



United States Department of Agriculture

# NRCS Bridger Plant Materials Center

## 2020 Progress Report of Activities

Issued November 2020

The Bridger Plant Materials Center (MTPMC) strives to provide technical information and other products supporting USDA NRCS Service Center staff and their clients. This report presents a brief overview of 2020 activities at the MTPMC within the Montana-Wyoming Plant Materials program and includes links to published Technical Documents on the MTPMC [website](#).

### New Studies in 2020

Four new replicated studies related to cover crops and soil health were initiated at the MTPMC in 2020. Ryan Noack, 2020 Big Sky Watershed Corps member, led two studies. The first is titled *Sorghum-Sudangrass Varietal Study* which compares the stand establishment, height, and biomass production of four popular sorghum-sudangrass varieties. With numerous varieties of variable price available on the commercial market and little replicated testing in Montana and Wyoming, this study aims to quantify variety performance relative to cost. A second companion study titled, *Sorghum-Sudangrass Varietal Performance as a Component of a Cover Crop Mix*, takes a practical look at the performance of the four tested sorghum-sudangrass varieties when incorporated into a cover crop mix.



Figure 1. Seeding replicated studies at the MTPMC.

A third cover crop study was initiated by Mark Henning, NRCS Area Resource Conservationist at the Miles City Area Office and is titled *Impact of Berseem Clover Seeding Rate in Cover Crop Mix on Legume Presence and Production*. With limited options for legumes in warm season cover crop mixes in this part of the US, this study evaluates berseem clover, which demonstrated adaptation to Montana and Wyoming environments in earlier trials. The performance of a six species cover crop will be evaluated with berseem clover seeding rates of 1, 2, and 4 pounds per acre.



Figure 2. Biomass sampling in cover crop study.

The fourth cover crop study is titled *Impact of Cover Crop Seeding Rate on Stand Establishment and Biomass Production* and compares various cover crop seeding rates (50, 75, 100, and 125% of the recommended rate) and their effect on stand establishment and biomass production per acre. A conventional seven species, warm season cover crop mix was used in the study. The goal of the study is to determine if conventional seeding rates are providing optimum production and conservation benefits relative to cost.

In addition to replicated studies, Darren Zentner, PMC Farm Foreman, initiated two new projects to determine if there may be trends or outcomes suggesting a need for

more extensive studies. One project evaluates inconsistent seedling emergence and stand establishment of Opportunity Germplasm Nevada bluegrass. It was sown at four depths and four packer wheel pressures to evaluate appropriate seeding technology. Another observational project evaluates the effects on seed

production of three different rates (none, 100%, 200%) of spring fertilizer applied to an established stand of 'Rosana' western wheatgrass. Both projects will be evaluated in 2021.

### Products and Technology Transfer

In 2020 the MTPMC completed and posted several publications and continued its webinar-based training program for NRCS field staff and partners.

The [release brochure for 'Rosana' western wheatgrass](#) was revised and updated. This MTPMC release is widely used in many conservation practices where a rhizomatous native species is beneficial or needed. It's strong sod-forming characteristics make it particularly effective for stabilizing soils and reducing soil surface erosion. It is broadly used as a reclamation species for improving depleted rangelands, mine lands, roadsides, recreation areas, and construction sites. It makes excellent late-season forage for cattle, livestock, and elk, among other species.



Figure 3. Rosana western wheatgrass.



Figure 4. Sunn hemp.

The final study report for [Effect of Guar and Sunn Hemp Seeding Rate on Stand Count and Biomass Production in a Warm Season Cover Crop Mix – One Year Results](#) project is available. Cover crops are useful tools for enhancing soil health and providing other conservation benefits, but little information is available on individual species performance in multi-species mixes. In this study, two leguminous crops, guar and sunn hemp, were seeded in a six-species cover crop mix at various rates. Guar seeding rate resulted in plant density and aboveground biomass differences, but no differences were seen with varying sunn hemp seeding rates. Neither guar nor sunn hemp seeding rate affected the aboveground biomass production of the cover crop mix.

The final study report for [Effects of Companion Cover Crops on One Year of Malt Barley Production](#) project is now available. This study investigated the effects of a three-species cover crop mix (crimson clover, forage collards and flax) sown with a conventional malt barley crop. Cover crops sown with or after cash crops may provide important conservation benefits. In one year of testing, the cover crop mix had no impact on the quantity or quality of the barley crop.



Figure 5. Combining malt barley.

The [Cover Crop Seeding Date](#) final study report is also available. Although cover crops are often sown in the spring or early summer when soil temperatures reach 60°F, it may be possible to sow them earlier. Earlier cover crop establishment allows access to sub-irrigated sites that are difficult to plant later in the spring or allows producers to accomplish field operations before the busy growing season. In this study, two different seeding dates (March 30 and April 22) did not result in significant differences in cover crop vigor, percent stand, stand count, or aboveground biomass. However, there were differences among individual cover crop species.





Figure 6. Seeding depth study.

The [Effects of Seeding Depth and Propagation Media on Seedling Emergence of Three Conservation Species](#) final study report by Zach Lenning (former Big Sky Watershed Corps member at MTPMC and now Montana NRCS Soil Conservationist in Chinook) demonstrates the importance of seeding depth and soil type on seedling emergence, especially for small-seeded species. Three species, lacy phacelia, Sandberg bluegrass and western yarrow were planted in sand or clay soil and sown at four separate depths. Results of this study show that seeding depth and soil type effect seedling emergence differently by species.

The final study report for [Pheasants Forever Upland Gamebird Cover Crop Mixes for Salt-Affected Sites and Custom Warm Season Cover Crop Mixes for Salt-Affected Sites](#) is now available. Although not replicated, these two demonstrations provide insight into cover crop salinity tolerance and suggest what circumstances may or may not be appropriate for the use of the tested species and mixes. Overall, cover crop biomass production on soils above 6 dS/m of conductivity (USDA soil salinity classification of “slightly saline”) was very low, suggesting salt-tolerant perennials may be a better fit for these conditions. On sites classified as “non-saline” or “very slightly saline” with less than 4 dS/m of electrical conductivity, the tested species may offer some conservation and production benefits.

Also finalized this year, the [Mixed- and Alternate-Row Seeding of Native Grasses and Forbs to Enhance Pollinator Habitat](#) study results suggest that alternate-row seeding is not needed to establish forb species in a pollinator planting. The species seeded performed similarly whether seeded in alternate rows or mixed rows, and in the presence or absence of a low percentage (5%) of slender wheatgrass. The species selected was the most important factor in seeding success. Species that established and performed well in all treatments were Indian ricegrass, bluebunch wheatgrass, slender wheatgrass, sideoats grama, blanketflower, Lewis flax, prairie coneflower, and white prairie clover.



Figure 7. Mixed and alternate-row pollinator study.

The [Evaluation of Cool Season Cover Crops in Southern Montana](#) study evaluated 58 commercially available cultivars and varieties of eight common annual, cool season species for their adaptation to Montana and Wyoming. Austrian winter pea, balansa clover, black oats, cereal rye, crimson clover, daikon radish, hairy vetch, and red clover varieties were evaluated for field emergence, plant height, days after planting to 50% bloom, disease and insect damage, and aboveground biomass production in 2017 and 2018. The same species and cultivars were evaluated at 25 Plant Materials Centers throughout the United States. Our Technical Note summarizes research findings for each species and provides reference table summaries on each species’ height, biomass, forage values, and nitrate levels.

In addition to the items discussed/linked above, the following documents were produced in 2019 and are available on the [MTPMC website](#).

Poisonous plants contain or produce substances that cause sickness, metabolic disorders, death, or health concerns in animals when ingested. Each year these plants adversely affect 3 to 5% of the cattle, sheep, goats, and horses that graze western United States rangelands, pasture, and forest lands. There are many plants in Montana and Wyoming that have been suspected of being poisonous. However, these plants vary in their toxicities, the types of animals affected, and the environmental conditions when poisoning occurs. In response to the many questions received on poisonous plants over the last few years from NRCS staff, Montana and Wyoming NRCS staff in collaboration with Montana State University and University of Wyoming scientists produced a new publication: [\*Plants Poisonous to Livestock in Montana and Wyoming, Considerations for Reducing Production Losses\*](#). This publication describes signs of poisoning and livestock affected, toxic doses and factors influencing toxicity, and the habitats where these poisonous plants grow in Montana and Wyoming. Environmental and management conditions leading to livestock poisoning along with management considerations to prevent or minimize impacts is also discussed.



Figure 8. Meadow deathcamas.

Plant Guides: [\*Desert Madwort \(Alyssum desertorum\)\*](#), [\*Hoary Alyssum \(Berteroa incana\)\*](#), and [\*Russian Olive \(Elaeagnus angustifolia\)\*](#)

Brochures: [\*Invasive Grasses in Montana\*](#) was developed with Montana State University to aid in the identification of invasive grass species.

[\*How to Choose a Good Pollinator Seed Mix\*](#) is a colorful and informative guide for landowners interested in seeding pollinator plants.

### Training

As a result of the positive feedback received on our virtual training in 2019, webinars for NRCS field staff and partners were again offered in 2020. Monica Pokorny, Plant Materials Specialist, Mark Henning, Miles City Area Resource Conservationist, and Joe Scianna, PMC manager, provided training on a variety of topics including *Plant Materials Selections for Rangelands*, *Cover Crop Selection for Montana and Wyoming*, *Interpreting a Seed Label and Seed Analysis Report*, and *Windbreaks: Plant Storage, Handling and Planting*. PowerPoints of these presentations can be found on the Montana and Wyoming NRCS SharePoint for NRCS employees.

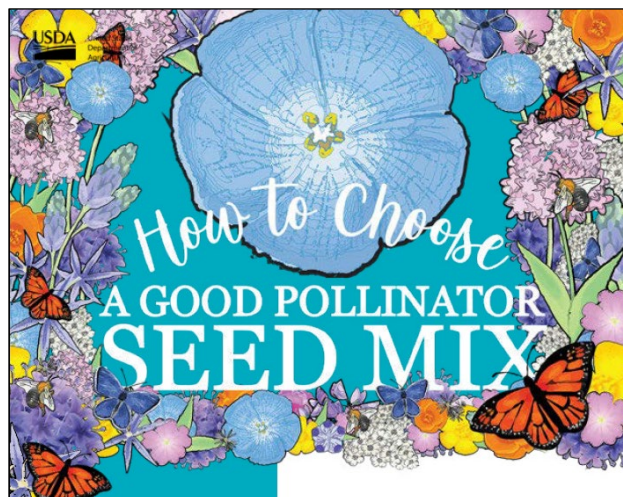


Figure 9. Cover of new pollinator seed mix brochure.

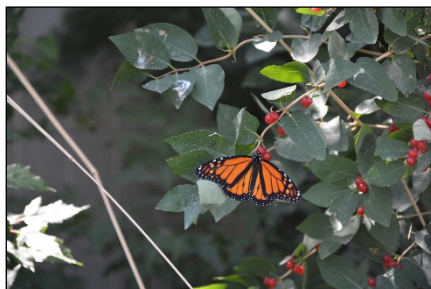


Figure 10. Monarch butterfly at MTPMC.

### Outreach to NRCS Customers, Partners, and the Public

In addition to training provided through webinars, Montana Plant Materials program staff collaborated with our customers, partners, and the public to provide presentations at multiple events and to multiple audiences. These presentations included: Montana Native Plant Society, Montana Society of American Foresters, Association of State Geologists, Montana State University Extension training events, Montana Audubon Center, Billings Pollinator Week event, and Conservation District events.



## Field Plantings



Figure 11. Insect on milkweed flower.

Field plantings are a collaboration of Plant Materials staff with NRCS Field Offices to 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 2020, we evaluated 11 field plantings in Montana and Wyoming. Observations were noted in three newly established field plantings. Our milkweed planting near Hamilton, MT, found that showy milkweed can establish from seed or rhizome transplants on sites with a high-water table or where soil around the roots remain moist (not wet) throughout the summer. In a smooth brome pasture diversification project near Stanford, MT, blanketflower was the best establishing native forb and sainfoin the best establishing introduced forb. In a similar smooth brome pasture diversification project near Cascade, MT, drill seeded small burnet, cicer milkvetch and/or forage chicory planted into glyphosate-treated pasture established and increased in density, canopy cover, and height over time. Sainfoin established on this site but decreased as the smooth brome recovered from the herbicide treatment.

Check out results of all MT and WY plantings on the [field planting reports website](#). Reports provide useful information on lessons learned for future conservation plantings.



Figure 12. Combining Foundation seed.



Figure 13. Back of plot drill seeding a Foundation field.

## Foundation Seed

A majority of cost-efficient, readily available conservation species seed originates from the Plant Materials Program. Demand for MTPMC Foundation seed by commercial seed producers for certified seed production remains high. In 2020, the MTPMC maintained 42 Foundation and Breeder seed production fields or orchards. Making sure Foundation seed is available for certified seed production by commercial seed growers is extremely important to our program, and ensures a consistent supply is available for various conservation practices (like revegetation after wildfires!). In the future, the MTPMC will be working with cooperators to contract produce Foundation seed. In the interim, the MTPMC will continue to distribute Foundation seed, although in more modest quantities, to commercial growers. A [listing of our releases](#) is on the web.

### Bridger PMC Staff

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The NRCS MTPMC is one of 25 Centers nationwide using plants to solve natural resource problems. Our current program emphasis addresses rangeland health, cover crops and soil health, pollinator-friendly plantings, woody plant establishment, and technology transfer, training and outreach. Our work reflects the current needs identified by our field staff. Our primary products include the development of new conservation technologies, conservation staff training, plant testing and selection, and Foundation seed production.