Plant Materials Center Studies and Plant Selection in 2018

There were several studies, plant evaluations, and seed increase activities at the Bridger Plant Materials Center (MTPMC) this past year. Shannon Filbey, our 2018 Big Sky Watershed Corp intern (see article below) installed, maintained, evaluated, and sampled the second phase of a national cover crop study at Bridger. This is a Plant Materials Program-wide replicated study comparing 8 species and 58 varieties including Austrian winter pea, radish, crimson clover, balansa clover, red clover, hairy vetch, cereal rye, and black oats. Some varieties, and even species, may not be adapted or practical for Montana and Wyoming, whereas others should be. Biomass sampling has been conducted each year and should provide good preliminary production data on these species and varieties. Look for study results in 2020.

National Cover crop study - Phase II.
Other cover crop work in 2018 included a replicated malting barley-cover crop study by Miles City area agronomist Mark Henning. Mark planted malt barley with and without three cover crop species (collards, flax, and clover) to quantify any potential differences in barley production and quality while enhancing soil health and potentially providing a forage crop. Mark collected extensive cover crop emergence data and farm foreman Darren Zentner collected barley production information. Final study report and/or technical note information will be available in 2019. Mark is also recording initial observations at Bridger of sunn hemp, guar, and sesame as potential cover crops for Montana.

Monica Pokorny and Shannon Filbey conducted the final evaluation of an alternate-row pollinator study planted in 2015 at Bridger. The goal of the study was to determine if planting forbs and grasses in separate (forbs in one row, grasses in the other) versus mixed in single rows results in better establishment of each life form.

We also evaluated and sampled a bluebunch wheatgrass initial evaluation planting, comparing 65 native bluebunch wheatgrass collections from Montana and Wyoming to ‘Goldar’ and ‘Anatone’. The goal of the study is to determine if there is a well-adapted seed source(s) from east of the Continental Divide for use in conservation applications in Montana and Wyoming. Several promising seed sources from Montana and Wyoming were identified, and the results of this initial evaluation planting can be found at bluebunch wheatgrass IEP. Next step – produce more seed of promising accessions and test them at Bridger and other locations in Montana and Wyoming.

Joe Scianna, Manager, Bridger PMC.
Recent Montana-Wyoming Plant Materials Publications

It was a busy year in 2018 summarizing final study reports, developing Technical Notes, writing progress reports and newsletters, and then getting them posted to the Montana NRCS and Plant Materials websites.

The Bridger Plant Materials Center Year 2018 Progress Report of Activities was recently completed and will be posted soon on both websites. This is a handy technical and informational summary of Montana-Wyoming Plant Materials activities and accomplishments for the previous year.

The study *Effect of Container Size on the Survival and Growth of Plains Cottonwood Populus deltoides* spp. *monilifera* Seedlings in a Riparian Planting in Eastern Montana, was a collaborative study with the ARS-Ft. Keogh Livestock and Range Research Laboratory in Miles City Montana. The study compared the performance of seedlings grown in three container sizes and investigated the effects of planting distance and elevation relative to the river near where they were planted. Although some benefits of deep pots were found, the results suggest that following established planting and maintenance procedures for plains cottonwood is adequate for targeted survival and growth in relevant conservation practices. For complete study findings, see the final study report results on the MTPMC website at cottonwood deep pots.

Two pollinator studies were completed in 2018, including *Spring Seeded Native Plants for Enhancing Pollinator Habitat* and *Dormant Seeded, Pollinator-Friendly Planting*. The spring planting tested and compared the establishment of six forbs when grown as single species, in a grass-forb mix, and in alternate-rows of forbs and grasses. All six forb species had acceptable performance in the individual species plots, mixed species, and alternate-row plots. Lewis flax, western yarrow, white prairie clover and prairie coneflower had the greatest plant density in all plots, and black-eyed Susan performed well. For complete study findings, see the final study report results on the MTPMC website. The dormant seeded study attempted to identify commercially available, pollinator-friendly forb species that establish well when seeded as a dormant fall planting. Purple coneflower, Maximilian sunflower, and silverleaf phacelia had the best overall performance of the six forb species when planted in individual, mixed, and alternate-row plots. For complete study findings see
In 2018, the MTPMC staff and Plant Materials Specialist continued working collaboratively on cover crop projects, partnering with Montana NRCS agronomists and Montana State University. Montana area agronomist Mark Henning completed final study reports for three cover crop projects he conducted with MTPMC staff in 2016 and 2017. The Evaluation of Cowpea and Mung Bean Varieties study attempted to identify well adapted warm season legumes for use in Montana and Wyoming in dryland cropping systems. All varieties exhibited excellent vigor and health, despite poor soil structure and soil compaction, and a lack of nodulation, demonstrating the potential for these species to do well in degraded soil. For complete study findings see the final study report results on the MTPMC website at cowpea and mung beans.

The Impact of Legume Seed Rate in Cover Crop Mix on Legume Presence and Production aimed to determine if higher seeding rates of cowpea and mung bean improved their establishment and biomass production in cover crop mixes. These species are used to add plant diversity and provide other benefits such as nitrogen fixation. Mark found significant differences in stand count between species and seeding rates. Cowpea, at 20 pounds per acre, had the highest stand count, while mung bean, at 5 pounds per acre, had the lowest stand count. For complete study findings see the final study report results on the MTPMC website at legume seed rate.

The Evaluation of Two Cowpea Varieties in a Cover Crop Mix study was based on earlier results indicating that the variety ‘Red Ripper’, due to its’ prostrate plant habit, may perform better in mixes than the upright ‘Iron & Clay’ variety, which is commonly used in cover crop mixes. ‘Red Ripper’ and ‘Iron & Clay’ were added separately to a six-way warm season cover crop mix at 20 pounds per acre and seeded in a dryland planting at the MTPMC. While there were no significant differences in stand count or biomass between ‘Red Ripper’ and ‘Iron & Clay’, there were differences in total biomass when cowpea biomass was added to the cover crop mix biomass. For complete study findings see final study report results on the MTPMC website at cowpea varieties.
Collaborative efforts at the MTPMC with Dr. Emily Meccage with Montana State University resulted in a final study report and Technical Note summarizing the findings of *Seeding Date Impact on Production of Four Perennial Cool-Season Forage Species* study. This study evaluated the impact of a delayed seeding date on forage establishment and yield. Two establishment dates were evaluated: early June 2015 (spring planting), and late July 2015 (summer planting). There was a significant impact of seeding date on plant count, with summer plantings having higher plant density compared to spring plantings. There was a trend for an effect of variety on weed count, with summer plantings having higher weed density compared to spring planting. There was no significant impact of seeding date on plant yields the year after establishment, but there was an impact of harvest and variety on plant yields. When water availability is not limiting, summer planting may be a feasible option for perennial forage establishment. For study findings see the final study report and Technical Note on the MTPMC website at seeding date impact and summer seeding.

**Joe Scianna, Manager, Bridger PMC and Monica Pokorny, MT-WY Plant Materials Specialist**

With 32 plant selections released to date, demand for MTPMC Foundation seed by commercial seed producers for certified seed production remains high. In 2018, the MTPMC maintained 31 active Foundation and Breeder seed production fields or orchards including ‘Trailhead’ basin wildrye, ‘Washoe’ basin wildrye, ‘Critana’ thickspike wheatgrass, ‘Rosana’ western wheatgrass, ‘Lutana’ cicer milkvetch, ‘Goshen’ prairie sandreed, ‘Shoshone’ manystem wildrye, Old Works Germplasm fuzzytongue penstemon, Stucky Ridge Germplasm silverleaf.

**Big Sky Watershed Corps Intern**

*Shannon Filbey Interns at the Bridger Plant Materials Center*

Shannon Filbey, Big Sky Watershed Corps.

Thanks to support from NRCS, the Montana Association of Conservation Districts, and the Soil and Water Conservation Districts of Montana, and the Big Sky Watershed Corps (Americorps) program, an intern was stationed at the MTPMC for most of 2018. Shannon Filbey arrived in February and hit the ground running, assisting with seed processing, data entry and database maintenance, map and spreadsheet development, and leadership on Phase II of our national cover crop study. Shannon also took leadership in the development of a new demonstration garden featuring conservation plant species – a favorite among NRCS staff and visitors. Shannon prepared the site, propagated the plants in the greenhouse, installed the weed fabric, planted the seedlings, and maintained the planting. Shannon’s assistance with studies and field operations was essential to our success and
smooth operation last year, and we’ll miss his work ethic and strong technical skills. Shannon completed his tour at Bridger in December and is currently planning on beginning his graduate program at the University of Montana this fall.

Joe Scianna, Manager, Bridger PMC.

Active Field Plantings

Field Plantings are an opportunity for Plant Materials staff to collaborate with NRCS field offices on studies or demonstrations to provide information applicable to conservation. Field plantings evaluate new plant species or planting technologies under a variety of soil, climatic, and land uses to assess their conservation potential under actual use conditions. In 2018, we evaluated 13 field plantings in Montana and Wyoming. Field Planting Reports summarize observations and evaluation results and provide useful information on lessons learned for incorporating into future plantings. Check out the 2018 field planting reports online.

Monica Pokorny, MT-WY Plant Materials Specialist

Facility Improvements

MTPMC Upgrades

PMC board of managers in front of remodeled shop. Remodeled chicken coop.

Thanks to the PMC Board of Managers, the Soil and Water Conservation Districts of Montana, the Montana Association of Conservation Districts, and NRCS there were numerous infrastructure improvements made at the MTPMC in 2018. The board funded the remodeling of two buildings, including
new windows, metal siding, entry and overhead doors, metal roofs, and structural upgrades. The buildings can now be used for irrigation supply and equipment storage, much needed space at the Center.

New concrete apron and bollards.  
New storage pad, sump, and bollards.

NRCS funded a new concrete apron behind the machine shed, a concrete pad and sump for the new chemical storage building, new sidewalks around the machine shed, safety bollards around the fuel tanks and chemical storage building, and a whole-facility 50 kW propane generator. Additional improvements are scheduled for 2019, including some siding repairs, a concrete floor, utilities to the new chemical building, and a seedbarn heater.

New 50kW generator.

Joe Scianna, Manager, Bridger PMC.

USDA is an equal opportunity provider, employer and lender.