



U.S. DEPARTMENT OF AGRICULTURE

Rose Lake Plant Materials Center 2025 Annual Report of Activities

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Effects of Seeding Rate, Date, and Termination Timing on Biomass and other Attributes of Cool Season Legume and Grass Cover Crops for Production Agriculture

Background

The Rose Lake Plant Materials Center (MIPMC) is conducting a nationally coordinated cover crop study in cooperation with the Agricultural Research Service (ARS) and North Carolina State University (NCSU) to determine how seeding rate and planting dates affect several varieties of cover crops. An important study goal is to determine whether there are opportunities to reduce seeding rates, thus reducing costs for the farmer and consequently increase the likelihood of cover crop adoption. The data and information gathered will help populate field office conservation tools and provide data to update conservation practice code 340 (Cover Crop).

We installed plots of 'Aroostook' cereal rye (*Secale cereale* L.) for a third year on 09/29/2025 and 11/14/2025 at five seeding rates: 15, 30, 60, 90 and 120 pure live seed (PLS) lbs/ac (Fig. 1). We chose 'Aroostook' cereal rye because it exhibits excellent fall growth, winter hardiness, and subsequent spring growth compared to other varieties.

Due to the government shutdown, the second planting date (10/17) could not be planted – and the third planting date was delayed a week. The first hard frost came on 11/06, and the last planting date came 11 days later. While the third planting date fell outside the recommended planting window in this region, we expect the planting will still provide relevant information.

As in previous years, we will record fall and spring canopy cover, days to closed canopy, height, and plant biomass. Plant height and spring canopy cover from the 2024 planting were taken in early spring 2025, between April and May.



Figure 1. Installation of cereal rye using a Wintersteiger precision plot planter in well-prepared seedbed in fall 2025.

Findings

BIOMASS—Similar to the previous year's (2024) results, we've seen that higher seeding rates produced higher biomass yield and that seeding rates 60, 90, and 120 PLS lbs/ac are not statistically different. Again, the largest biomass yield was positively correlated to the highest seeding rate. However, this year the total biomass yield was lower for all seeding rates.

While we found no effect of planting date on biomass yield in 2024, we found a significant effect in 2025. This year, the earliest planted seed (09/27/2024) had the highest biomass yield. This could be due to poorer establishment and weather conditions for the second and third planting dates.

PERCENT COVER—Fall data from 2024 showed that seeding date is more important to consider than seeding rate for maximizing fall percent cover. The earliest planting date (09/27) had the greatest percent cover in fall. By spring (04/29), when plants put more energy into stem elongation, we no longer see significant differences between seeding rates, dates, or interaction between rate and date.

CRP Mix Performance Comparison Study

Background

CRP plantings are critical to conservation programs, but many plantings face challenges to successful stand establishment and management. Ready-made, commercially available CRP seed mixes are often expensive, subjected to species substitution, and according to anecdotal accounts, underperform in the field. Designing multi-species custom mixes does not appear to be a feasible option, as it is cost prohibitive. CRP stand establishment also uses no-till planting, often resulting in intense weed pressure during the early years of establishment.

MIPMC staff installed a randomized complete block design (RCBD) planting using 11 ready-made, commercially available CRP mixes in fall 2024. The purpose of the study is to compare the performance of these 11 CRP seed



Figure 2. Photo of partridge pea (*Chamaecrista fasciculata*) in first season of growth.

mixes to determine which mix performs best and to identify potential barriers to establishment.

In Spring 2025, crabgrass (*Digitaria* spp.) and downy brome (*Bromus tectorum*) competed with forb seedlings. Some forbs emerged in early May in the first planting year. These species included wild lupine (*Lupinus perennis*), prairie cinquefoil (*Drymocallis arguta*), partridge pea (*Chamaecrista fasciculata*) (Fig. 2), and evening-primrose (*Oenothera* spp.).

Table 1. Plant species in CRP seed mix study one year after planting.			
Species Emergence First-year			
Forbs			
<i>Lupinus perennis</i>	wild lupine	<i>Helianthus maximiliani</i>	Maximilian sunflower
<i>Drymocallis arguta</i>	prairie cinquefoil	<i>Verbena stricta</i>	hoary vervain
<i>Chamaecrista fasciculata</i>	partridge pea	<i>Desmodium canadense</i>	showy tick trefoil
<i>Oenothera</i>	evening-primrose	<i>Heliopsis helianthoides</i>	false sunflower
<i>Coreopsis lanceolata</i>	lance-leaved coreopsis	<i>Asclepias syriaca</i>	common milkweed
Grasses			
<i>Schizachyrium scoparium</i>	little bluestem	<i>Andropogon gerardii</i>	big bluestem

In September, we observed a substitution in one seed mix, highlighting a challenge faced by land managers. In our case, cutleaf evening-primrose (*Oenothera laciniata*) was substituted for common evening-primrose (*Oenothera biennis*). These species have very different physiological traits. While *O. biennis* is taller and selected for its bird and pollinator value, *O. laciniata* seldom reaches more than two feet tall, and its wildlife value is less certain. The latter is also considered a weedy species in cotton production systems. No seed mixes were identified on the label as including cutleaf evening-primrose.

We will continue collecting data on percent cover, stems/ft², stand height, and species richness.

Prairie Grass and Wildflower Conservation Establishment Planting (Observation Planting)

Background

Many grass/forb plantings become grass dominant as the planting ages, often requiring intensive grass management and regular re-seeding of forbs. MIPMC staff planted a prairie grass and wildflower demonstration planting in late fall/early winter at the PMC in 2021. The upland seed mix planted in a sandy loam soil consisted of 26 Michigan ecotype species in a forb dominant mixture. The rationale of the project was to develop a seed mix where native grasses would not dominate later in the life of the planting.

Four species of native grasses were broadcast planted at 10.4 seeds/sq. ft. The 22 remaining forb species were planted at 17.6 seeds/sq. ft. MIPMC staff and volunteers evaluated the plots in summer 2023, 2024, and 2025. Staff used both a quadrat and Canopeo app to determine plant counts and percent cover respectively (Fig. 3).

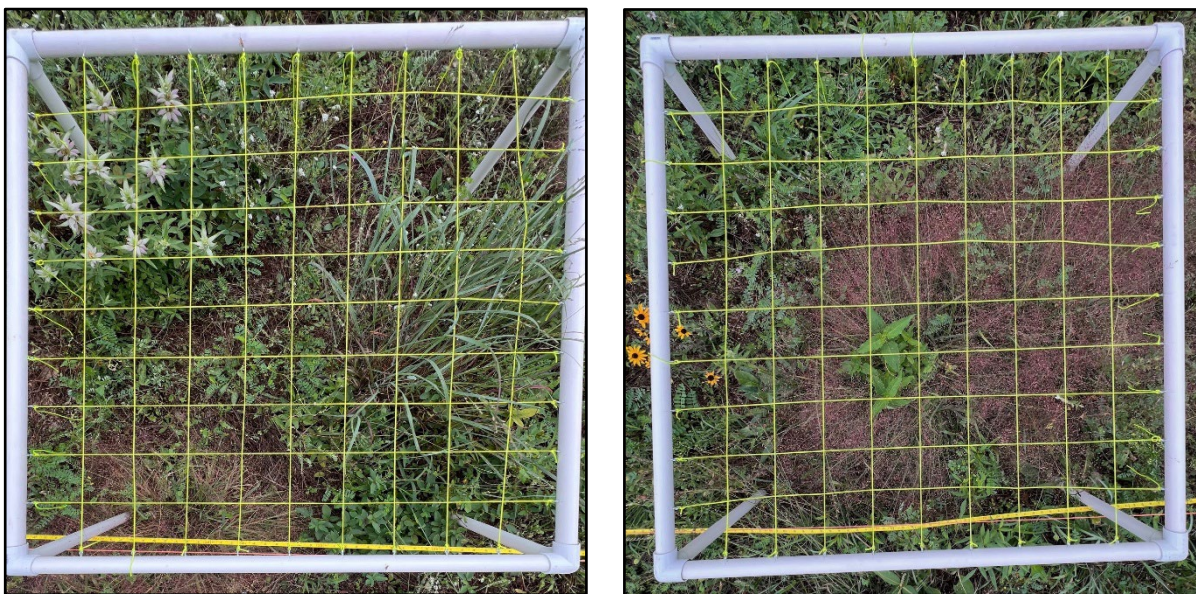


Figure 3. Quadrat sampling along transects to determine plant counts and percent plant cover.

Findings

All grass species included in the mix were present in 2025. Canada wildrye (*Elymus canadensis* 'Icy Blue') was the most abundant, followed by purple lovegrass (*Eragrostis spectabilis*), sideoats grama (*Bouteloua curtipendula*), and prairie dropseed (*Sporobolus*

heterolepis). In surveys conducted in 2023 and 2024, purple lovegrass was the most common grass.

Of the 22 forb species planted, 13 were identified in 2025. Similar to findings from 2024, false sunflower (*Helianthus helianthoides*) was most abundant (Table 2).

Table 2. Ranking of most abundant forb species observed in 2025.

Most abundant forb species in 2025 survey (in order)		
1	false sunflower	(<i>Helianthus helianthoides</i>)
2	yellow coneflower	(<i>Ratibida pinnata</i>)
3	common milkweed	(<i>Asclepias syriaca</i>)
4	spotted beebalm	(<i>Monarda punctata</i>)
5	wholeleaf rosinweed	(<i>Silphium integrifolium</i>)

Overall, desired cover continues to increase each year. In 2023, desired cover was about 7%. That number nearly tripled in 2024 to about 20%. The 2025 survey estimates 29% of the field is desired cover (Table 3). Forbs had higher plant counts than grasses in the first two sampling years. The total sampled grass to forb ratio in 2025 was approximately 1:1.

Table 3. Comparison of percent desired cover of native plants in 2023, 2024, and 2025; including percent cover increase from 2023-2025.

Transect	% Cover 2023	% Cover 2024	% Cover 2025	% Cover Increase
1	3.17	21.42	29.75	8.33
2	7.75	17.58	24.83	7.25
3	9.42	31.08	35.08	4
4	7.83	16.75	42.58	25.83
5	6.00	10.33	17.00	6.67
Average % yearly increase	6.83	12.60	10.42	

We'll continue to monitor and manage unwanted species. Common methods for managing wildflower plantings include mowing, burning, and spot spraying to keep unwanted vegetation in check. Because weedy woody species like mulberry (*Morus* spp.) and box elder (*Acer negundo*) increased in spring 2025, we burned

the field on 04/04/2025. The observational planting was mowed on 7/01/2025 to manage weeds and reduce the seed production of unwanted species. We will continue to sample the planting using yearly transects.

Establishment of Michigan Ecotype Forb Pollinator Blocks

On 06/13/2024 field office staff, trainees, MIPMC staff and volunteers planted over twelve thousand seedlings of 25 native forb species into 9.5ft x 20ft plots (Fig. 4). PMC staff will continue to use the planting for teaching and outreach, as well as a source of locally adapted Michigan ecotype seed for future trials of conservation mixes at the PMC and offsite locations.

MIPMC Staff conducted regular field checks to track plant health, bloom time, and seed maturity.



Figure 4. Late summer photograph of MI ecotype forb pollinator blocks after one year of growth.

Treatment Study to Reduce Reed Canarygrass in Wetland Ponds to Favor Native Diversity

Reed canarygrass (*Phalaris arundinacea*) is one of the most persistent invasive grasses in North America, posing significant ecological, economic, and conservation challenges—especially in riparian, wetland, and conservation plantings. The perennial rhizomatous grass forms dense, persistent monocultures that outcompete native grasses, sedges, and forbs. Without effective management strategies, reed canarygrass drastically reduces plant diversity and alters community structure. The MIPMC is evaluating two management methods for reed canarygrass control: chemical (herbicide) treatment versus mechanical (mowing).

In fall 2024, PMC Staff installed 9 plots, each approximately 15 ft. x 20 ft., with three replications of each treatment and a control. The grass-selective herbicide, clethodim, was applied to chemically managed plots on 11/01/2024 and 04/30/2025. The

mechanically managed plots were mowed on 10/30/2024 and on 05/15/2025. Treatment timing was selected to maximize disruption to the reed canarygrass stand while reducing off-target effects.

Photos for fractional green canopy cover were taken and processed in a software app to determine percentage of green cover. First year data suggests that the overall health and vigor of reed canarygrass was reduced by both chemical and mechanical disturbance allowing seed germination from the seedbank. Ten of the plant species seeded in a 2022 wetland mix grew in the plots with disturbance treatments (Fig. 5). Stinging nettle (*Urtica dioica*) was more abundant in chemically treated plots, but mowing treatments helped reduce both reed canarygrass and nettle pressure.

We will continue collecting data on the effects of chemical and mechanical treatments on the reed canarygrass plots in 2026.



Figure 5. Photograph of native plant reemergence after chemical and mechanical disturbance to a wetland infested with reed canarygrass (*Phalaris arundinacea*).

Outreach/ Collaboration

Michigan State University's (MSU) Corey Marsh Ecological Research Center reached out to the MIPMC to assist in assessing the germination, dormancy, and mortality of plants in the seed bank of muck farm soil samples. The goal is to assess the seed bank composition of a wetland that has been overrun with invasive reed canarygrass and to determine strategies for restoration. The samples will be grown out and evaluated in the PMC greenhouse.

The MIPMC continues its collaboration with the USDA-ARS Plant Introduction Station in Ames, IA to plant and evaluate NC-7 regional ornamental plants including sassafras (*Sassafras albidum*) and mountain maple (*Acer spicatum*). The fall 2025 planting date was scheduled during the government shutdown and has been rescheduled for spring 2026. PMC staff are currently overwintering plants in our greenhouse.

Publications

PMC Advisory Committee, Newsletter Blast

The Michigan Plant Materials Advisory Committee consists of seventeen members who meet on a biannual basis to discuss ways in which the PMC can help meet the needs of field offices. This year, it will be chaired by Andy Henriksen, State Forester. To help achieve outreach goals, the committee drafts monthly newsletter articles for distribution to all Michigan field offices and State Resource Conservationists within the MIPMC service area. This year, the PMC created and distributed 6 email blasts covering topics such as seed dormancy, Amur honeysuckle, crabapples, buckthorn ID, Prairie View Indiana Germplasm, and 'Streamco' Willow.

The MIPMC also completed a new, improved plant guide for switchgrass (*Panicum virgatum*) (9 pgs.). It will be available with our other recent plant guide for cow parsnip (*Heracleum maximum*) on the USDA-NRCS Plants Database. <https://plants.usda.gov/>

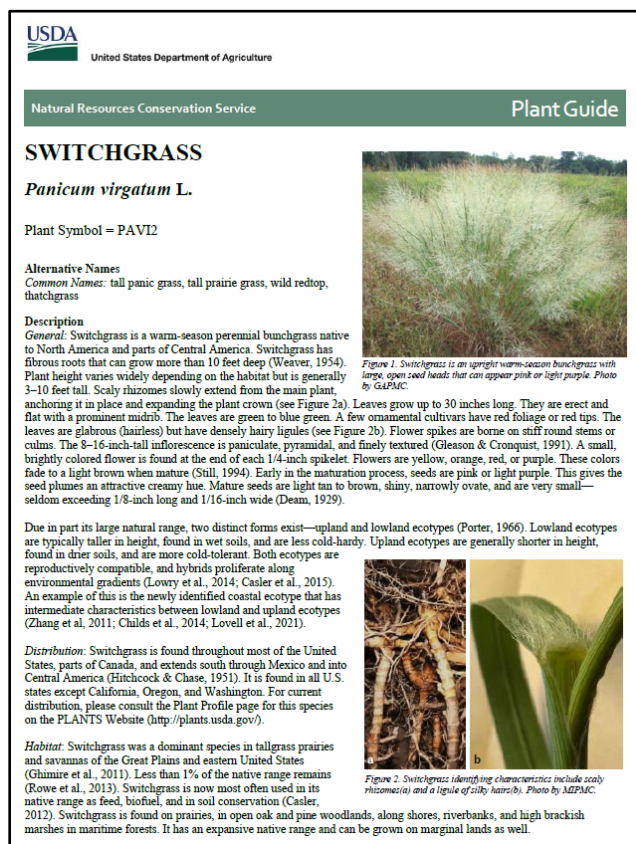


Figure 6. First page screenshot of new switchgrass (*Panicum virgatum*) Plant Guide.

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The Rose Lake Plant Materials Center (MIPMC) in East Lansing, Michigan provides plant solutions for the Great Lakes Region. The Rose Lake program serves Indiana, Michigan, Ohio, Wisconsin, and portions of Illinois, New York, and Pennsylvania. The MIPMC has developed technology to improve water quality and soil health.