2014.

Seed of individual species weighed and ready to package

The first emergers were blanketflower and white prairie clover on June 10, 2014. Plots were mowed in mid-summer to an approximate height of 4 inches to reduce weed competition. Frequency count and height were recorded in early August, and first bloom dates and average number of blooms per species were recorded throughout August (see Table 1).

Table 1. Wildflower seedling height, first bloom date and average number of blossoms per plant.

Species	Seedling Ht.	Blooms	
	cm	*1st date*	*no.*
Prairie coneflower	8	August 8	3
Lewis flax	10	August 9	10
Maximilian sunflower	17	August 14	16
White prairie clover	9	August 19	7
Blanketflower	6	-	-

Although not yet statistically analyzed, some interesting trends seem to be emerging (see Table 2). In the establishment year, there is a fairly consistent relationship, across all mixes and treatments, between the ratio of grasses to forbs sown and the ratio of grasses and forbs emerged. The grasses, in the proportions tested, do not appear to impact forb establishment. Preliminary results also indicate the mixes treated with a seed carrier did not establish differently than mixes seeded without a carrier. The number of established plants per square foot was very low in almost all cases. This may be due to a combination of relatively low mixture seeding rates (relative to the weed seed density), and heavy weed competition, which plagued the study.

Table 2. Preliminary emergence results, 2014.

Percentage	Carrier	Seeds Planted	Established		
Life Form	Yes/No	Sds/ft^2	Plants /ft^2	% of Life form Emerged	% of All Emerged Plants
20% Grass 80% Forb	No No	5.6 22.4	1.05 2.16	18.75 9.64	32.8 67.2
20% Grass 80% Forb	Yes Yes	5.6 22.4	1.03 2.08	18.39 9.29	33.2 66.8
40% Grass 60% Forb	No No	11.1 16.4	2.04 2.14	18.38 13.05	48.9 51.1
40% Grass 60% Forb	Yes Yes	11.1 16.4	1.81 2.37	16.31 14.45	43.3 57.7
60% Grass 40% Forb	No No	16.3 11	2.05 1.69	12.58 15.36	54.9 45.1
60% Grass 40% Forb	Yes Yes	16.3 11	2.29 1.47	14.05 13.36	60.9 39.1

Only the densities of slender wheatgrass (more in 80% grass than 20% grass) and white prairie clover (more in 60% wildflower than 40% wildflower) were affected by the mix proportion, maybe because they were the species with the highest average establishment densities (0.79 to 1.95 plants per square foot).

Yet to be found are Opportunity Nevada bluegrass and Great Northern western yarrow. Some seedlings of Medicine Creek Maximilan sunflower were cut when the plots were mowed, so reported height values are re-growth after mowing. Seedheads developed in Pryor slender

wheatgrass, but not in Goldar bluebunch wheatgrass.

Eleven-week old Stillwater upright prairie coneflower seedling

Mix 2 grass and wildflower establishment

It is important to note weed control is a critical issue for successful pollinator planting establishment. Some weed problems can be avoided by thorough site preparation and diligent mechanical cultivation. Mechanical options may include timely mowing, although seedlings may be inhibited by shading from the clippings. Swathing and baling may be needed to remove the debris and minimize shading. This study will again be evaluated in 2015.

Susan R. Winslow – BPMC Agronomist

DATR Chatter

The Development of Acid/Heavy Metal Tolerant Releases (DATR) Project

As many of you know, the Development of Acid/Heavy Metal Tolerant Releases (DATR) project, sponsored by the Deer Lodge Valley Conservation District, has received funding from the Montana Department of Justice--Resource Damages Program for three more years. The project involves selecting superior plant materials and developing improved establishment techniques for restoring lands in the Anaconda, Montana, area impacted by historic smelting operations. The restoration site has very acidic soils (pH of 4.5) and most soil samples contain arsenic and copper concentrations exceeding EPA's upper range for phytotoxicity. Although testing and selection were designed specifically for the site conditions characteristic of the Anaconda-Butte area, these seed sources may perform well in other critical and non-critical areas with similar climates.

To date, the project has released six plants demonstrating excellent establishment under the acid/heavy metal conditions surrounding the former Anaconda smelter. Washoe Germplasm basin wildrye, Copperhead Germplasm slender wheatgrass, Opportunity Germplasm Nevada bluegrass, Old Works Germplasm fuzzytongue penstemon, Prospectors Germplasm common snowberry, and Mill Creek Germplasm silver buffaloberry have all been released by the NRCS Bridger Plant Materials Center for use by the commercial seed industry to increase seed production for restoration activities. All of the releases are native plants that originated in the mining/smelting impacted Upper Clark Fork River Basin.

Most recently, I have been working to complete and summarize the findings of several studies. Three technical notes were written explaining the plant selection process, describing the categories of plants that were tested, reporting on the results of a seed mix study conducted in the Anaconda Superfund site, and explaining how to design a seed mix for critical area restoration.

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.

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.

Mill Creek Woody CEP

The Mill Creek Woody CEP tests the performance of local (indigenous) sources versus non-local sources of woody plants when grown in low pH and heavy metal contaminated soil. The results could be the basis for future plant selections, as well as determining if off-site seed sources were appropriate for use on metal-affected sites in the Anaconda area.

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 (pictured below). Species, seed source selection, and their relative proportions in the mix are discussed. Although this technical note presents potential seed mixes for re-vegetating or restoring native plant communities on smelter-impacted sites in the Anaconda-Butte area of Montana, another goal is to provide the reader with the basic decision-making tools when developing custom seed mixtures. All three technical notes are posted at http://www.nrcs.usda.gov/wps/portal/nrcs/detail/mt/plantsanimals/?cid=stelprdb1245022.

Stucky Ridge, near Anaconda, Montana, 1999

Foundation Seed Available

The Plant Materials Center has Foundation seed on hand for all of the releases mentioned above, as well as for other releases. The seed is available

to certified seed and nursery growers. If you are interested in producing seed or growing plants of any of these releases, contact Bill Grey at the Montana Foundation Seed Program at:

Bill Grey, MFSP Manager
Phone: (406) 994-5687
Fax: (406) 994-7600
MFSP Web site: http://
plantsciences.montana.edu/FoundationSeed/

or

Mike Moore with Wyoming Seed Certification Service at:

Mike Moore, Manager
Wyoming Seed Certification Service
Director of Operations, Powell Research and Extension Center
Phone: 307-754-9815 or 307-754-2223
Cell: 307-202-0219
PREC Web site:
http://www.uwyo.edu/uwexpstn/centers/powell/

Joe LeFebvre, DATR Project Leader

Picture This!

Amur maple fall color at the Bridger Plant Materials Center