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Aberdeen Plant Materials Center

2022 Progress Report of Activities

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The mission of the USDA NRCS Plant Materials Program is to develop and transfer effective state-of-the art plant science technology to meet customer and resource needs. The Aberdeen Plant Materials Center (IDPMC) was established in 1939 to evaluate and select plant materials and techniques for establishment and management of plants for use in resource conservation activities in the Western United States.

There are 25 PMCs nationwide, each serving a specific geographic and ecological area. IDPMC serves portions of the Intermountain West including southern Idaho, western Utah, northern Nevada, western Wyoming, and eastern Oregon.

Aberdeen's primary areas of focus are improving habitat for at-risk wildlife species such as sage-grouse, improving range and pasture productivity, and increasing plant species diversity on Intermountain rangelands. We are also investigating plants and technologies for improving soil health in Intermountain agricultural lands. For more information on any of these, or other, PMC projects, please call or email the center with the information at the top of the page.

Long-Term Evaluation of Bluebunch and Snake River Wheatgrass

While plant materials releases have typically undergone some level of testing, long-term comparisons and evaluations are relatively few. Understanding long-term environmental adaptation of species and releases is critical for persistent site restoration and rehabilitation. IDPMC established a multi-species display nursery in the semiarid Snake River Plain at Orchard, ID in 2004. The display nursery included nine entries of bluebunch wheatgrass and four entries of Snake River wheatgrass, which were evaluated yearly for plant density from 2005 through 2008, and again in 2021. In this non-replicated case study, we found several bluebunch and Snake River wheatgrass accessions and releases adapted to local site conditions but not being of local origin. Our observations further suggest that Anatone Germplasm bluebunch wheatgrass may be better adapted to lower precipitation areas than 'Goldar'. We did not see evidence that Snake River wheatgrass was more drought tolerant than bluebunch releases at the Orchard study site, but rather we saw significant variation among releases or accessions of each species. See our study report for more information.

Plots of bluebunch wheatgrass and Snake River wheatgrass were evaluated over a 16-year period at Orchard, Idaho.

When a Weed is Not a Weed

A weed is typically defined as a plant that interferes with management objectives. However, there may be instances when a plant is unwanted in an area only because someone else has declared it a weed. The popular book, Weeds of the West, for example, lists 350 problematic plant species. However, among the many non-native and invasive species listed, the book also contains over 100 species native to the region, several of which have no apparent liability other than not providing optimal forage to livestock. As a result, many native species have developed a stigma that has prevented them from being used for native site ecological

reclamation and restoration. This stigma attached to ruderal native species has kept what may be a valuable tool out of the hands of restoration practitioners, potentially hampering restoration efforts. To address these issues, we are giving consideration to native "weeds" and seeing new restoration potential. Many native ruderal species possess the exact attributes that are most sought after for restoration, i.e., drought tolerance, adaptation for establishing in disturbed conditions, and the capacity to compete against true invasive species. A native weed's ability to capture disturbed sites such as roadsides and degraded pastures can be suited for site reclamation projects like post-fire rehabilitation, oil and gas reclamation, and CRP seedings.

In a recent issue of Rangelands, we outline the benefits of native weeds and their place as a tool for restorationists. We also provided the photo for the cover!

Root Length

One very important plant trait for restoration is early root development. Plants with faster growing roots are better able to take advantage of intermittent moisture and get established, and they can better withstand later dry spells. By measuring root lengths shortly after germination, we can compare plants from different populations and select promising accessions for future plant releases. Measuring small, twisting roots, however, can be a challenge. We have found a way to scan young seedlings flattened within transparent sheets to upload seedling imagery onto the computer. We then use software designed to measure snakes to calculate root lengths. We are applying this technology to all the new species currently under evaluation.

Seedlings from two different populations of curlycup gumweed presented on transparent sheets for measuring root lengths. Seedlings on the left had significantly longer roots after 10 days of growth than seedlings from the other population.

PMC Mentoring

In early October, we were excited to welcome WAPMC Agronomist Jessica Wayment for a visit. This in-person mentorship meeting allowed us to showcase IDPMC studies, facilities, equipment, and methods. The two PMCs have been identifying and discussing areas where we can collaborate in the future. This visit included a trip to the desert to collect seed with a racquet and hopper.

WAPMC Agronomist Jessica Wayment collects seed from curlycup gumweed with a racquet and hopper.

Breeder and Foundation Seed Production

The Aberdeen PMC produces the highest quality conservation seed available and is responsible for the production of Breeder and Foundation seed of 20 plant releases. In 2022, the PMC had seed production fields of 'Tegmar' intermediate wheatgrass, Anatone Germplasm bluebunch wheatgrass, Richfield Selection firecracker

penstemon, Clearwater Selection Venus penstemon, ‘Goldar’ bluebunch wheatgrass, ‘Appar’ blue flax, Maple Grove Germplasm Lewis flax, ‘Paiute’ orchardgrass, ‘Regar’ meadow brome, and Soda Springs Germplasm buckwheat. Seed growers should contact the University of Idaho Foundation Seed program or the Utah Crop Improvement Association to request Foundation or early generation Certified seed of these or our other plant releases.

Foundation seed produced by the PMC is allocated through the University of Idaho Foundation Seed program or the Utah Crop Improvement Association to seed producers.

National Parks

IDPMC has been working with Yellowstone National Park for many years to produce seed for restoration efforts within the park. In 2020 the PMC entered into a new agreement to produce seed of several grasses and forbs including: mountain brome, Idaho fescue, western needlegrass, slender cinquefoil, showy goldeneye, curlycup gumweed, sulphur-flower buckwheat and silky phacelia.

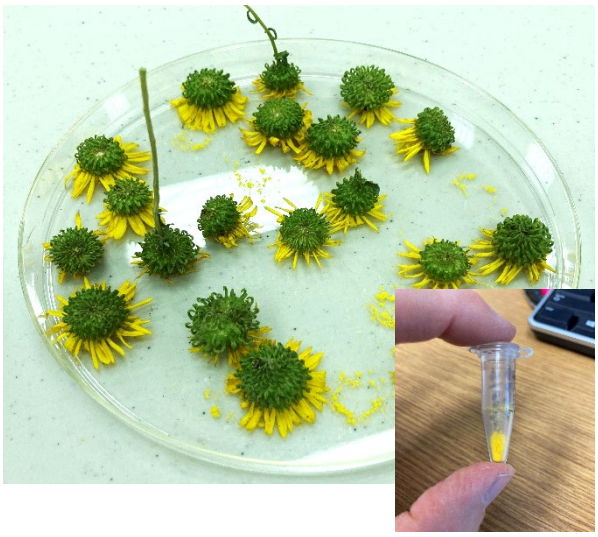
The PMC is similarly working with Grand Teton National Park to increase seed of source collections from the park to be used for restoration projects. This year we installed new production plots of mountain brome, wooly sunflower, Lewis flax, western aster and western yarrow.

Cinquefoil being grown for seed production for Yellowstone NP.

Contribution to a Pollen Nutritional Composition Database

Bees depend on pollen to provide lipids and protein—essential nutrients not available in nectar. Currently, PMCs are working with ARS bee scientists, who are analyzing the nutritional composition of pollen from various bee forage plants. The results will eventually be included in the PLANTS database profile for each species analyzed. This database will be the first of its kind for bee forage plants in North America.

IDPMC is interested in the pollen nutrition of curlycup gumweed, a native forb. The plant blooms and produces pollen in the fall, making it a valuable late-season food source to native bees in the arid west. We collected pollen in September and sent it to ARS for nutritional analysis. Collecting pollen directly from the gummy inflorescences was a challenge; the most effective collection method was to place the flower heads face down on a petri dish and collect the pollen that was shed over time into a composite sample. We will continue to contribute to the pollen nutritional database in the future.



Pollen collection from curlycup gumweed flowers for nutrient analysis.

Oxygenated Water Germination

In laboratory and greenhouse activities, it’s often desirable to speed up the germination process. Many species have a significant dormancy mechanism that requires lengthy stratification treatments before seed will germinate. IDPMC discovered a method that can drastically speed up germination rates, and in some cases, bypass the stratification need. Placing the seed in highly oxygenated water stimulates germination and seedling growth in many species, allowing us to speed up propagation and synchronize growth evaluations. Here is a list of a few species that have responded positively to an oxygenated water treatment: Nebraska sedge, Baltic rush, pale evening

primrose, curlycup gumweed, large-flowered Agoseris, Idaho fescue, Munroe's globemallow, and sand dropseed. We will continue to screen species and quantify these benefits over the next winter.

Seeds of curlycup gumweed placed in oxygenated water begin to germinate within 24 hours. Standard germination of this species typically requires a 60-to-90-day stratification period to induce germination.

Products and Technology Transfer

Training Videos

Our in-person training efforts have been affected due to COVID-19 restrictions. In 2020 we posted four videos to the Idaho NRCS YouTube Channel, and in 2022 we added a new video on succession management. So far, these videos have garnered nearly 1,000 views since posting.

- IDPMC Overview
- How to Develop a Seed Mix
- Drill Calibration
- Grass Identification
- Succession Management

Final Study Reports

- Establishment and management of showy milkweed in Idaho's Snake River Plain
- Seedling emergence and seed production of curlycup gumweed
- Preliminary greenhouse study to evaluate the effects of native soil amendment on seedling growth of early- and late-seral natives compared to cheatgrass (*Bromus tectorum*), an exotic annual
- One-year evaluation of warm season cover crops in the Intermountain West
- 16-year case study of bluebunch wheatgrass and snake river wheatgrass plant materials in Idaho's Snake River Plain

Technical Notes

- Technical Note 79: Succession management for rangeland seedings
- Technical Note 78: Propagation, production, and management of selected plants with ethnobotanical uses in southern Idaho
- TN19s: Calibración de una Sembradora para Siembras de Conservación

Journal Articles

- When a weed is not a weed: succession management using early seral natives for rangeland restoration. Rangelands 44(4): 270-280.
- Establishment and 10-year persistence of plant materials at Curlew National Grassland in southern Idaho. Native Plants Journal 23(2): 178-192.
- Establishment and management of showy milkweed in Idaho's Snake River Plain. Tree Planters Notes 65(2): 44-53.
- Seed production and propagation of northern bog violet for Nokomis fritillary butterfly habitat restoration. Native Plants Journal 23(1): 13-138.
- Assessment of biogeographic variation in traits of Lewis flax for use in restoration and agriculture. AoB Plants 14(2).
- Seedling Emergence and Seed Production of Curlycup Gumweed. Native Plants Journal 23(3): 299-308.

Fact Sheet

- Succession Management: Building resilience with native "weeds"

Release Brochures

- Fish Creek Germplasm bottlebrush squirreltail
- Sand Hollow Germplasm bottlebrush squirreltail
- Toe Jam Creek Germplasm bottlebrush squirreltail

Presentations

- Plant Identification, Camas NWR
- Succession Management, BYU
- Succession Management, SRM online meeting
- Cover Crop Rate Trials, Idaho Soil Health 5 for 5

Website

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