



United States Department of Agriculture

2023 ANNUAL PROGRESS REPORT OF ACTIVITIES, NORMAN A. BERG PLANT MATERIALS CENTER

Special Project: USDA Headquarters People's Garden



Figure 1: Jorge Penso hosting a tour of the People's Garden for participants in the Urban Transformation Network.

The People's Garden continued to thrive in 2023. While PMC staff were working in the garden, we interacted with international visitors from across the world, children exploring plants, local workers having lunches and conversations, and gardeners getting new ideas about what to plant and how to best care for their gardens. With the help of the PMC staff and a group of dedicated volunteers the garden harvested and donated over 400 lbs. of produce to DC Central Kitchen.

We added many new features to the garden this year, including an information board to share resources about NRCS programs and to share schedules of USDA educational demonstrations for the public. We also added a little free library to share books about gardening, soils, and botany. We updated signage in the garden, making more durable, accessible information available for visitors about the People's Garden Initiative, about sustainable agriculture, and about the garden's plants.

Over the course of the growing season we interacted with over 100 visitors from across the United States and the world. We also provided People's Garden tours for many groups, including: students at Cultivating Change Summit, a conference for LGBTQ students interested in agriculture; fellows in the The Terra Preta do Indio Tribal Fellowship program, who were faculty and staff at tribal colleges and universities (TCUs); participants in the USDA internship for college students from families where a parent had immigrated to the U.S. to work on farms, and students from Chicago who are part of the Urban Transformation Network and are involved in the Chicago People's Garden hub (Figure 1).

We were able to create a variety of more formal demonstrations and educational opportunities at the garden for groups of different ages and knowledge levels. This summer and fall we hosted a cooking event in collaboration with a world-renowned chef, we shared ideas and knowledge with students in a high school Environmental Literacy program, and we partnered with the Center for Faith Based Initiatives to host a Sukkot celebration in the garden. In association with the U.S. Forest Service, we hosted a forest therapy session in the garden as part of the World Forum on Urban Forests conference.

We worked again this year with the Agricultural Marketing Service to demonstrate growing a variety of plants and mushrooms to visitors at the USDA Farmers Market. With the help of our public affairs team, we created more videos on Instagram that provided cultivation tips and other interesting facts about plants and gardening. In the 2024 growing season we are looking forward to our partnership with the Xerces society, which will set the groundwork for more demonstrations of pollinator-friendly plantings in the garden, and will help facilitate more partnership building for events.

Cool-Season Grasses Forage Growth Curve Study

The MDPMC continued a study to document dry matter yields of common forage grasses following a simulated hay production regime (Figure 2). This study is generating data for the RUSLE2 and WEPP applications and will provide information for NRCS mid-Atlantic Forage Suitability Group Descriptions. Forage growth curves ultimately benefit producers’ ability to implement an effective stocking rate, balancing forage availability and demand.

In this, the third of a four-year study, we clipped ‘Max Q’ tall fescue (novel endophyte) and ‘Persist’ orchardgrass forage grasses to record the growth of the grass in a field for haying. Usually, hay is harvested 3-4 times seasonally; Figure 2 details the growth of the grasses for each of these hay cuts. We measured grass growth a total of thirty-six times over the growing season (Apr. -Dec.). Forage grasses performed well. Max Q tall fescue’s yield was lower than orchardgrass in the first cut (early May; 2000 lbs./A. vs. 4100 lbs./A.) and in the total seasonal yield (5100 lbs./A vs. 8300 lbs./A).

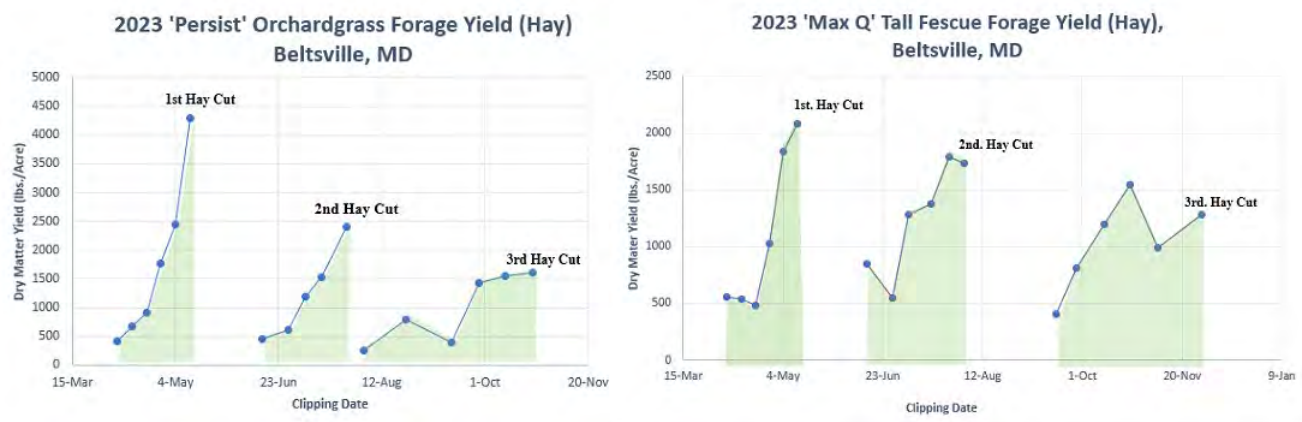


Figure 2: Max Q' tall fescue (left) and 'Persist' orchardgrass (right) forage yields (hay) throughout the 2023 growing season, documenting the timing and dry matter yields from the first, second and third cut of hay from fields at the Norman A Berg Plant Materials Center.

Wildflower Establishment Using Teff, Demonstrations and Study



Figure 3: Wildflower planting at Urban Farm Incubator at Watkins Regional Park, July 14, 2023.

After a successful demonstration at NASA Goddard Space Flight Center using teff as a weed controlling nurse crop for wildflower plugs, the PMC continued the partnership and planted additional areas at NASA to demonstrate seeding of wildflowers into teff residue following rototilling and seeding a teff smother crop.

NASA and PMC staff hosted a Meadow Day at NASA to showcase our successful demonstrations using teff for site preparation and wildflower establishment. Federal land managers from across the government including representatives from NASA, USGS, DoD, USFWS, FDA, the Naval Research Lab, and University of Maryland Extension, came to observe the one- and two-year-old wildflower plantings to learn about our experience in alternative site preparation methods, weed control and future evaluations of wildflowers seeded into teff residue. These demonstrations were especially important for land managers who are restricted in their use of herbicides and are seeking alternatives for converting land to wildflower plantings. We demonstrated methods for spring tilling or tarping followed immediately by seeding teff and planting wildflower plugs. We also demonstrated spring planting teff for fall planting wildflower plugs; this method has the added benefit of requiring less watering for the wildflowers.

To understand the effectiveness of using teff to suppress weeds before seeding wildflowers, we have established several additional plantings. At the PMC we installed a small demonstration in December 2021 using wildflower seed remaining from previous work as well as seed from the USGS Native Bee Inventory and Monitoring Lab in Beltsville, MD. Weed suppression remained strong in 2022 while allowing some wildflowers to establish. In 2023 the wildflower diversity increased while the weed pressure remained low.

In 2022 we established a fall seeded wildflower planting following spring tilling and teff seeding at the Urban Farm Incubator at Watkins Regional Park. In 2023 the black-eyed Susans put on quite the show (Figure 3) while other wildflowers were smaller in size and number, and the weed pressure remained low. We have also established additional demonstration plantings at the USGS Native Bee Inventory and Monitoring Lab in Beltsville, MD, and at NASA Goddard. To further demonstrate site preparation using teff in an NRCS planting, the PMC provided guidance for a Wetland Reserve Easement planted Carrol County that reduced the need for herbicides in a sensitive area.



Figure 4: Turfgrass planting with teff to suppress weeds ahead of wildflower plantings in the winter of 2023/24.

We seeded a large area at NASA with teff in 2023 (Figure 4) and in 2024 we will use this field to demonstrate dormant seeding of wildflowers into teff residue including a study to examine the best practices that support wildflower establishment when seeded into thick weed-suppressing teff residue. The six study treatments include two seeding methods (drilling or broadcasting), over three seeding dates. We aim to provide recommendations on dates and seeding methods for establishing wildflowers in teff residue in the Mid-Atlantic region.

Cool Season Cover Crop Biomass Accumulation Study

The MDPMC completed the cool season cover crop biomass study and will continue work as mentioned above with the nationwide study to evaluate rate, date and termination timing on biomass and other attributes. Cereal rye is one of the most common cover crops in the mid-Atlantic, but its large stature at termination can complicate cash crop planting. This study evaluated the biomass production of two varieties of cereal rye and four grains with shorter stature.

We planted cereals in two separate studies. We planted one study as cereal monoculture at 30 and 60 Pure Live Seed (PLS) pounds/acre. The other study was planted with cereals at 15 or 30 PLS pounds/acre with and without ‘Kentucky Pride’ crimson clover (10 PLS pounds/acre). Shorter varieties produced less biomass and grain plus crimson clover treatments generally produced higher total biomass than grain alone. Crimson clover reduced grain biomass, but the biomass production of crimson clover compensated for the lower biomass of the grains. Average heights and biomass production for the grains were 17 inches and 1.2 tons per acre for ‘Cosaque’ black oats, 29 inches and 2.2 tons per acre for ‘Atlantic’ winter barley, 31 inches and 2.1 tons per acre for SY TF813 triticale, 36 inches and 2.0 tons per acre for P919 winter forage barley, 69 inches and 3.0 tons per acre for ‘Wintergrazer’ cereal rye, and 70 inches and 3.3 tons per acre for ‘Wrens Abruzzi’ cereal rye.

Solar Installation Seed Mix Grazing Demonstration



Figure 5: (Left) Solar grazing demonstration (April 2022) showing a diversity of flowering forbs. (Right) MD-PMC staff and interns from NRCS-DE observing pollinators visiting a high-diversity mix.

Since 2021, we have been working with the American Solar Grazing Association, NRCS-New York, and the NYPMC to investigate forb/grass seed mixes which support pasture for sheep underneath or between solar panels. We planted seven different pollinator-friendly grass/forb/legume mixes in August 2021, and documented plant presence/absence in May, June, August and October of 2022 and 2023.

After 2 years, all species present in the plots were under 4 ft tall, one of the requirements for plantings below solar arrays. We managed the fields by mowing high (18 inches) to reduce weed growth and weed seed development.

Cool season grass/legume mixes and forb mixes established well. In the high diversity mixes, about half of the planted forbs emerged. The cool season grasses (Kentucky bluegrass, perennial ryegrass, red fescue, hard fescue, and orchardgrass), established well in mixes. Most legume species we planted established well in mixes (white clover, red clover, alsike clover, wild senna, bird's foot trefoil, sensitive pea and partridge pea). Two legume species did not establish well in the mixes; blue false indigo (established from only 1 of 3 mixes) and roundheaded lespedeza (did not establish in the 1 mix where it was planted). Of the 27 varieties of forbs we planted, only 10 established and persisted in their mixes (these were: swamp milkweed, New England aster, aromatic aster, blue chicory, lanceleaf coreopsis, purple coneflower, orange coneflower, mistflower, oxeye sunflower, wild bergamot, and early goldenrod).

None of the warm season grasses planted in this demonstration (sideoats gramma, blue gramma, purple lovegrass, roundseed panicgrass, and little bluestem, all of which generally establish slowly) established over the course of two years. For a warm season grass pasture, producers often clear the land with an herbicide that affects other plants besides the warm season grasses, but that wasn't possible here, (since we were trying to establish a mix of species). Producers who aim to establish WSG in seed mixes should have a expertise in applying herbicides effectively. To make more conclusions about solar installing seeding mix management, a more complex study is necessary.

Effects of seeding rate, date & termination timing on biomass and other attributes of cool season legume & grass cover crops for production agriculture

The MD PMC is one of 12 PMCs to participate in a nationally coordinated study on the Effects of Seeding Rate, Date and Termination Timing on Biomass and other Attributes of Cool Season Legume and Grass Cover Crops for Production Agriculture. Cover crops can provide soil health benefits when they are planted and terminated in the recommended timing windows for the region. However, producers may choose sub-optimal cover crop planting and termination dates based on when they need to harvest their fall crop and when they need to plant their spring crop. The objective of this study is to evaluate the effect of seeding dates, rates, and timing of termination on attributes of adapted varieties of cool season legume and grass species across a range of climatic conditions. This study will enable the PMCs to provide region-specific guidance and recommendations for improving cover crop outcomes to increase adoption and economic feasibility.



Figure 6: Study plots after seeding cereal rye, September 26, 2023

This study will evaluate three seeding dates and 5 seeding rates of cereal rye: 15, 30, 60, 90, and 120 PLS lb./ac. The Plant Materials Program is partnering with USDA Agricultural Research Service and North Carolina State University to test 3D biomass imagery technology, to estimate biomass. The 3D biomass imagery will be collected using a tablet capturing images of the cover crops from many different angles at a set height above the ground; software then generates the biomass estimates. We are also measuring cover crop height and conducting a final destructive biomass harvest. In this study we'll be able to compare the data generated by the 3D biomass imagery with the data generated by traditional methods, to potentially make future data collection more efficient. Other measurements will include, fall canopy cover, spring canopy cover, days to closed canopy, and canopy cover at biomass termination.

In FY 2023, we prepared for the first year of a 2-year study on cereal rye by conducting soil tests, liming, tilling, and smoothing the field with a drag harrow, and by preparing our equipment for effective data collection. The first seeding of cereal rye was completed on September 26, 2023 (Figure 8). Hairy vetch will be added to the study in 2024 and evaluated for two years.

***Collaborative Project Between Universities and Plant Materials Centers
Examining Plant Technology to Mitigate Saltwater Intrusion on
Agricultural Land Using Coastal Riparian Herbaceous Buffers***

Coauthored by Shawn Belt, Scott Snell, Chris Miller, and Natalie Howe



Figure 7: George Washington University Students collecting biomass samples in Somerset County, MD July 2023

With research partners from University of Maryland, George Washington University and University of Delaware, the MDPMC and NJPMC staff continued to evaluate the function and use of conservation plants experiencing irregular saltwater flooding, collecting data on biomass, forage quality, and weed pressure (Figure 5). The research plots were established in 2021 using bare root propagules harvested from Cape May and Beltsville PMCs and planted at two farms in Somerset County, Maryland where saltwater intrusion presents a growing threat to crop production.

Based on needs identified by the Maryland State Biologist and input from Bob Glennon, Virginia Tech Conservation Management Institute Private Lands Biologist and former Plant Materials Program employee, we are planning a project to evaluate pollinator seed mixes and develop recommendations for conservation cover plantings in areas expected to convert to brackish or salt marsh over the next decade or so.

Technology Transfer, Publications, Presentations, Training, & Outreach

- People’s Garden tour for Office of Urban Agriculture and Innovative Production. December 2022
- Pennsylvania Farm Show– Backyard Conservation and Attracting Pollinators Exhibit. Jan 2023
- Wildflower Establishment Meadow Day Tour– NASA. May 2023.
- People’s Garden tour and donation event with DC Central Kitchen and Food Rescue. May 2023
- NRCS careers presentation at Youth Environmental Summit at The Well at Oxon Run. May 2023
- People’s Garden tour for participants in The Terra Preta do Indio Tribal Fellowship for faculty and staff at tribal colleges and universities. June 2023
- Pollinator Plant ID – Central MD. June 2023
- Pollinator Plant ID – Western MD. June 2023
- Forage and Weed ID – Southern MD. July 2023.
- Forage and Weed ID – Eastern MD. July 2023.
- Urban Agriculture -MDA. July 2023
- PMC tours for interns at DE NRCS and interns in USDA Program for Students from Migrant and Farmworker Backgrounds. July 2023
- Presentation on Growing vegetables for AMS training at USDA Farmers Market. August 2023
- Online Pollinator Establishment – at MDNRCS Monthly Technical Webinar. July 2023
- MD All-Hands Meeting Plant ID Activity. September 2023
- People’s Garden tour for International Club Luncheon. September 2023
- People's garden tour for students at Cultivating Change Summit, conference for LGBTQ students interested in agriculture. October 2023.
- People’s Garden tour for World Forum on Urban Forests Forest Therapy event. October 2023
- People’s Garden tour for Smithsonian Early Enrichment Program. October 2023



Figure 8: MD-PMC staff leading trainings: (L)- Forage and Weed ID training; (R)– Wildflower ID training.

The Norman A. Berg National Plant Materials Center

The Norman A. Berg Plant Materials Center (MDPMC) located in Beltsville, Maryland is one of 25 Plant Materials Centers (PMCs) in the Plant Materials Program of USDA's Natural Resources Conservation Service. The mission and activities of the MDPMC are twofold: (1) to provide assistance to and coordination for the National Plant Materials Program, and (2) to assist with high-priority conservation issues in the Mid-Atlantic region of the U.S.

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