# Rose Lake
# Plant Materials Center
# 2012 Technical Report

East Lansing, Michigan

**USDA-NRCS Rose Lake Plant Materials Center**
**7472 Stoll Road**
**East Lansing, MI 48823**

**http://plant-materials.nrcs.usda.gov/mipmc/**
**Center Phone: 517-641-6300**
**Center Fax: 517-641-4421**

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## USDA-NRCS ROSE LAKE PLANT MATERIALS CENTER STAFF and ASSOCIATED PERSONNEL

**Center Staff**
**John Leif, Manager**
**John Durling, Agronomist**
**Sergio Pérez, Biological Sciences Technician**
**Elaine Gerona, Office Automation Assistant**

**Plant Materials Specialist**
**Vacant**

**Central Region Plant Materials Specialist**
**Joel Douglas**

**National Program Leader**
**John Englert**

**State Conservationist Advisory Committee**
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**Jane Hardisty, Indiana**
**Terry Cosby, Ohio**
**Patricia Leavenworth, Wisconsin**
**Ivan Dozier, Illinois**
**Donald Pettit, New York**
**Denise Coleman, Pennsylvania**

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## Introduction

Rose Lake Plant Materials Center (RLPMC) was established in 1958 on a 40-acre site at the Michigan Department of Natural Resources, Rose Lake Wildlife Research Station (42.798° North, 84.414° West, 875 ft ASL) located eight miles northeast of Lansing, Michigan. Soil association is Boyer-Marlette-Houghton with well drained and moderately well drained, gently sloping to steep loamy sands to loams on moraines and very poorly drained muck in depressions.

Rose Lake PMC is part of a network of 27 Plant Materials Centers serving all 50 states and territories. It serves Indiana, Michigan, Ohio, Wisconsin, and portions of Illinois, New York, and Pennsylvania. The mission, purpose, goals, and objectives of the Plant Materials Program as stated in the National Plant Materials Manual are provided below.

**Mission** The mission of the NRCS Plant Materials Program (PMP) is to develop, test, and transfer plant science technology to meet customer and natural resource needs. Natural Resources Conservation Service PMP activities are consistent with the objectives of the current USDA and NRCS Strategic Plans, namely to provide timely and effective vegetative solutions for identified resource needs.

**Purpose** The purpose of the NRCS PMP is to:

- Assemble, test, and release plant materials for conservation use.
- Determine techniques for successful use and management of conservation plants.
- Facilitate the commercial increase of conservation plants.
- Provide for the timely development and transfer of effective applied plant science technology to solve conservation problems.
- Promote the use of plant science technology to meet the goals and objectives of the USDA and NRCS Strategic Plans.

**Goals and Objectives** The PMP revised its Strategic Plan to reflect changes outlined in the 2006-2010 NRCS Strategic Plan. The goals and objectives for the PMP are:

- Strategic Goal 1 – Identify and evaluate plants and develop technology for their successful establishment and maintenance to solve natural resource conservation problems.
    - Objective 1.1: Conserve and enhance soil resources with plant science technology.
    - Objective 1.2: Improve water quality and quantity with plant science technology.
    - Objective 1.3: Enhance fish and wildlife resources with plant science technology.
    - Objective 1.4: Identify and develop plants and plant technology to mitigate air quality issues.
- Strategic Goal 2 – Provide plant materials and plant technology that are economically feasible for meeting resource concerns.
    - Objective 2.1: Provide for and promote the commercial production of NRCS plant releases to ensure that adequate seed and plants are available for use in cooperative conservation programs.

    - Objective 2.2: Maintain and improve the productivity of agricultural lands and watersheds through plants and plant management technology.
    - Objective 2.3: Increase the alternative uses and specialized uses of conservation plant releases to meet emerging needs.
- Strategic Goal 3: Provide equal access for all Americans to the PMP.
    - Objective 3.1: Deliver products and services fairly and equitably.
    - Objective 3.2: Promote the products of the PMP through effective communications and program delivery.
    - Objective 3.3: Increase the use of plant materials to address issues of human health, safety, and aesthetics.
    - Objective 3.4: Make effective use of Internet-based technology to provide customer-focused service.

**Long Range Plan** Rose Lake PMC operations are guided by a Long Range Plan (LRP) which is a compilation of Plant Materials LRPs from Indiana, Ohio, Michigan, and Wisconsin. The RLPMC LRP was updated and approved by the State Conservationists Advisory Committee in June 2009. The RLPMC LRP is consistent with goals and objectives identified in the NRCS Strategic Plan.

## Studies

| Study Number | Study Name | Purpose | Report Page |
|---|---|---|---|
| MIPMC-P-0201-CR | Development of a Great Lakes Release of Virginia Wildrye (*Elymus virginicus* L.) | Release | 16 |
| MIPMC-P-0503-WL | Evaluation and Great Lakes Release of American Plum (*Prunus americana* Marsh.) | Release | 10 |
| MIPMC-P-0603-WE | Evaluation and Release of Canada Bluejoint [*Calamagrostis canadensis* (Michx.) Beauv.] | Release | 23 |
| MIPMC-P-0906-PA | Selection and Evaluation of Improved Big Bluestem (*Andropogon gerardii* Vitman) for Use as Forage for Livestock | Release | 24 |
| MIPMC-P-0910-PA | Yellow Alfalfa [*Medicago sativa* L. ssp. *falcata* (L.) Arcang.] Release | Release | 26 |
| MIPMC-T-0004-CR | Interagency Agreement [Involving Apostle Islands National Lakeshore] | Technology | 8 |
| MIPMC-T-0802-WI | Demonstration Planting of Selected Plants for Use by Native Pollinators | Technology | 27 |
| MIPMC-T-1001-WO | Evaluation of Wildrye (*Elymus spp*.) Cover Crops in Tree Establishment | Technology | 20 |
| MIPMC-T-1002-CP | Plant Growth Parameters for Brassicaceous Cover Crops | Technology | 18 |
| MIPMC-T-1003-CP | Evaluation of Various Grass Species for Use in Vegetative Barriers | Technology | 11 |

## Partnership and Program Development

Rose Lake PMC partners with other federal, state, and local agencies; universities; tribes; and private entities to achieve its missions and goals. Rose Lake PMC is always looking to create new partnerships while strengthening its many existing partnerships. Sometimes partnerships result in *reimbursable agreements* which help in technology development and information gathering for releasing Conservation Plants.

### Interagency Agreement between NRCS Plant Materials Program and National Park Service – Apostle Islands National Lakeshore Agreement Number: F6140090501 As Component of Study No. MIPMC-T-0004-CR

**Introduction** The Apostle Islands National Lakeshore is operated by the National Park Service and comprised of Long Island, Oak Island, Outer Island, Raspberry Island, Rocky Island, and others in Lake Superior near Bayfield, Wisconsin. Several of the islands have historic lighthouses that once guided mariners through the rough waters of Lake Superior. Continuous erosion of steep slopes has jeopardized these historic facilities. Since 2000 RLPMC has worked with Apostle Islands National Lakeshore doing reimbursable projects to develop propagation protocols and produce native plant stock for stabilizing slopes, preventing erosion, preserving native plant resources, and revegetating at Apostle Islands National Lakeshore.

**Plants Delivered** During the summers of 2010 and 2011 National Park Service staff collected seeds from beachgrass (*Ammophila breviligulata*), common milkweed (*Asclepias syriaca*). crinkled hairgrass (*Deschampsia flexuosa*), juniper (*Juniperus communis*), Canada mayflower (*Maianthemum canadense*), and evening primrose (*Oenothera oakesiana*). Rose Lake PMC staff adapted or developed and implemented propagation protocols. Approximately 16,000 plants were delivered in Cone-tainers™ to the Park Service in 2012 as shown in Table 1.

Table 1. Plants propagated at Rose Lake Plant Materials Center and delivered to Apostle Islands National Lakeshore. 2012.

| Species | | Quantity delivered |
|---|---|---|
| *Scientific name* | Species code | |
| *Ammophila breviligulata* | AMBR | 1810 |
| *Asclepias syriaca* | ASSY | 2350 |
| *Deschampsia flexuosa* | DEFL | 8820 |
| *Juniperus communis*† | JUCO6† | 260 |
| *Maianthemum canadense*† | MACA4† | 400 |
| *Oenothera oakesiana* | OEOA | 2690 |

†JUCO6 and MACA4 were collected in 2010 and propagated in 2011. Plants were kept at RLPMC and delivered in 2012.

**Propagation Protocol** Yet-to-be-determined at RLPMC is the effect that separating juniper seed has on germination. Juniper berries contain 2 or 3 seeds each. Berries are hard and the pulp has a sticky texture which makes seed separation difficult. Popular literature suggests that submerging berries in lye solution will ease seed separation.

In 2011 whole berries were planted with and without a 16-week cold stratification and seeds submerged in lye solution and separated were also planted with and without a 16-week cold stratification. No emergence was noted in 2012. (Delayed emergence is typical for juniper.) Pots were overwintered in 2012-13 and germination will be evaluated again in spring 2013.

**Publication** In 2012 RLPMC published "Propagation Protocols – Plants Produced for Apostle Islands National Lakeshore." This document is available through the Plant Materials Program website.

## Plant Material Collections

### Study No. MIPMC-P-0503-WL
### Evaluation and Great Lakes Release of American Plum (*Prunus americana* Marsh.)

The collection, assembly, selection, and release of new plant varieties and/or germplasm are integral to the Plant Materials Program. Every release starts with a collection. To this end RLPMC is in the process of collecting American plum seed from throughout the service area. Details are provided in Table 2.

Table 2. Plant materials collections on-going at Rose Lake PMC in 2012.

| Common name | *Scientific name* | Description | Collection Location (number of collections received) |
|---|---|---|---|
| American plum | *Prunus americana* Marsh. | American plum is a native, small tree. It is found in thickets, borders of woods, streambanks, floodplains, and fencerows. Flowers are white and 5-petaled. The 1-in drupe is stone-seeded and red to yellow. The fruit is palatable to wildlife and humans. *Prunus americana* is closely related to *P. nigra*, Canadian plum. | Henderson Co., IL (1); Hillsdale Co., MI (1); Clinton Co., MI (1); Wood Co., OH (1); Madison Co., OH (1); Pickaway Co., OH (1); Ashland Co., WI (4); Bayfield Co., WI (1); Dane Co., WI (2); Fon du Lac Co., WI (1); Green Co., WI (2); Madison Co., OH (1); Sheboygan Co., WI (3) |

## Plants for Vegetative Barriers

Conservation buffers are areas or strips of land maintained in permanent vegetation to help control pollutants and manage other environmental problems. Grassed waterways (NRCS 412 Standard) and vegetative barriers (NRCS 601 Standard) are two of 10 conservation practices commonly thought of as buffers.

A grassed waterway with vegetated filter system is a natural or constructed vegetated channel that is shaped and graded to carry surface water at a nonerosive velocity to a stable outlet that spreads the flow of water before it enters a vegetated filter. However, this land-area extensive practice is sometimes dismissed in lieu of periodic filling and reshaping of the eroded area.

Vegetative barriers, a less land-area extensive conservation practice, can be a viable alternative to grassed waterways and other conservation practices. Vegetative barriers are narrow, permanent strips of stiff stemmed, erect, tall, dense perennial vegetation established in parallel rows and perpendicular to the dominant slope of the field. They are designed to reduce sheet and rill erosion, reduce ephemeral gully erosion, manage water flow, stabilize slopes, and trap sediment.

Vegetative barriers should:

- Include noninvasive, desirable plants
- Exhibit excellent erosion control qualities
- Not impede normal farming operations
- Be easy to maintain
- Remove as little land from production as possible

## Study No. MIPMC-T-1003-CP
## Evaluation of Various Grass Species for Use in Vegetative Barriers

Vegetative Barriers as defined by USDA-NRCS Conservation Practice Standard 601 are permanent strips of stiff, dense vegetation established along the general contour of slopes or across concentrated flow areas. Their purpose is to reduce sheet and rill erosion, reduce ephemeral gully erosion, manage water flow, stabilize steep slopes, and trap sediment. The 3-year study described herein evaluated three grass accessions for use in vegetative barriers.

**Objective** "Evaluation of Various Grass Species for Use in Vegetative Barriers (MIPMC-T-1003-CP)" was designed with sub studies relating to initial transplant spacing and to soil deposition. The former evaluated response of switchgrass (*Panicum virgatum*), prairie cordgrass (*Spartina pectinata*), and miscanthus (*Miscanthus sinensis*) to initial spacings of three and 12 inches between transplants in rows. (Miscanthus accessions were used as standards but are not being considered for use in vegetative barriers because of their potential invasiveness.) Experimental design was a randomized complete block with three replicates and five transplant

plugs per species X spacing combination. Grasses in the sub studies are identified by species and source, variety, or cultivar in Tables 3 and 4.

**Procedure** Data were collected and analyzed on time required for between-plant gaps to fill, canopy height, barrier porosity, and achievement of 0.05 and 0.10 Vegetative Stiffness Index (VSI). (Vegetative Stiffness Index predicts barrier function during runoff events and is based on stem diameter and density.) Barrier porosity was determined by ArcMap analysis of optical images taken by fixed-point digital photography in October 2012. Observations were also made of whether transplants encroached into adjacent plots.

**Results** By the end of the establishment year (2010) all entries in the spacing substudy had achieved vegetative barrier functionality (VSI≥0.10). At the end of the second year (2011) gaps between plants were no longer discernible between the 12-inch spacing transplants and there were no canopy height differences associated with spacing (Table 3). At the end of the third year (2012) no canopy height differences and no porosity differences were observed (Table 4). Encroachment of prairie cordgrass into borders and other plots was observed, but encroachment of other species was not observed.

The soil deposition substudy was established using transplant plugs in a randomized complete block with five replicates. Fifteen-inch diameter black plastic rings were installed around each transplant in the soil deposition substudy. Soil was added inside the rings to simulate deposition in April 2011 (3 inches) and in April 2012 (additional 6 inches) around treated plants each of which was paired with a control plant that did not receive soil deposition. Data collected and analyzed included canopy height, sward circumference, aboveground fresh weight, and achievement of 0.05 and 0.10 Vegetative Stiffness Index. Observations were also made of whether transplants encroached into adjacent plots.

By the end of the establishment year (2010) all entries in the deposition substudy, treated and non-treated, had achieved vegetative barrier functionality (VSI≥0.10). At the end of the second year (2011) and again at the end of the third year, no differences in canopy height above the original soil surface were observed (Table 4). At the end of the third year (2012) no differences in sward circumference and no within accession differences in aboveground fresh weight were observed (Table 4). Encroachment of prairie cordgrass into borders and other plots was observed, but encroachment of other species was not observed.

The spacing substudy showed that vegetative barrier functionality was achieved by both switchgrass accessions (‘Northwind’ and ‘Heavy Metal’) at both initial spacings (three inches and 12 inches on center) by the end of the establishment year. The miscanthus accessions and prairie cordgrass also achieved vegetative barrier functionality by the end of the establishment year, but are not being considered for vegetative barrier use because of potential invasiveness and observed encroachment into other plots, respectively.

**Conclusion** The deposition substudy showed no adverse effect from deposition of nine inches of soil in two years on either switchgrass accession (‘Northwind’ or ‘Heavy Metal’) or on miscanthus accessions or on prairie cordgrass. However, neither the miscanthus accessions nor

prairie cordgrass are being considered for vegetative barrier use because of potential invasiveness and observed encroachment into other plots, respectively.

Based upon results of this study only switchgrass (Panicum virgatum ‘Northwind’ or Panicum virgatum ‘Heavy Metal’) can be recommended for Vegetative Barriers as defined by USDA-NRCS Conservation Practice Standard 601

Table 3. Effect of initial transplant spacing on vegetative barrier grasses at Rose Lake PMC.

| Plant Spacing at Establishment | Standard: *Miscanthus sinensis* var. *gracillimus* from Rose Lake PMC stock | | | *Panicum virgatum* 'Northwind' switchgrass | | | *Panicum virgatum* 'Heavy Metal' switchgrass | | | *Spartina pectinata* prairie cordgrass | | | Standard: *Miscanthus sinensis* var. *gracillimus* from wholesale grower | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Autumn 2011 Canopy Height (ft) | Autumn 2012 Canopy Height (ft) | Autumn 2012 Porosity (%) | Autumn 2011 Canopy Height (ft) | Autumn 2012 Canopy Height (ft) | Autumn 2012 Porosity (%) | Autumn 2011 Canopy Height (ft) | Autumn 2012 Canopy Height (ft) | Autumn 2012 Porosity (%) | Autumn 2011 Canopy Height (ft) | Autumn 2012 Canopy Height (ft) | Autumn 2012 Porosity (%) | Autumn 2011 Canopy Height (ft) | Autumn 2012 Canopy Height (ft) | Autumn 2012 Porosity (%) |
| 3 inch | 4 | 4 | 10 | 5 | 5 | 9 | 4 | 4 | 15 | 4½ | 3½ | 33 | 4½ | 4 | 10 |
| 12 inch | 4½ | 4 | 10 | 5 | 5 | 9 | 4 | 4 | 13 | 4½ | 3½ | 24 | 4½ | 4 | 10 |
| | ns† | ns† | ns† | ns† | ns† | ns† | ns† | ns† | ns† | ns† | ns† | ns† | ns† | ns† | ns† |

†No significant difference within column at P<0.05

Table 4. Effect of soil deposition on growth characteristics of vegetative barrier grasses at Rose Lake PMC.

| Soil Deposition | Standard: *Miscanthus sinensis* var. *gracillimus* from Rose Lake PMC stock | | | | *Panicum virgatum* 'Northwind' switchgrass | | | | *Panicum virgatum* 'Heavy Metal' switchgrass | | | | *Spartina pectinata* prairie cordgrass | | | | Standard: *M. sinensis* var. *gracillimus* from wholesale grower | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Autumn 2011 Canopy Height (ft) † | Autumn 2012 Canopy Height (ft) † | Autumn 2012 Sward Circumference (in)‡ | Autumn 2012 Aboveground Fresh Wt (lbs) § | Autumn 2011 Canopy Height (ft) † | Autumn 2012 Canopy Height (ft) † | Autumn 2012 Sward Circumference (in)‡ | Autumn 2012 Aboveground Fresh Wt (lbs) § | Autumn 2011 Canopy Height (ft) † | Autumn 2012 Canopy Height (ft) † | Autumn 2012 Sward Circumference (in)‡ | Autumn 2012 Aboveground Fresh Wt (lbs) § | Autumn 2011 Canopy Height (ft) † | Autumn 2012 Canopy Height (ft) † | Autumn 2012 Sward Circumference (in)‡ | Autumn 2012 Aboveground Fresh Wt (lbs) § | Autumn 2011 Canopy Height (ft) † | Autumn 2012 Canopy Height (ft) † | Autumn 2012 Sward Circumference (in)‡ | Autumn 2012 Aboveground Fresh Wt (lbs) § |
| 0 inches | 5 | 4½ | 25 | 4.8 | 5 | 5½ | 17 | 2.8 | 4 | 4½ | 18 | 2.4 | 5½ | 4½ | 10 | 0.6 | 5½ | 5 | 24 | 4.1 |
| 3 inches in 2011, additional 6 inches in 2012 | 5 | 4½ | 19 | 3.7 | 5 | 5½ | 17 | 3.0 | 4 | 4½ | 17 | 1.7 | 6 | 4½ | 13 | 0.7 | 5½ | 5 | 24 | 5.4 |
| | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ | ns¶ |

†Measured from original soil surface to top of plant

‡Measured at 12 inches above original soil surface

§Cut at 12 inches above original soil surface

¶No significant difference within column at $P<0.05$

## Cover Crops and Conservation Cover

Cover crops are legumes, grasses, or other herbaceous plants established for seasonal cover and other conservation purposes. Cover crops protect the soil from erosion during vulnerable times, e.g., after harvest in the fall through establishment of crop in the spring.

Organic and sustainable farming systems are especially reliant on cover crops for soil fertility and pest management. Legume cover crops capture nitrogen from the air. Cover crops capture nitrogen and release it as the cover crop decays. Weeds are suppressed and disease cycles are broken with appropriate timing. Cover crops may also provide supplemental forage for grazing or harvesting.

### Study No. MIPMC-P-0201-CR
### Development of Great Lakes Composite of Virginia Wildrye (*Elymus virginicus* L.)

**Background** Virginia wildrye is a native, cool-season perennial bunchgrass with erect stems that reach to 4-ft high. Leaves are flat, up to 0.5-in wide, and rough on both sides and the margins. Spikes are stiff and up to 5-in long. The lower portion of the spike is often enclosed by the sheath. Lemmas have awns that reach 1.5 in. Auricles are claw-like and clasping. Virginia wildrye is found in moist woods, meadows, and prairies throughout the United States east of the Rockies. It has good tolerance to flooding and moderate tolerance to drought.

**Description of Study** A collection of Virginia wildrye was assembled from native stands in Michigan, Indiana, Ohio, and Wisconsin. Material is being evaluated and composite selected for restoration or revegetation potential as conservation cover or streambank protection in the Great Lakes states and Midwest.

**Procedures** Virginia wildrye was collected from native stands by field staff and partners and accessioned. Plants from each of 19 accessions were started in the greenhouse and transplanted into field plots at RLPMC and elsewhere. Based on for survival, vigor, plant density, height, lodging resistance, disease and insect damage, seed production, and germination as observed in plots established in 2002, 2003, and 2005 “finalists” were selected.

Seed from original collections as available and seed collected from plots were used to establish transplants in a randomized design with four replicates.

**Observations** Field data collected in 2011-12 are presented in Table 5.

**Table 5. Virginia wildrye growth data. Rose Lake PMC. 2011-12.**

| Accession number | Origin | Survival (%) | | First anthesis | | Mature height (ft) | | Vigor[¶] | Lodging[#] | Fall greenup[††] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2011[†] | 2012[‡] | 2011 | 2012 | 2011[§] | 2012[‡] | 2011[§] | 2011[§] | 2011[‡‡] | 2012[§§] |
| 9084315 | Indiana | 82 | 50 | 23-Jun | 12-Jul | 2.0 | 0.5 | 4 | 1 | 8 | 8 |
| 9084344 | Indiana | 100 | 88 | 7-Jul | 12-Jul | 3.5 | 2.5 | 1 | 5 | 3 | 4 |
| 9084350 | Ohio | 96 | 56 | 3-Jun | 7-Jun | 2.5 | 2.0 | 1 | 2 | 5 | 5 |
| 9084514 | Indiana | 99 | 50 | 10-Jul | 12-Jul | 3.0 | 2.5 | 1 | 1 | 3 | 7 |
| 9084521 | Indiana | 89 | 6 | 3-Jun | 7-Jun | 2.5 | 2.0 | 3 | 1 | 6 | 8 |
| 9084531 | Indiana | 97 | 44 | 7-Jul | 14-Jul | 3.0 | 2.5 | 1 | 1 | 4 | 4 |
| 9084536 | Indiana | 99 | 75 | 7-Jul | 12-Jul | 3.0 | 2.5 | 1 | 3 | 2 | 4 |
| Standard O'ma'ha | | 97 | 25 | 7-Jul | 12-Jul | 3.0 | 2.0 | 1 | 2 | 5 | 8 |
| | | | | | | | | | | | |
| $LSD_{(0.05)}$ | | 10 | 45 | 4 days | Varies | 0.5 | varies | 0.6 | 2.1 | 2.4 | 2.6 |

[†]Evaluated on 19 May 2011

[‡]Evaluated on 24 August 2012

[§]Evaluated on 27 July 2011

[¶]Rating scale from 1=excellent vigor to 9=poor vigor

[#]Rating scale from 1=no lodging to 9=severe lodging

[††]Rating scale from 1=most plants green, vigorous, 12-18 inches tall to 9=no green plants

[‡‡]Evaluated on 13 October 2011

[§§]Evaluated on 12 October 2012

**MIPMC-T-1002-CP**
**Plant Growth Parameters for Brassicaceous Cover Crops**

**Background** Oilseed radish, mustard, turnip, and rapeseed – all members of the mustard or brassica family and utilized as cover crops – are being evaluated at Rose Lake PMC. These purposes for cover crops are recognized in Michigan NRCS Conservation Practice Standard 340:

- Reduce erosion from wind and water.
- Increase soil organic matter content.
- Capture and recycle or redistribute nutrients in the soil profile.
- Promote biological nitrogen fixation and reduce energy use.
- Increase biodiversity.
- Suppress weeds
- Manage soil structure.
- Minimize and reduce soil compaction.
- Reduce pest pressure.
- Encourage Pollination

Little growth and development data are currently available for brassicaceous cover crops. Data from this study has been provided to ARS and NRCS modelers for inclusion in conservation planning tools such as Revised Universal Soil Loss Equation, Version 2 (RUSLE2) and Wind Erosion Simulation Models (WEPS). Both require plant growth measurements to accurately predict the conservation effects of plants.

This brassicaceous cover crop evaluation was a collaborative effort. Other partners included Michigan State University Extension cover crop program, the University of Minnesota, and USDA-NRCS Central National Technology Support Center and the modelers and conservation planning tool developers which they represent. At least 10 individuals have been involved in field operations.

**Results** Experimental designs including species evaluated, summary results, and preliminary results interpretations were published in the 2011 Rose Lake Plant Materials Center Annual Technical Report. Results not included in the aforementioned report (i.e. , brassica overwintering data recorded in spring 2012 and yield of oat grain harvested in summer 2012) are shown in Tables 6 and 7. Higher overwinter survival recorded in spring 2012 than in 2011 (Table 6) is attributable to the mild winter preceding spring 2012. Brassicas that did survive winter 2011-12 were difficult to terminate with herbicides (dicamba and 2,4-D) applied at the labeled rates for oats. In summer 2012 oat grain yields were higher following oilseed radish that following other treatments, although yields following oilseed radish (Table 7) were only about 29 dry bu/a.

| Table 6. Brassica cover crop overwintering as recorded in April 2011 and 2012. Rose Lake PMC. | | |
|---|---|---|
| Cover crop | April 2011 | April 2012 |
| | Live plants/ft$^2$ | |
| Oilseed radish | 0.0 | 0.1 |
| Mustard | 0.0 | 0.1 |
| Rapeseed | 0.2 | 4.0 |
| Forage turnip | 0.0 | 3.6 |

| Table 7. Oat yield following overwintered brassica cover crop. Rose Lake PMC. | | |
|---|---|---|
| Preceding cover crop | Summer 2011 | Summer 2012 |
| | Oat grain yield (% of control) | |
| Oilseed radish | No significant difference among cover crops. Control not available. | 426 |
| Mustard | | 292 |
| Rapeseed | | 134 |
| Forage turnip | | 306 |
| Control (w/o brassica) | | 100 |

Additional data analysis is being conducted by graduate students Victoria Ackroyd and Miriam Gieske at Michigan State University and the University of Minnesota, respectively, and additional results dissemination is likely through their efforts. These and other posters and papers have been presented to-date:


Ackroyd, V. J., D. R. Mutch, D. G. Baas, J. C. Durling, J. W. Leif, and S. A. Pérez, USDA-NRCS Plant Materials Center. 2012. Fall-planted brassica cover crop winter-kill and weed suppression. Michigan State University Extension News. http://msue.anr.msu.edu/news/fall-planted_brassica_cover_crop_winter-kill_and_weed_suppression

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**MIPMC-T-1001-WO**
**Evaluation of Wildrye (*Elymus spp.*) Cover Crops in Tree Establishment**

**Background** Forestland accounts for up to 30 percent of agricultural land in Michigan. Considerable emphasis has been placed on establishing, maintaining, and improving forestland in Michigan. In addition to forestland, trees are used in windbreaks, riparian areas, filter strips, and wildlife corridors. While evaluating cover crop and herbicides treatment combinations for establishing trees, this study falls within PM Program Objective 1.1 (Conserve and enhance soil resources with plant science technology) and Objective 1.2 (Improve water quality and quantity with plant science technology) and within the national priority of Transition to Organics.

**Description of Study** This study was developed to address the following questions as they relate to the utility of cover crops and herbicides in tree establishment: How do *Elymus* spp. cover crops affect tree survival, tree growth, and/or herbivore browse? How do strip herbicide treatments affect tree survival and/or tree growth? Is there interaction between effect of cover crop and herbicide treatments?

**Procedure** Study was sited on approximately 0.6 acre plot east of buildings at Rose Lake PMC on Boyer complex soil (0-6% slope, well drained, loamy sand). Previous years' crops were glyphosate resistant soybeans treated with glyphosate. Canada wildrye (*Elymus canadensis* L.) and Virginia wildrye (*Elymus virginicus* L.) were drilled at 4.6 PLS lbs/a and 5.2 PLS lbs/a, respectively, on 20 Sept 2011. Nitrogen at 11.5 lbs/a was broadcast on 8 May 2012. Seedling red oak (*Quercus rubra* L.) and shagbark hickory (*Carya ovata* (Mill.) K. Koch) were transplanted on 10 May 2012. Tree tubes were placed around the transplanted trees and staked. Approximately 5 inches of irrigation water was applied in June 2012. Wildrye and tree species establishment were according to plot plan as shown in Table 8. Weeds (especially mares tail) were mowed in late summer.

Cover photo shows tree establishment plot in May 2012.

**Data Collection** Data were collected on survival and height at planting and in the fall of 2012 and will continue through the duration of the study.

Table 8. Plot plan for evaluation of wildrye (*Elymus spp* .) cover crops in tree establishment. MIPMC-T-1001-WO.

Stoll Road N↑

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Block 1 | | | | 96 ft total across wildrye strip | | | | | | | | |
| O2 | O1 | O1 | O2 | O2 | O2 | H2 | H1 | H1 | H2 | H2 | H2 | ctrl 24 ft |
| O1 | O2 | O2 | O1 | O1 | O1 | H1 | H2 | H2 | H1 | H1 | H1 | |
| O1 | O2 | O1 | O1 | O2 | O1 | H1 | H2 | H1 | H1 | H2 | H1 | CWR 24 ft |
| O2 | O2 | O1 | O2 | O1 | O2 | H2 | H2 | H1 | H2 | H1 | H2 | |
| O2 | O2 | O1 | O2 | O1 | O1 | H2 | H2 | H1 | H2 | H1 | H1 | VWR 24 ft |
| O1 | O1 | O2 | O1 | O2 | O2 | H1 | H1 | H2 | H1 | H2 | H2 | |
| Block 2 | | | | | | | | | | | | |
| O1 | O2 | O1 | O2 | O1 | O2 | H1 | H2 | H1 | H2 | H1 | H2 | ctrl 24 ft |
| O2 | O1 | O2 | O1 | O2 | O1 | H2 | H1 | H2 | H1 | H2 | H1 | |
| O2 | O1 | O2 | O1 | O2 | O1 | H2 | H1 | H2 | H1 | H2 | H1 | CWR 24 ft |
| O1 | O2 | O1 | O2 | O1 | O2 | H1 | H2 | H1 | H2 | H1 | H2 | |
| O1 | O2 | O1 | O2 | O1 | O2 | H1 | H2 | H1 | H2 | H1 | H2 | VWR 24 ft |
| O2 | O1 | O2 | O1 | O2 | O1 | H2 | H1 | H2 | H1 | H2 | H1 | |
| Block 3 | | | | | | | | | | | | |
| O2 | O2 | O2 | O2 | O2 | O1 | H2 | H2 | H2 | H2 | H2 | H1 | CWR 24 ft |
| O1 | O1 | O2 | O1 | O1 | O1 | H1 | H1 | H2 | H1 | H1 | H1 | |
| O2 | O1 | O1 | O1 | O2 | O1 | H2 | H1 | H1 | H1 | H2 | H1 | VWR 24 ft |
| O2 | O2 | O2 | O1 | O2 | O1 | H2 | H2 | H2 | H1 | H2 | H1 | |
| O1 | O2 | O1 | O2 | O1 | O2 | H1 | H2 | H1 | H2 | H1 | H2 | ctrl 24 ft |
| O2 | O1 | O2 | O1 | O2 | O1 | H2 | H1 | H2 | H1 | H2 | H1 | |
| Block 4 | | | | | | | | | | | | |
| O2 | O2 | O1 | O2 | O1 | O1 | H2 | H2 | H1 | H2 | H1 | H1 | VWR 24 ft |
| O1 | O1 | O2 | O1 | O2 | O2 | H1 | H1 | H2 | H1 | H2 | H2 | |
| O2 | O1 | O1 | O2 | O2 | O2 | H2 | H1 | H1 | H2 | H2 | H2 | ctrl 24 ft |
| O1 | O2 | O2 | O1 | O1 | O1 | H1 | H2 | H2 | H1 | H1 | H1 | |
| O1 | O2 | O1 | O1 | O2 | O1 | H1 | H2 | H1 | H1 | H2 | H1 | CWR 24 ft |
| O2 | O2 | O1 | O2 | O1 | O2 | H2 | H2 | H1 | H2 | H1 | H2 | |

O1 = oak, no herbicide
O2 = oak, + herbicide — Each tree 12 ft centers within row, 8 ft between rows

H1 = Hickory, no herbicide — herbicide applied in a circular pattern (18-24 inch diameter) around each tree
H2 = Hickory, + herbicide — tree tubes used on all trees to prevent deer browse

CWR = Canada wildrye, 4.6 lb/a PLS
VWR = Virginia wildrye, 5.2 lb/a PLS

No spaces between blocks. Spaces shown in this diagram for clarity purposes only.

cover crops drilled 20 Sept 2011
trees transplanted 10 May 2012
herbicide sprayed 11 May 2012

## Plants for Wetland Restoration

Wetlands are transitional areas between terrestrial and fully aquatic ecosystems. They include swamps, marshes, and bogs. Wetlands perform many important functions: They improve water quality by trapping nutrients such as nitrogen and phosphorous, toxic substances, and disease-causing microorganisms. They slow and intercept runoff, protect shorelines and banks from erosion, and protect upland areas from floods. Wetlands also provide valuable habitat for wildlife.

**Problem** Historically, humans have made large-scale efforts to drain wetlands for development or to flood them for use as recreational lakes. Since the 1700s the US has lost 50% of its wetlands. With this loss and degradation of wetlands comes:

- decreased water quality
- lost wildlife habitat
- increased flooding
- less groundwater recharge
- diminished recreational opportunities and aesthetics

**Need** In order for wetlands to be restored and for new wetlands to be created, information related to plant species establishment and management is required and plant material must be made available. Rose Lake PMC has assembled and is testing Canada bluejoint [*Calamagrostis canadensis* (Michx.) Beauv.] to address this need.

**Study No. MIPMC-P-0603-WE**
**Evaluation and Release of Canada Bluejoint [*Calamagrostis canadensis* (Michx.) Beauv.]**

**Background** Canada bluejoint grows in dense tufts 1.5 – 5 ft tall, typically in meadows, bogs, and wet thickets or as an understory plant in open, wet woods. Seed heads are open and nodding during flowering. Bluejoint is perennial and native to much of the US except the Gulf Coast states. *Calamagrostis canadensis* is a widely variable species.

**Materials and Methods** Native Canada bluejoint from Indiana, Michigan, and Wisconsin was assembled and accessioned. Plants were established from seed in the greenhouse and transplanted into the field. Field plots were established in a wet area at RLPMC with accessions listed in Table 9. Field plots were evaluated for survival, vigor, disease and insect damage, height, lodging, and seed production.

Table 9. Canada bluejoint accessions established in 2006 in evaluation plots in Michigan and Indiana.

| Accession | Origin |
|---|---|
| 9084188 | Chippewa County, Michigan |
| 9084330 | Pulaski County, Indiana |
| 9084331 | White County, Indiana |
| 9084357 | Polk County, Wisconsin |
| 9084529 | Starke County, Indiana |
| 9086445 | Roscommon County, Michigan |
| 9086446 | Roscommon County, Michigan |
| 9086529 | Ontonagon County, Michigan |
| 9086623 | Ontonagon County, Michigan |

**Results and Conclusions** Accessions 9086445 and 9086446 were selected as “winnners” because they survived and produced more seed than other accessions in six years of field trials (as reported in the RLPMC 2011 Technical Report). Seed of these accessions has been provided to a commercial grower who has agreed to provide an assessment of market demand for these potential releases.

## Plants for Improved Forage

Forages offer a natural solution for addressing many conservation challenges. Quality forage, wildlife habitat, erosion control, nutrient filtering, streambank protection, biofuel, improved soil quality, and reduced nitrogen requirements on row crop and pasture land are among the benefits of forages. The Plant Materials Program and cooperating agencies are major contributors of many forage selections that are planted on private and public lands for the conservation of natural resources.

### Study No. MIPMC-P-0906-PA
### Selection and Evaluation of Improved Big Bluestem (*Andropogon gerardii* Vitman) for Use as Forage for Livestock

**Background** Big bluestem is a native, perennial, warm-season grass reaching heights of 8 ft at maturity. It has long white hairs on the upper leaf surface near the base of the blade. Lower leaf sheaths and blades are sometimes hairy. Big bluestem is bluish in color during most of the summer, often becoming reddish purple when mature. Seedheads consist of two or three racemes that arise from a common joint on the stem and resemble a turkey's foot. Prior to European settlement it was a major constituent of the tall grass prairies and savannas across the Great Plains, Midwest, and northeastern United States.

Warm-season forage grasses such as big bluestem are being integrated into grazing systems to increase beef production during the summer months when cool-season forage production declines. Unlike cool-season grasses that have their greatest growth during cooler temperatures, warm-season grass production peaks at higher temperatures. Utilizing these contrasting patterns of yield distribution helps to ensure adequate feed throughout the summer months and enhance cool-season forage production in the late summer and fall.

**Description of Study** Five big bluestem accessions were identified as having superior forage characteristics through Plant Materials Study 26I101G initiated in 1992 (Table 10). These five parent lines were allowed to cross pollinate. Recurrent selection of these progeny will be used to develop a forage quality big bluestem release through the NRCS Plant Materials Program.

**Materials and Methods** In 2007 RLPMC excavated 10-20 individual plants from each of five isolated clone populations and placed them in gallon pots. Potted plants were placed in the RLPMC shade house in 2008 and allowed to randomly cross pollinate with each other. Seeds were harvested, stratified, and planted in greenhouse flats in December 2008. From these seedlings approximately 200 plants were visually selected by the Plant Materials Specialist and Grazing Lands Specialist for forage characteristics and used to establish an isolated poly-cross block.

Approximately 25% of plants in the poly-cross block were rogued out for non-uniformity, apparently lower quality or quantity of forage production, unacceptable disease levels, and/or flowering that was not synchronous with most other plants in the block. Roguing was done by

RLPMC staff in consultation with the Michigan Grazing Lands Specialist and the MSU Forage Research Assistant. Small quantities of seed were hand harvested in 2011 and 2012.

Commercially available forage bluestems (e.g. Bonilla, Bonanza, and Niagra) will be grown in isolation for comparison of seed germination and forage characteristics. Cycles of selection of the RLPMC big bluestem will continue until a release is developed with forage characteristics, seed germination, and seedling vigor that are comparable or superior to the commercial standards.

Table 10. Parent lines of anticipated release of big bluestem for forage.

| Accession | Origin |
|---|---|
| 9070139 | Porter County, Indiana |
| 9070149 | Jasper County, Indiana |
| 9070162 | Porter County, Indiana |
| 9070163 | Jasper County, Indiana |
| 9070197 | Washtenaw County, Michigan |

**Harvest** Seed was hand harvested in 2011 and 2012.

**Study No. MIPMC-P-0910-PA**
**Yellow Alfalfa [*Medicago sativa* L. ssp. *falcata* (L.) Arcang.] Release**

**Objective** Objectives of this study are to evaluate and produce foundation seed of yellow-flowered alfalfa for use in conservation practices. Seed produced at RLPMC will be provided to MSU and South Dakota State University for release through their respective Agricultural Experiment Stations.

**Backgound** Yellow alfalfa (AKA yellow-flowered alfalfa) is a subspecies of alfalfa (Medicago sativa). Introduced from Siberia, it has been grown in the United States since the early 1900s. Plant characteristics and growth requirements are similar to purple-flowered alfalfa. However, it blooms for a longer duration and has more fibrous roots than purple-flowered alfalfa. Research at MSU has shown it to produce as much forage in a 2-cut system as purple-flowered alfalfa produces in a 3-cut system. Anecdotal evidence suggests its faster recovery after grazing.

**Seed Production** Approximately 6500 greenhouse-started seedlings were transplanted into a limed and fertilized ¼-acre field at RLPMC in spring 2010. Irrigation was supplied, weeds were mechanically and chemically controlled, deer exclusion fencing was installed, and blue-flowered and other off-type plants were hand rogued. To increase seed-set leafcutter bees were imported from Canada in 2011 and placed near the production field in a shelter containing nesting blocks.

Seed was harvested with a plot combine in early August 2011. Harvest was preceded by applications of a desiccant (paraquat) and Spodnam® to control pod shatter. After cleaning bulk seed yield was nearly 10 lbs. Laboratory analysis showed 98.88% seed purity, 23% germination, and 71% hard seed. Harvested seed quantities in 2012 were similar to 2011.

## Plants as Habitat for Native Pollinators

### Study No. MIPMC-T-0802-WI
### Demonstration Planting of Selected Plants for Use by Native Pollinators

**Background** This study plan was developed collaboratively and with partial funding from the Xerces Society for Invertebrate Conservation. The plan suggested the establishment of beneficial insect plantings to demonstrate usage of flowering plants – especially native trees, shrubs, perennial forbs, and annual forbs – for the creation of habitat for important beneficial insects, i.e., pollinators and predators and parasites of crop pests. Proposed planting arrangements included a hedgerow of shrubs and small trees, a linear planting of annual and perennial forbs, and/or a meadow planting of beneficial plants for pollinators. The habitat plantings included locally appropriate genetic stock. Native herbaceous plants were chosen based on field work conducted by scientists at MSU. Shrubs and small trees were chosen in consultation with local and regional experts based on genera known to be important sources of pollen and nectar for bees and other pollinators. Plantings will be monitored for the abundance and diversity of bees and other beneficial insects and bloom periods will be recorded.

**Hedgerow and Linear Planting** Hedgerow and linear plantings of perennial herbaceous and woody plants were established at Rose Lake PMC in 2008. Species were arranged in anticipated order of bloom with the earliest bloomers at the southwest end. The planting was enclosed in a deer exclusion fence.

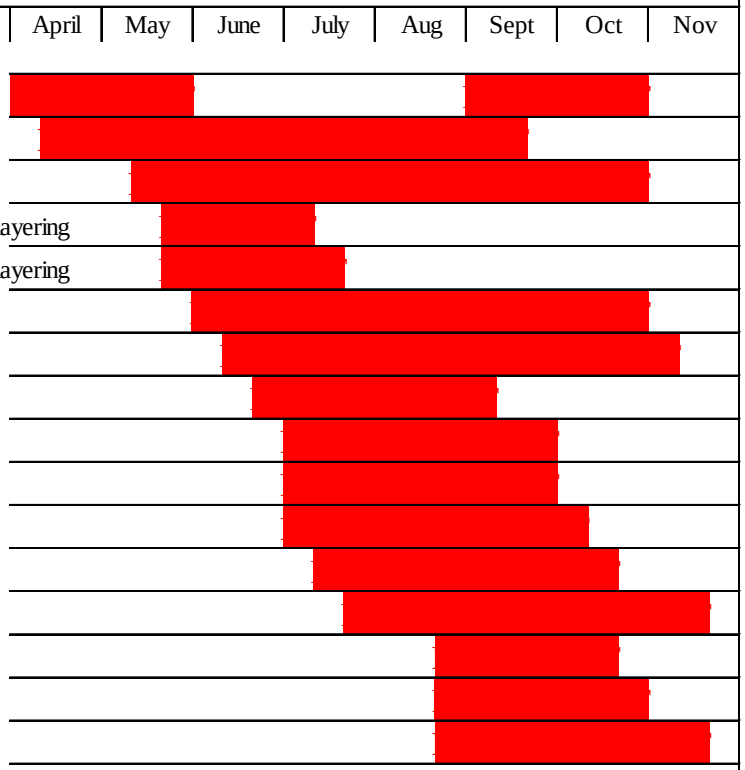
**Observations** Plants near the southwest end of the plot (*Fragaria virginiana* and *Salix interior*) generally bloomed first. Bloom times and spread of perennial herbs are shown in Table 11. *Solidago spp.* and others on the northeast end were still blooming after a frost.

**Meadow Planting** Non-stratified and stratified seeds of perennial forbs, grasses, and legumes were planted with a Truax drill in a one-acre meadow, split to compare non-stratified and stratified seed in 2010. Metering the moist, stratified seed through the drill was very difficult and would not be recommended without significant procedural or equipment modifications.

**Observations** Years before it was planted to meadow flowers, this area was a crown vetch (*Securigera varia*) seed production field. Crown vetch is still the predominate species in this area, thus the development of Tolerance of Selected Wildflower Species to Herbicides (RLPMC Study MIPMC-T-1302-WI) which will be established in 2013. Lessons learned are that successful establishment of a pollinator-friendly meadow requires that the challenges of simultaneously drilling multiple species of moist, stratified seed and of seed banks of competitive perennials must be addressed.

Table 11. Bloom period and spread of wildflowers at USDA-NRCS Rose Lake PMC, E. Lansing, MI.

| Common Name | *Scientific name* | Spread?† Yes/No | Means of Propagation‡ | Bloom Period§ |
|---|---|---|---|---|
| Wild Strawberry | *Fragaria virginiana* | Y | seed, rhizomes, stolons | |
| Golden Alexander | *Zizia aurea* | Y | seed, cutting, division | |
| Spiderwort | *Tradescantia ohiensis* | N | seed, cutting, division | |
| Hairy Penstemon | *Penstemon hirsutus* | N | seed, basal cutting, division, layering | |
| Foxglove Beardtongue | *Penstemon digitalis* | N | seed, basal cutting, division, layering | |
| Purple Coneflower | *Echinacea purpurea* | Y | seed, basal cutting | |
| Black-Eyed Susan | *Rudbeckia hirta* | Y | seed, cutting | |
| Butterfly Milkweed | *Asclepias tuberosa* | N | seed, root cutting, rhizomes | |
| Wild Bergamot | *Monarda fistulosa* | Y | seed, cutting, division | |
| Culver's Root | *Veronicastrum virginicu* | N | seed, cutting, division | |
| Missouri Ironweed | *Vernonia missurica* | N | seed, sprig | |
| Yellow Giant Hyssop | *Agastache nepetoides* | Y | seed, cutting | |
| Showy Goldenrod | *Solidago speciosa* | N | seed, rhizomes | |
| Riddell's Goldenrod | *Oligoneuron riddellii* | N | seed, rhizomes | |
| New England Aster | *Symphyotrichum novae* | N | seed, cutting | |
| Hairy Goldenrod | *Solidago hispida* | N | seed, rhizomes | |




†Did plant spread beyond 2008 planting as evaluated during and after 2012 growing season?

‡Means of propagation as indicated by various sources including USDA-NRCS PLANTS Database.

§Bloom periods evaluated in 2009-12. Aggregated bloom periods as shown here are longer than bloom periods in any single year.

**Appendix A**

## Released Material

'Affinity' (*Thuja occidentalis* L.) Northern White Cedar
Released: 1993 (FY1993)
Accession Number: 477011 (PI Number: 477011)
Release Type: cultivar
Plant Origin: native
Collection Location: Pulaski Co., IN
Plant Type: tree
Plant Duration: perennial
Propagation: seed
Uses: field and farmstead windbreaks, screen or border planting in urban situations, and winter browse

Alcona Germplasm [*Desmodium glabellum* (Michx.) DC.] Dillenius' Tick-Trefoil
Released: 2006 (FY2006)
Accession Number: 9055415 (PI Number: 654405)
Release Type: tested germplasm
Plant Origin: native
Collection Location: Alcona Co., MI
Plant Type: legume
Plant Duration: perennial
Propagation: seed
Uses: wildlife food plots as an alternative to introduced plant species

Grant Germplasm [*Desmodium paniculatum* (L.) DC.] Panicledleaf Tick-Trefoil
Released: 2006 (FY2006)
Accession Number: 9055428 (PI Number: 654406)
Release Type: tested germplasm
Plant Origin: native
Collection Location: Grant Co., WI
Plant Type: legume
Plant Duration: perennial
Propagation: seed
Uses: wildlife food plots as an alternative to introduced plant species

Icy Blue Germplasm (*Elymus canadensis* L.) Canada Wildrye
Released: 2004 (FY2004)
Accession Number: 9084347 (PI Number: 641962)
Release Type: tested germplasm
Plant Origin: native
Collection Location: LaPorte Co., IN
Plant Type: cool-season grass
Plant Duration: perennial
Propagation: seed
Uses: restoration, wildlife cover, and erosion control
Registration Document: Durling, J.C., J.W. Leif, and D.W. Burgdorf. 2006. Registration of Icy Blue Canada Wildrye Germplasm. Crop Sci. 46:2330-2331.

'Imperial' *Populus* ×*canadensis* Moench (pro sp.) [*deltoides* × *nigra*] Carolina Poplar
Released: 1979 (FY1979)
Accession Number: 432347 (PI Number: 432347)
Release Type: cultivar
Plant Origin: introduced
Collection Location: Rice Co., MN
Plant Type: tree
Plant Duration: perennial
Propagation: vegetative
Uses: windbreaks (especially around orchards) and pulpwood

'Indigo' (*Cornus amomum* P. Mill.) Silky Dogwood
Released: 1982 (FY1982)
Accession Number: 468117 (PI Number: 468117)
Release Type: cultivar
Plant Origin: native
Collection Location: Clinton Co., MI
Plant Type: shrub
Plant Duration: perennial
Propagation: seed or vegetative
Uses: single row windbreak under center pivot irrigation, field and farmstead windbreak, soil bioengineering, and wildlife food

Koch Germplasm [*Calamovilfa longifolia* (Hook.) Scribn. var. *magna* Scribn. & Merr.] Prairie Sandreed
Released: 2007 (FY2007)
Accession Number: 9086408 (PI Number: Ames 29312)
Release Type: selected
Plant Origin: native
Collection Location: costal zones along Lakes Michigan and Huron
Plant Type: warm-season grass
Plant Duration: perennial
Propagation: seed or vegetative
Uses: wind erosion control, dune stabilization, and water quality improvement

'Lancer' (*Lathyrus latifolius* L.) Perennial Pea
Released: 1984 (FY1984)
Accession Number: (PI Number: 477009)
Release Type: cultivar
Plant Origin: naturalized
Collection Location: MI
Plant Type: legume
Plant Duration: perennial
Propagation: seed
Uses: erosion control plant, wildlife cover plant, land reclamation, brush management, roadside seeding mixtures, critical area planting where objective includes beautification

Leelanau Germplasm (*Viburnum opulus* L. var. *americanum* Ait.) Highbush Cranberry
Released: 1999 (FY1999)
Accession Number: 9031863 (PI Number: 608015)
Release Type: selected
Plant Origin: native
Collection Location: Leelanau Co., MI
Plant Type: shrub
Plant Duration: perennial
Propagation: vegetative
Uses: windbreaks (especially on wet or organic soils) and wildlife habitat

'Magenta' (*Malus sp*.) Hybrid Crabapple
Released: 1990 (FY1990)
Accession Number: 9005032 (PI Number: 514275)
Release Type: cultivar
Plant Origin: introduced
Collection Location: Clinton Co., MI
Plant Type: tree
Plant Duration: perennial
Propagation: seed
Uses: small tree for single row windbreaks & beautification

Marion Germplasm [*Desmodium glabellum* (Michx.) DC.] Dillenius' tick-trefoil
Released: 2009 (FY2009)
Accession Number: 9005087
Release Type: tested germplasm
Plant Origin: native
Collection Location: Marion Co., WI
Plant Type: legume
Plant Duration: perennial
Propagation: seed
Uses: wildlife food plots as an alternative to introduced plant species
Registration Document: Leif JW, Durling JC, Burgdorf DW. 2010. Notice of release of Dillenius' tick-trefoil: a selected class of natural germplasm. Native Plants Journal 11(1):23-25.

Prairie View Indiana Germplasm (*Andropogon gerardii* Vitman) Big Bluestem
Released: 2005 (FY2005)
Accession number: 9086588 (PI Number: 642389)
Release Type: Selected
Plant Origin: Native
Collection Location: Indiana
Plant Type: warm-season grass
Plant Duration: perennial
Propagation: seed
Uses: wildlife food/cover, erosion control, increased species diversity, and native environment restoration

Prairie View Indiana Germplasm [*Schizachyrium scoparium* (Michx.)] Little Bluestem
Released: 2005 (FY2005)
Accession number: 9086577 (PI Number: 642388)
Release Type: Selected
Plant Origin: Native
Collection Location: Indiana
Plant Type: warm-season grass
Plant Duration: perennial
Propagation: seed
Uses: wildlife food/cover, erosion control, increased species diversity, and native environment restoration

Prairie View Indiana Germplasm [*Sorghastrum nutans* (L.) Nash] Indiangrass
Released: 2005 (FY2005)
Accession number: 9086556 (PI Number: 642387)
Release Type: Selected
Plant Origin: Native
Collection Location: Indiana
Plant Type: warm-season grass
Plant Duration: perennial
Propagation: seed
Uses: wildlife food/cover, erosion control, increased species diversity, and native environment restoration

Riverbend Germplasm (*Salix sericea* Marsh.) Silky Willow
Released: 2003 (FY2003)
Accession Number: 9069052 (PI Number: Ames 27796)
Release Type: tested
Plant Origin: native
Collection Location: Daviess Co., IN
Plant Type: shrub
Plant Duration: perennial
Propagation: vegetative
Uses: streambank/shoreline restoration and riparian corridors

'Roselow' (*Malus sargentii* Rehder) Sargent's Crabapple
Released: 1978 (FY1978)
Accession Number: 477986 (PI Number: 477986)
Release Type: cultivar
Plant Origin: introduced
Collection Location: Japan
Plant Type: tree
Plant Duration: perennial
Propagation: seed
Uses: farm and field windbreaks

Southlow Michigan Germplasm (*Andropogon gerardii* Vitman) Big Bluestem
Released: 2001 (FY2001)
Accession number: 9084510 (PI Number: 642398)
Release Type: Source Identified
Plant Origin: Native
Collection Location: Southern Lower Michigan
Plant Type: warm-season grass
Plant Duration: perennial
Propagation: seed
Uses: wildlife cover filter strips
Registration Document: Durling, J.C., J.W. Leif, and D.W. Burgdorf. 2007. Registration of Southlow Michigan Big Bluestem Germplasm. Crop Sci. 47:455.

Southlow Michigan Germplasm (*Panicum virgatum* L.) Switchgrass
Released: 2001 (FY2001)
Accession number: 9084512 (PI Number: 642395)
Release Type: Source Identified
Plant Origin: Native
Collection Location: Southern Lower Michigan
Plant Type: warm-season grass
Plant Duration: perennial
Propagation: seed
Uses: wildlife food/cover, erosion control, increased species diversity, and native environment restoration
Registration Document: Durling, J.C., J.W. Leif, and D.W. Burgdorf. 2008. Registration of Southlow Michigan Germplasm Switchgrass. Journal of Plant Registrations. 2:60.

Southlow Michigan Germplasm [*Schizachyrium scoparium* (Michx.) Nash] Little Bluestem
Released: 2001 (FY2001)
Accession number: 9084511 (PI Number: 642397)
Release Type: Source Identified
Plant Origin: Native
Collection Location: Southern Lower Michigan
Plant Type: warm-season grass
Plant Duration: perennial
Propagation: seed
Uses: wildlife food/cover, erosion control, increased species diversity, and native environment restoration
Registration Document: Durling, J.C., J.W. Leif, and D.W. Burgdorf. 2007. Registration of Southlow Michigan Little Bluestem Germplasm. Journal of Plant Registrations. 1:134.

Southlow Michigan Germplasm (*Sorghastrum nutans* L. Nash) Indiangrass
Released: 2001 (FY2001)
Accession number: 9084513 (PI Number: 642396)
Release Type: Source Identified
Plant Origin: Native
Collection Location: Southern Lower Michigan
Plant Type: warm-season grass
Plant Duration: perennial
Propagation: seed
Uses: wildlife food/cover, erosion control, increased species diversity, and native environment restoration
Registration Document: Durling, J.C., J.W. Leif, and D.W. Burgdorf. 2008. Registration of Southlow Michigan Germplasm Indiangrass. Journal of Plant Registrations. 2:56.

Vintage Germplasm Common Elderberry [*Sambucus nigra* L. ssp. *canadensis* (l.) R. Bolli]
Released: 2010
Accession number: 9084126
Release Type: Selected
Plant Origin: Native
Collection Location: Tipton County, Indiana
Plant Type: shrub
Plant Duration: perennial
Propagation: seed or vegetative
Uses: streambank and shoreline stabilization, enhancement of riparian corridors, and food and shelter for wildlife
Registration Document: Leif, J.W., J.C. Durling, and D.W. Burgdorf. 2011. Notice of release of Vintage germplasm common elderberry: a selected class of natural germplasm. Native Plants Journal. 12(2):129-131.

**Appendix B**

## Publications and presentations

Results of experiments and observations at RLPMC are disseminated through publications, presentations at professional and grower meetings, and other means, including for the first time in 2012, YouTube™. These were presented, posted to the website (http://plant-materials.nrcs.usda.gov/mipmc/), or otherwise disseminated in 2012:


Ackroyd, Mutch, Baas, Durling, Leif, and Pérez, USDA-NRCS Plant Materials Center. 2012. Fall-planted brassica cover crop winter-kill and weed suppression. Michigan State University Extension News. http://msue.anr.msu.edu/news/fall-planted_brassica_cover_crop_winter-kill_and_weed_suppression

Buehler and Burgdorf. 2012. Plant Propagation Rack. You Tube Video at http://www.youtube.com/watch?v=s7LZIqFhDFA

Buehler, Leif, and Pérez. 2012. Calibration of a Truax No-Till Grain Drill. You Tube Video at http://www.youtube.com/watch?v=4DfsW9EEnbY

Burgdorf, Feck, and Leif. 2012. Community Garden Guide Season Extension: Construction and Operation of a Plant Propagation Rack. RLPMC. 13 p.

Durling and Leif. 2012. Rose Lake Plant Materials Center 2011 Technical Report. RLPMC. 54p.

Durling, Leif, Ackroyd, and Pérez. 2012. Brassica cover crops: considerations from a recent mild winter. Presented at Shiawassee County 2012 Agricultural Tour, Laingsburg, MI.

Gieske, Ackroyd, Baas, Durgan, Durling, Grigar, Leif, Mutch, Pérez, and Wyse. 2012. Brassicaceous Fall Cover Crop Performance in Minnesota and Michigan. Rose Lake PMC, East Lansing, MI. Poster presented at Midwest Cover Crops Council meeting in W. Lafayette, IN. February 2012. 2p.

Grigar and Leif. 2012. Calibration of Truax No-Till Grain Drill (Model FLX 1188RD). RLPMC. 5p.

Leif and Gerona. 2012. Rose Lake Plant Materials Center Spring Newsletter. RLPMC. Spring 2012. 3p.

Leif. 2012. Propagation Protocol Plants Produced for Apostle Islands National Lakeshore. RLPMC. June 2012. 34p.

Leif. 2012. Apostle Islands National Lakeshore FY 2011 Annual Report. RLPMC. 4p.

Mutch, Baas, Ackroyd, Leif, Durling, and Pérez. 2012. Brassica variety trials – NRCS Rose Lake Plant Material Center. Presented at Midwest Cover Crop Council, Ada, OH.

**Appendix C**

## Weather and Climate

| Growing season temperature and precipitation data, 2012† and long-term‡, for Rose Lake PMC. | | | | | | |
|---|---|---|---|---|---|---|
| | May | June | July | August | September | Growing Season |
| Average Daily Maximum (°F) | 74.9 | 81.4 | 90.2 | 82.4 | 75.4 | 80.9 |
| | 69.7 | 79.9 | 83.7 | 82.0 | 74.4 | 77.9 |
| Average Daily Minimum (°F) | 48.8 | 53.8 | 62.4 | 55.7 | 48.9 | 53.9 |
| | 45.3 | 55.5 | 59.2 | 57.7 | 50.5 | 53.6 |
| Precipitation (in) | 2.28 | 1.44 | 3.33 | 2.64 | 3.41 | 13.10 |
| | 2.95 | 3.64 | 2.97 | 3.08 | 2.58 | 15.22 |
| †2012 data as recorded by Campbell Scientific automatic weather station at Rose Lake PMC.<br>‡Long-term data as median of Clinton, Ingham, and Shiawassee values from respective soil surveys. | | | | | | |

**2012 Growing Season Weather Summary** Precipitation was less than normal in May through September. Record breaking warm temperatures in March (not shown in table) brought blossoms out early; however, several occurrences of freezing temperatures in April and May resulted in a complete failure of the crabapple crop at Rose Lake PMC.

**Climate** Rose Lake PMC is inland approximately 100 miles from Lakes Michigan, Huron, and Erie. Rose Lake PMC's proximity to the Great Lakes slightly influences the continental climate toward semi-maritime. Prevailing winds are westerly. Annual precipitation is approximately 30 inches distributed throughout the year. The frost-free growing season averages 140 – 145 days, from mid-May to early October. January and July are the coldest and warmest months, respectively.

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