Rose Lake
Plant Materials Center
2011 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

Plant Materials Specialist Phone: 517-641-7831
Plant Materials Specialist Cell: 517-281-5939
Plant Materials Specialist Fax: 517-641-4421

Table of Contents

			Page
Contact Information			2
Table of Contents			3
Personnel			5
Introduction			6
Studies			8
	Partnerships and Program Development		9
		National Ash (*Fraxinus spp*.) Seed Collection Initiative	9
		Interagency Agreement [Involving Apostle Islands National Lakeshore]	10
	Plant Material Collections		14
		Evaluation and Release of Riverbank Wildrye (*Elymus riparius* Wiegand)	14
		Evaluation and Great Lakes Release of American Plum (*Prunus americana* Marsh.)	14
		Development of a Great Lakes Release of Buttonbush (*Cephalanthus occidentalis* L.)	14
		Evaluation and Release of Broomsedge Bluestem (*Andropogon virginicus* L.)	14
		Evaluation and Release of Coralberry (*Symphoricarpos orbiculatus* Moench)	14
		Selection and Release of Northern Honeysuckle (*Diervilla lonicera* Mill.)	14
		Woodland Bluegrass (*Poa sylvestris* A. Gray) Evaluation and Release	14
	Plants for Vegetative Barriers		18
		Evaluation of Various Grass Species for Use in Vegetative Barriers	18
	Cover Crops and Conservation Cover		20
		Development of a Great Lakes Composite of Virginia Wildrye (*Elymus virginicus* L.)	21
		Plant Growth Parameters for Brassicaceous Cover Crops	23
	Plants for Wetland Restoration		28
		Evaluation and Release of Canada Bluejoint [*Calamagrostis canadensis* (Michx.) Beauv.]	28
	Plants of Cultural Significance		31
		Ginger (*Asarum* L.) Evaluation	31
	Plants for Restoration or Reclamation of Disturbed Areas		32
		Development of a Great Lakes Release of Bottlebrush Grass (*Elymus hystrix* L.)	32
	Plants for Improved Forage		34
		Selection and Evaluation of Improved Big Bluestem (*Andropogon gerardii* Vitman) for Use as Forage for Livestock	34
		Yellow Alfalfa [*Medicago sativa* L. ssp. *falcata* (L.) Arcang.] Release	36

	Plants for Residential Sewage Treatment Systems		37
		Evaluation of Species for Use in Vegetative Treatment Areas as a Component of Residential Sewage Treatment Systems	37
	Plants as Habitat for Native Pollinators		39
		Demonstration Planting of Selected Plants for Use by Native Pollinators	39
Appendix A: Released Material			44
Appendix B: Publications and Presentations			51
Appendix C: Weather and Climate			53

USDA-NRCS ROSE LAKE PLANT MATERIALS CENTER STAFF & ASSOCIATED PERSONNEL

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

Plant Materials Specialist
David W. Burgdorf

Central Region Plant Materials Specialist
Joel L. Douglas

National Program Leader
John M. Englert

State Conservationist Advisory Committee
Garry Lee, Chair, Michigan
Jane Hardisty, Indiana
Terry J. Cosby, Ohio
Patricia Leavenworth, Wisconsin
William J. Gradle, Illinois
Astor F. Boozer, New York
Denise Coleman, Pennsylvania

State Plant Materials Committees

Indiana	Wisconsin	Michigan	Ohio
Ken Collins, Ch.	Greg Rebman, Ch.	Andy Henriksen, Ch.	MaryAnn Core, Ch.
Dave Burgdorf, Adv.	Dave Burgdorf, Adv.	James Scott, Adv.	Dave Burgdorf, Adv.
John Leif, ex officio	John Leif, *ex officio*	Dave Burgdorf, Adv.	Mike Laughrey, Adv.
Kelley Barkell	Matt Blohowiak	John Leif, Adv.	John Leif, ex officio
Barry Fisher	Brian Briski	Karen Blair	Matt Duncan
Susan Grivas	Judy Derricks	Jerry Davis	Nicholas Lee
Adam Heichelbech	Elizabeth Doolittle	Stacy Kimble	Jonathan Mauk
Susannah Hinds	Ryan Galbreath	Damarys Mortenson	Mark Reynolds
Jo Hodgett	Pattie Haack	Carol Schadd	Mark Scarpitti
Brian Ingmire	Brian Hillers	Thomas Tauzer	Gina Schworm
Ellen Jacquart	Terry Kelly	Jennifer Taylor	
Brianne Lowe	Tom Melnarik	James Williams	
Jim Norris	Phil Meyer		
Doris Scully	Pat Murphy		
Vic Shelton	Mike Patin		
Dave Stratman	Brian Pillsbury		
Jenny Vogel	Merrie Schamberger		
Shannon Zezula	Jason Thomas		
	Michele Wilkinson		

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	Year Initiated	Report Page
MIPMC-P-0201-CR	Development of a Great Lakes Release of Virginia Wildrye (*Elymus virginicus* L.)	Release	2002	20
MIPMC-P-0204-CR	Development of a Great Lakes Release of Bottlebrush Grass (*Elymus hystrix* L.)	Release	2002	31
MIPMC-P-0207-CR	Evaluation and Release of Riverbank Wildrye (*Elymus riparius* Wiegand)	Release	2007	14
MIPMC-P-0503-WL	Evaluation and Great Lakes Release of American Plum (*Prunus americana* Marsh.)	Release	2005	14
MIPMC-P-0504-WE	Development of a Great Lakes Release of Buttonbush (*Cephalanthus occidentalis* L.)	Release	2005	14
MIPMC-P-0601-CR	Evaluation and Release of Broomsedge Bluestem (Andropogon virginicus L.)	Release	2006	14
MIPMC-P-0603-WE	Evaluation and Release of Canada Bluejoint [*Calamagrostis canadensis* (Michx.) Beauv.]	Release	2006	27
MIPMC-P-0706-WL	Evaluation and Release of Coralberry (*Symphoricarpos orbiculatus* Moench)	Release	2006	14
MIPMC-P-0906-PA	Selection and Evaluation of Improved Big Bluestem (*Andropogon gerardii* Vitman) for Use as Forage for Livestock	Release	2009	33
MIPMC-P-0907-RI	Selection and Release of Northern Honeysuckle (*Diervilla lonicera* Mill.)	Release	2009	14
MIPMC-P-0910-PA	Yellow Alfalfa [*Medicago sativa* L. ssp. *falcata* (L.) Arcang.] Release	Release	2009	35
MIPMC-P-0911-WO	Woodland Bluegrass (*Poa sylvestris* A. Gray) Evaluation and Release	Release	2009	14
MIPMC-T-0004-CR	Interagency Agreement [Involving Apostle Islands National Lakeshore]	Technology	2000	10
MIPMC-T-0701-TE	National Ash (*Fraxinus spp.*) Seed Collection Initiative	Technology	2007	9
MIPMC-T-0801-WE	Evaluation of Species for Use in Vegetative Treatment Areas as a Component of Residential Sewage Treatment Systems	Technology	2008	36
MIPMC-T-0802-WI	Demonstration Planting of Selected Plants for Use by Native Pollinators	Technology	2008	38
MIPMC-T-0901-WO	Ginger (*Asarum* L.) Evaluation	Technology	2009	30
MIPMC-T-1002-CP	Plant Growth Parameters for Brassicaceous Cover Crops	Technology	2010	22
MIPMC-T-1003-CP	Evaluation of Various Grass Species for Use in Vegetative Barriers	Technology	2010	18

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. Partnering has two advantages: First, partnering facilitates conservation by garnering the knowledge, skills, and abilities of each agency or group involved. Second, it broadens RLPMC's range of plant and conservation skills thereby widening the customer base and demand. Often partnerships result in *reimbursable agreements* which help in technology development and information gathering for releasing Conservation Plants.

Study No. MIPMC-T-0701-TE
National Ash (*Fraxinus spp*.) Seed Collection Initiative

The National Ash Seed Collection Initiative, started at the Rose Lake PMC in 2005, is now being handled by the USDA Forest Service. The Forest Service National Seed Laboratory receives samples directly from collectors, communicates collection protocols, and handles processing and archival functions. The National Seed Laboratory website may be accessed through RLPMC's ash collection website (www.ashseed.org) or with the link below.

http://www.nsl.fs.fed.us/geneticconservation_ash.html

Over the last half decade RLPMC staff and Plant Materials Specialist Dave Burgdorf have made numerous presentations on ash seed to government agencies, tribes, other partners, and the general public. Posters and brochures were distributed to NRCS Field Offices and other partners. The ash seed collection effort also received popular press and television coverage.

Moreover, Professor Deborah McCullough of Michigan State University (MSU) and her graduate students and post-docs continue to publish ash borer-related research based on studies conducted in part at RLPMC. Recent publications include:

> Mercader, R.J., N.W. Siegert, A.M. Liebhold, and D.G. McCullough. 2011. Influence of foraging behavior and host spatial distribution on the localized spread of the emerald ash borer, *Agrilus planipennis*. Population Ecology 53:271–285.
>
> Mercader, R.J., N.W. Siegert, A.M. Liebhold, and D.G. McCullough. 2011. Simulating the effectiveness of three potential management options to slow the spread of emerald ash borer (*Agrilus planipennis*) populations in localized outlier sites. Canadian Journal of Forest Research 41:(2) 254-264.
>
> Tluczek, A.R., D.G., McCullough, and T.M. Poland. 2011. Influence of host stress on emerald ash borer (Coleoptera: Buprestidae) adult density, development, and distribution in *Fraxinus pennsylvanica* trees. Environmental Entomology 40:357-366 (10).

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. This reimbursable project was 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.

Current Efforts During the summer of 2010 National Park Service staff collected seeds from beachgrass (*Ammophila breviligulata*), Canada wildrye (*Elymus canadensis*), crinkled hairgrass (*Deschampsia flexuosa)*, Canada mayflower (*Maianthemum canadense*), blueberry (*Vaccinium angustifolium* or *myrtilloides*), juniper (J*uniperus communis*), wormwood (*Artemisia vulgaris*), cowwheat (*Melampyrum lineare*), and smooth rose (*Rosa blanda*) and sent them to RLPMC. Rose Lake PMC staff adapted or developed and implemented propagation protocols. Approximately 5000 plants were delivered in Cone-tainers™ to the Park Service in 2011 with additional plants to be delivered later.

Beachgrass

Beachgrass (*Ammophila breviligulata*) seed germination rates are usually low, so most beachgrass propagation has been vegetative. However, Rose Lake PMC experienced success with producing beachgrass from seed and is attempting to develop beachgrass with higher-germination seed.

To provide plants for Apostle Islands untreated beachgrass seed from Apostle Islands was sown in greenhouse flats in late January 2011. Plants were transferred to Cone-tainers™ when they were about 2 in tall. Approximately 1500 beachgrass plants were delivered to Apostle Islands in May 2011.

Discussions among Apostle Islands and NRCS staff indicated an interest in developing beachgrass that is propagated by seed. So, Rose Lake PMC initiated a field experiment to determine if beachgrass germination is a heritable trait that can be increased through selection. Seed-propagated beachgrass plants were planted outside in a crossing block. Germination rates of seed from this seed-propagated beachgrass will be compared with germination rates of seed from vegetatively propagated beachgrass. Germination rate comparisons are expected to begin in 2012 or 2013.

Canada wildrye

Canada wildrye (*Elymus canadensis*) seeds were collected from the Park and sent to the Rose Lake PMC. Seeds were planted in greenhouse flats in late January 2011. Plants were transferred to Cone-tainers™ when they were about 2 in tall. Approximately 1300 Canada wildrye plants were delivered to the Park in June 2011.

Crinkled hairgrass

Previous research has demonstrated that no additional seed treatments are necessary for germination of crinkled hairgrass (*Deschampsia flexuosa*). Hairgrass seeds that were collected in 2010 were planted in greenhouse flats in January 2011. Plants were transferred to Cone-tainers™ when they were about 2 in tall. A total of 1803 hairgrass plants were delivered to the Park in May 2011.

Canada mayflower

Canada mayflower (*Maianthemum canadense*) seeds were collected in 2010 and subjected to stratification and growing conditions as show in Table 1.

Table 1. Seed stratification and growing conditions applied to Canada mayflower at Rose Lake PMC. 2010-11.

Treatment	Stratification	Greenhouse Growing Condition	Cones with emerged plants (%)[†]
1	90 day cold (4°C)	Open sunlight/supplemental light	50
2	90 day cold (4°C)	Under shade cloth, no supplemental light	44
3	60 day cold (4°C)	Open sunlight/supplemental light	44
4	60 day cold (4°C)	Under shade cloth, no supplemental light	35
			N.S. at $P \leq 0.05$

[†]Final emergence count on 9 Sept 2011.

Following stratification seeds were planted in greenhouse containers in January 2011. As of September 2012 approximately 250 plants emerged with no apparent differences in germination and emergence due to treatments. Plants will be maintained under shade through 2011 and delivered to the Park in spring 2012.

Blueberry

Blueberry (*Vaccinium angustifolium* or *myrtilloides*) seeds were collected in 2010 and subjected to stratification treatments as shown in Table 2.

Table 2. Seed stratification applied to blueberry at Rose Lake PMC. 2010-11.		
Treatment	Stratification	Stratification Media
1	90 day cold (4°C)	Peat moistened with tap water
2	90 day cold (4°C)	Peat moistened with low pH water soluble fertilizer

Seed was subjected to stratification treatments then planted in greenhouse containers in January 2011. No emergence was observed in 2011. Containers will overwinter outdoors and germination and emergence will be evaluated again in spring 2012.

Juniper

Juniper (J*uniperus communis*) seeds were collected in 2010 and subjected to one of three scarification and stratification treatments as shown in Table 3.

Table 3. Seed scarification and stratification treatments applied to juniper at Rose Lake PMC. 2010-11.		
Treatment	Scarification	Stratification
1	None	90-day warm (30°C) followed by 90-day cold (4°C)
2	H_2SO_4 soak for 30 min	90-day warm (30°C) followed by 90-day cold (4°C)
3	H_2O_2 soak for 24 hr	90-day warm (30°C) followed by 90-day cold (4°C)

Seeds were planted in the greenhouse in April 2011. No emergence was observed in any treatments in 2011. Containers will overwinter outdoors and germination and emergence will be evaluated in spring 2012.

Juniper seeds collected in 2009 were subjected to H_2SO_4 soak for 30 min or no scarification. Both scarified and non-scarified seeds were stratified with 60-day warm followed by 60-day cold followed by 60-day warm. Seeds were planted in Cone-tainers™ in June 2010. No emergence was observed in any treatment through 2010. Cone-tainers™ were covered with plastic landscape fabric and kept in the PMC shadehouse through the winter and returned to the greenhouse in the spring. Germination in spring 2011 averaged 31 – 34% with no differences between treatments. Approximately 280 juniper plants will be delivered in 2012.

Wormwood

Wormwood seeds were collected in 2010 and subjected to stratification treatments (Table 4). Following stratification treatments seeds were planted in greenhouse containers in January 2011. Experimental design was a randomized complete block with three replicates and approximately 100 seeds per treatment. Emergence was evaluated weekly. Emergence was nearly complete 2 weeks post planting. Final emergence counts nine weeks post planting. Final emergence is provided in the Table 4. Significant treatment differences were not observed.

Table 4. Emergence of wormwood as affected by stratification. Rose Lake PMC. 2010-11.

Treatment	Stratification	Emergence (%) 60 days after planting
1	None	16
2	30 days warm (30°C)	29
		N.S. at P≤0.05

A total of 279 wormwood plants were delivered to the Park in May 2011.

Cowwheat

Cowwheat seeds were collected in 2010 and subjected treated as shown in Table 5.

Table 5. Stratification and germination treatments applied to cowwheat. Rose Lake PMC. 2010-11.

Treatment	Stratification	Germination Environment
1	60-day cold (4°C)	Greenhouse conditions 15 – 25°C
2	60-day cold (4°C)	Cold temperature conditions 4°C
3	90-day cold (4°C)	Greenhouse conditions 15 – 25°C
4	90-day cold (4°C)	Cold temperature conditions 4°C

Stratification treatments are complete and seeds were planted in greenhouse containers in January 2011. No emergence was observed in 2011.

Smooth Rose

Forty eight smooth rose (*Rosa blanda*) emerged from seeds planted in 2010. Plants were transferred to Cone-tainers™ and delivered to the Park in June 2011.

Plant Material Collections

Study No. MIPMC-P-0207-CR
Increase and Release of Riverbank Wildrye (*Elymus riparius* Wiegand)

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

Study No. MIPMC-P-0504-WE
Development of a Great Lakes Release of Buttonbush (*Cephalanthus occidentalis* L.)

Study No. MIPMC-P-0601-CR
Evaluation and Release of Broomsedge Bluestem (*Andropogon virginicus* L.)

Study No. MIPMC-P-0706-WL
Evaluation and Release of Coralberry (*Symphoricarpos orbiculatus* Moench)

Study No. MIPMC-P-0907-RI
Selection and Release of Northern Honeysuckle (*Diervilla lonicera* Mill.)

Study No. MIPMC-P-0911-WO
Woodland Bluegrass (*Poa sylvestris* A. Gray) Evaluation and Release

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 riverbank wildrye, American plum, buttonbush, coralberry, and broomsedge bluestem plant materials from throughout the service area. Details are provided in Table 6.

Table 6. Plant materials collections on-going at Rose Lake PMC in 2010.			
Common name	Scientific name	Description	Collection Location (number of collections received)
Riverbank wildrye	*Elymus riparius* Wiegand	Riverbank wildrye is a native, cool-season, clump-forming perennial grass without rhizomes. It grows from 3 – 4 ft tall, blooms from June to Aug., and produces small seed heads. Seed heads are 3 – 8 in long with two spikelets at each node.	Calhoun Co., MI (1); Fairfield Co., OH (1); Morgan Co., OH (1); Rock Co., WI (1); Sheboygan Co., WI (1)
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)

Table 6, cont'd.			
Buttonbush	*Cephalantus occidentalis* L	Common buttonbush is a native, multi-stemmed wetland shrub. Mature plant is up to 12 ft tall. White flowers in spherical clusters form 1-in diameter button-like seed heads. Dark green, glossy, deciduous foliage is opposite or whorled.	Monroe Co., IN (1); Washington Co., IN (1); Noble Co., OH (2); Dane Co., WI (1); LaCrosse Co., WI (4); Rock Co., WI (1)
Broomsedge bluestem	*Andropogon virginicus* L.	Broomsedge bluestem is native to Rose Lake RLPMC service areas. It is a warm-season, herbaceous, perennial bunch grass that begins its growth when the average daytime temperature is between 60° to 65° F. It benefits wildlife, is ornamental, and has potential conservation application. It is found on low fertility soils and prevents erosion where similar warm-season grasses cannot be found. It is grazed readily by cattle in spring and early summer, but decreases rapidly in forage quality and palatability with advancing maturity.	Pike Co., OH (1)
Coralberry	*Symphoricarpos orbiculatus* Moench	Coralberry is a native, perennial shrub. It is 2 to 7 ft tall with egg-shaped, oppositely arranged leaves. Once established, it reproduces by lateral stems up to 4 ft long that root and grow in a cluster. Its common name is from its rich, red, coral-colored fruit that persist late into the winter and its specific scientific name is for the shape of the berries (orbiculatus means round).	Marion Co., IN (1)
Northern Honeysuckle	*Diervilla lonicera* Mill.	Northern honeysuckle (*Diervilla lonicera* Mill.), also known as dwarf bush-honeysuckle, is a low growing shrub native to Michigan and adjoining states. It tolerates coarse and medium soils but does not tolerate anaerobic conditions. Northern honeysuckle can survive in soil with pH ranging from 4.8 – 7.0. It has showy flowers that may be attractive to pollinators, and fruit that may be valuable to wildlife.	collection notice issued in 2010

Table 6, cont'd.			
Woodland Bluegrass	*Poa sylvestris* A. Gray	Woodland bluegrass is a native perennial grass that grows about 2-3 ft tall sending up several unbranched culms. Each culm terminates in a panicle of spikelets about 4-8 in long. This grass prefers dappled sunlight to light shade, moist to mesic conditions, and a rich loamy soil. Most vegetative growth occurs during the spring. It is adapted to coarse and medium textured soils but is not well adapted to fine textured soils. Woodland bluegrass is shade tolerant and tolerant to anaerobic conditions, but is not drought tolerant. The plant blooms in mid-spring and seed production is complete by early – midsummer. There is no known commercial seed source for this species.	collection notice issued in 2010

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

Objective This study is intended to measure growth and development of several grass species. Data collected will be used to evaluate plants for use in vegetative barriers (NRCS Practice Standard 601) and to supplement data used by conservation planning tools including RUSLE2 (Revised Universal Soil Loss Equation, Version 2) and WEPS (Wind Erosion Prediction System).

Various grasses have been evaluated for use in vegetative barriers. Ease of establishment, longevity, stem density and stiffness, competitiveness with crop, resistance to herbicides used on crops, and ability to emerge through sediment or to resume growth from buried stem nodes are characteristics that are important for plant utilization in vegetative barriers.

Procedure Separate field experiments were designed and established in June 2010 for plant response to soil deposition and to within-row plant spacing. Both designs were randomized complete blocks with five replicates and both included Prairie cordgrass (*Spartina pectinata* Bosc ex Link), two switchgrass cultivars (*Panicum virgatum* L. 'Heavy Metal' and 'Northwind'), and two miscanthuses (*Miscanthus sinensis* Andersson and *Miscanthus sinensis* Andersson var. *gracillimus* Hitchc.). Weeds were controlled mechanically and chemically and fertilizer N was applied at 50 lbs/a in 2011.

Fifteen-inch diameter black plastic rings were installed around each plant in the soil deposition study. Soil was added inside half the rings to a depth of 3 in above surrounding ground level on 15 April 2011 to simulate soil deposition.

Results Table 7 shows results of the deposition study. No significant differences between treatments were observed except for stem diameter in PMC Miscanthus – a difference that eludes scientific explanation. Soil deposition and observations will be continued in 2012.

Table 7. Effect of soil deposition on various grass species. Rose Lake PMC. 29 Sept 2011.

	Natural Height (ft)		Stems/Plant		Stem Diameter (in)	
	no depo	depo	no depo	Depo	no depo	depo
' Heavy Metal' switchgrass	4	4	182	226	0.10	0.11
' Northwind' switchgrass	5	5	96	98	0.17	0.16
M. sinensis var. *gracillimus*	5 ½	5 ½	125	131	0.18	0.17
Miscanthus (PMC)	5	5	125	91	0.16*	0.20*
prairie cordgrass	5 ½	6	34	29	0.20	0.21

*Significant difference between treatment pair means at $P \leq 0.05$

Discussion The Michigan NRCS Vegetative Barrier Standard (601) states "Species will be selected that exhibit characteristics that are required for adequate function such as: emergence though several inches of sediment or resuming growth from buried stem nodes. . . " Grasses in this study met that criterion.

Results Table 8 shows results of the spacing study. Significant differences between treatments were not observed in natural height, crown width, and stem diameter in October 2011. Data collection will continue in 2012.

Table 8. Effect of plant spacing on various grass species. Rose Lake PMC. 3 Oct 2011.

	Natural Height (ft)		Crown Width (in)		Stem Diameter (in)	
	3 inch	12 inch	3 inch	12 inch	3 inch	12 inch
' Heavy Metal' switchgrass	4	4	13	12	0.11	0.13
' Northwind' switchgrass	5	5	11	10	0.14	0.13
M. sinensis var. *gracillimus*	4 ½	4 ½	12	12	0.16	0.19
Miscanthus (PMC)	4	4 ½	11	11	0.19	0.17
prairie cordgrass	4 ½	4 ½	18	18	0.17	0.17

No significant differences between treatment pair means at $P \leq 0.05$.

Discussion The lack of differences between 3-in and 12-in initial spacing in crown width and stem diameter as observed at the end of the second growing season suggest that either initial spacing would ultimately be effective for purposes of Michigan NRCS Vegetative Barrier Standard (601).

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. There are approximately 96,000 seeds/lb.

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 start plants in the greenhouse 23-24 Feb 2010. Seedlings were transplanted to Cone-tainers™ then to field plots on 25 May 2010 in a randomized design with four replicates.

Observations Field data collected in 2011 are presented in Table 9.

Table 9. Virginia wildrye growth data. Rose Lake PMC. 2011.							
Accession number	**Origin**	**Survival[†](%)**	**First anthesis**	**Mature height (ft)[‡]**	**Vigor[‡,§]**	**Lodging[‡]**	**Fall greenup[¶,#]**
9084315	Indiana	82	23 June	1.9	4	1	8
9084344	Indiana	100	7 July	3.4	1	5	3
9084350	Ohio	96	3 June	2.6	1	2	5
9084514	Indiana	99	10 July	3.0	1	1	3
9084521	Indiana	89	3 June	2.4	3	1	6
9084531	Indiana	97	7 July	3.0	1	1	4
9084536	Indiana	99	7 July	2.8	1	3	2
Standard	**O'ma'ha**	97	7 July	3.1	1	2	5
LSD$_{(0.05)}$		10	4 days	0.4	0.6	2.1	2.4

[†]Evaluated on 19 May 2011.
[‡]Evaluated on 27 July 2011.
[§]Rating scale from 1=excellent vigor to 9=poor vigor in 1.0 increments.
[¶]Evaluated on 13 Oct 2011.
[#]Rating scale from 1=most plants green, vigorous, 12-18 inches tall to 9=no green plants.

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. Proven benefits of cover crops include protection of soil from erosion, reduced need for fertilizer and pesticide application, enhanced soil health, water quality protection through sequestration of nutrients, and increased yield or increased profit of subsequent crops.

Little growth and development data are currently available for brassicaceous cover crops. Data from this study will be included in the database for 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 is a collaborative effort. Other partners include Michigan State University Kellogg Biological Station Cover Crops 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.

Materials and Methods Brassicaceous cover crops were planted in late summer 2010 and 2011 as shown in Table 10 following small grain harvest. Design was a randomized complete block with four replicates. Individual plots were 10 ft X 30 ft. Fertilization was according to soil test laboratory recommendations and irrigation was applied to maintain optimum growing conditions. Growth parameters such as plant population; groundcover; flower presence; root, shoot, and total plant length; and root and stem diameter were measured and recorded in the field at 15-day intervals. Plants were collected and partitioned into below ground, stem and root (if heaved), and leafy components on each sample date for dry matter determination. Laboratory analyses to determine N content were or will be performed for one sample date near the end of each growing season. Air temperature data were recorded for growing degree day determination.

Results Oilseed radish produced the fastest and most complete groundcover (Table 11 and Figures 1 and 2). Ninety percent groundcover was achieved at 38 and 39 days in 2010 and 2011, respectively. Total biomass did not vary within species groupings within years, e.g., 13 oilseed radishes were not different in 2010 and 9 oilseed radishes were not different in 2011. (Table 12 shows P values ranging from 0.20 to 0.57.) As shown in Figure 3 later established cover crops (2011) achieved less total biomass than those that were established earlier (2010).

First-year results presentations included these:

> Victoria J. Ackroyd, John C. Durling, Miriam F. Gieske, Dean G. Baas, Beverly R. Durgan, Jerry J. Grigar Jr., John W. Leif III, Dale R. Mutch, Sergio A. Pérez, and Donald L. Wyse. 2011. Plant Growth Attributes of Brassicaceous Cover Crops. Presented at ASA CSSA SSSA Annual Meetings, San Antonio, TX.
>
> John Durling, Miriam Gieske, and Victoria Ackroyd. 2011. Results from a Brassica Cover Crops Trial in Minnesota and Michigan. Presented at Midwest Cover Crop Council, Ada, OH.

Means of disseminating results from two years of this study will likely include technical notes, Extension bulletins, posters and papers at scientific and producer meetings, journal article(s), and databases for RUSLE2, WEPS, and other conservation tools.

Table 10. Brassicaceous cover crop planting, harvest, and growing season data from Rose Lake PMC. 2010-11.

Species grouping	Year	Planting rate (lbs/a)	Planting date	Final harvest date	$\sum GDD_{50}$ planting to harvest†
Oilseed radish (*Raphanus sativus*)	2010	10	13-Aug	8 to 10-Nov	963
	2011	10	2-Sep	1-Nov	535
Mustard (*Brassica juncea* or *Sinapis alba*)	2010	8	13-Aug	8 to 10-Nov	963
	2011	8	2-Sep	1-Nov	535
Forage Turnip (*Brassica rapa* X *B. napus*)	2010	2	13-Aug	8 to 10-Nov	963
	2011	2	2-Sep	1-Nov	535
Rapeseed (*Brassica napus*)	2010	5	13-Aug	8 to 10-Nov	963
	2011	5	2-Sep	1-Nov	535

†86/50 cutoffs (corn) from http://www.agweather.geo.msu.edu/mawn/

Table 11. Brassicaceous cover crop ground cover, flowering, N accumulation, and overwintering at Rose Lake PMC. 2010-11.

Species grouping	Year	Ground cover @ 1.5 months (%)	Fall flowering (y/n)	Total N in biomass (lbs/a)†	Overwintering (plants/plot)
Oilseed radish (*Raphanus sativus*)	2010	97	yes & no	109	0
	2011	99	yes & no	TBD	TBD
Mustard (*Brassica juncea* or *Sinapis alba*)	2010	81	yes & no	92	0
	2011	89	yes & no	TBD	TBD
Forage Turnip (*Brassica rapa* X *B. napus*)	2010	96	no	132	5
	2011	95	no	TBD	TBD
Rapeseed (*Brassica napus*)	2010	88	no	107	103
	2011	80	no	TBD	TBD

†Harvested 12-Oct 2010

Table 12. Total end-of-season biomass of brassicaceous cover crops at Rose Lake PMC. 2010-11.

Species grouping	Year	Entries	Biomass (lbs/a)	ANOVA P-value†
Oilseed radish (*Raphanus sativus*)	2010	13	5721	0.57
	2011	9	3157	0.21
Mustard (*Brassica juncea* or *Sinapis alba*)	2010	4	5460	0.20
	2011	5	2285	0.62
Forage Turnip (*Brassica rapa* X *B. napus*)	2010	2	5949	0.35
	2011	1	3157	NA
Rapeseed (*Brassica napus*)	2010	1	3576	NA
	2011	1	1505	NA

†ANOVA P-value within species grouping, within year for end-of-season total biomass.

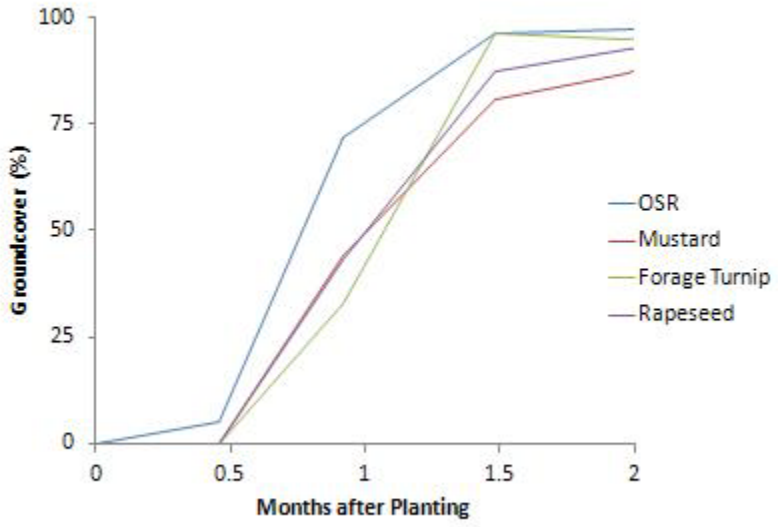

Figure 1. Groundcover development of brassicaceous cover crops @ Rose Lake PMC. Est. 13 Aug 2010.

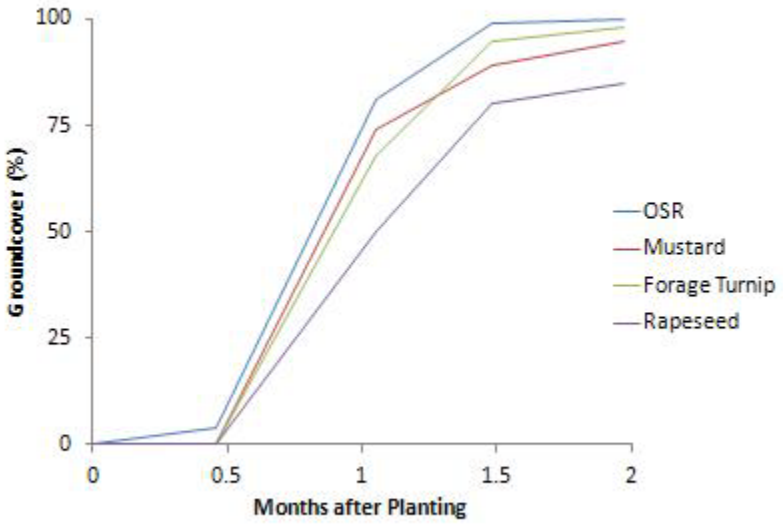

Figure 2. Groundcover development of brassicaceous cover crops @ Rose lake PMC. Est. 2 Sept 2011.

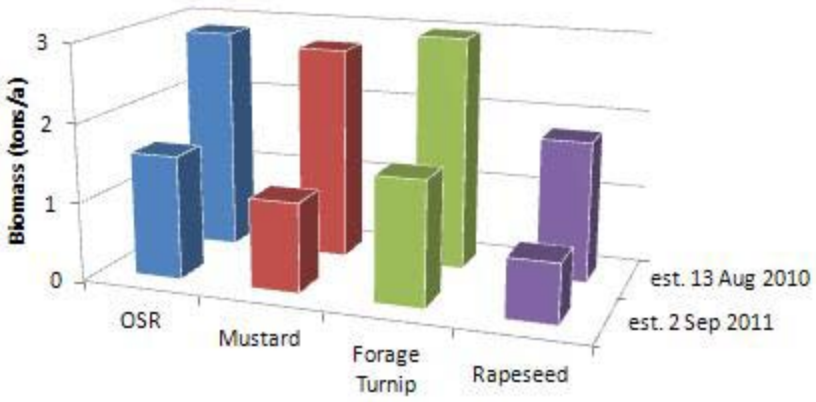

Figure 3. Total biomass yield of brassicaceous cover crops @ Rose Lake PMC.

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, becoming somewhat contracted as the seed ripens. Each flower has a small tuft of hair at the base. The foliage and stem are comparatively soft and lax. This grass gets its name from the bluish-purple stem nodes and slender, bluish leaves. Leaf blades have a rough surface. The roots have numerous creeping rhizomes. The seed heads are purplish-green during flowering. Mature seed is smooth, yellow-brown, ellipsoid, and about 1/16 in long. Bluejoint is perennial and native to much of the US except the Gulf Coast states. *Calamagrostis canadensis* is a widely variable species.

Description A collection of Canada bluejoint was assembled from native stands. This material is being evaluated and selected for potential release.

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 in 2006 in LaPorte County, Indiana and at RLPMC with accessions listed in Table 13. Field plots are being evaluated for survival, vigor, disease and insect damage, height, lodging, seed production, and germination over the duration of the study plan.

Data collection at the Indiana plot was discontinued in 2008. This was due to constraints on travel to remote locations and staff time as well as the poor performance at this site of all bluejoint entries.

Table 13. Canada bluejoint accessions established in 2006 in evaluation plots in Michigan and Indiana.

Accession	Origin	Entry Location
9084188	Chippewa County, Michigan	MI
9084330	Pulaski County, Indiana	IN, MI
9084331	White County, Indiana	IN, MI
9084357	Polk County, Wisconsin	IN, MI
9084529	Starke County, Indiana	IN, MI
9086445	Roscommon County, Michigan	MI
9086446	Roscommon County, Michigan	IN, MI
9086529	Ontonagon County, Michigan	IN, MI
9086623	Ontonagon County, Michigan	IN, MI

Results Plant growth data from RLPMC plots is presented in Table 14. In accessions where plants survived in only 2 or 3 replicates, missing values were supplied by Statistix®8's missing value function and analysis of variance was performed with degrees of freedom adjusted.

Height differences among accessions were observed in all years. Tallest accessions were 9084330, 9086445, and 9086446 and shortest was 9086623 (Table 14). Differences were observed in vigor, disease, and lodging in some years. First flowering dates differed among accessions and among years. The latest accession to flower was 9084357. Significant differences were observed in bulk seed yield, but PLS/plot has not been determined.

Table 14. Canada bluejoint plant growth data. Rose Lake PMC.

Accession	Vigor†	Disease†	Insect Damage†	Lodging†	Height (ft)†,‡	First Anthesis Date	Seed yield (g/plot) §
	2007- 2010	2007 - 2010	2007-2010	2007-2010	2007 - 2010	2009 – 2010	2009 - 2010
9084188	No significant differences among accessions at 0.05	No significant differences among accessions at 0.05	No observable differences in insect damage	No significant differences among accessions at 0.05	3.0 bc	Early to mid June	No significant differences among accessions at 0.05
9084330					3.7 a	Early to mid June	
9084331					2.8 c	Early to mid June	
9084357					2.8 c	Most did not reach anthesis	
9084529					3.2 abc	Early to mid June	
9086445					3.5 ab	Early to mid June	
9086446					3.6 a	Early to mid June	
9086623					2.0 d	Most did not reach anthesis	
9086529	No plants survived. Not included in ANOVA.						
	†Evaluated on 16 July 2007, 31 July 2008, 7 July 2009, and on 17 June 2010						
	‡Means with the same letter do not differ significantly at $LSD_{(0.05)}$						
	§Harvested on 5 and 13 Aug 2009 and on 12 Aug 2010						

Plants of Cultural Significance

Study No. MIPMC-P-0901-WO
Ginger (*Asarum* L.) Evaluation

Background The Bay Mills Indian Community has requested assistance with evaluation and selection of ginger which they consider to have cultural significance.

Plot Layout Observation plots with four plants each of five ginger accessions (Table 15) were established July 2009 at RLPMC in a location with light shade to partial sunlight.

Table 15. Ginger accessions established in 2009 in evaluation plots at Rose Lake PMC.

Accession	Origin
9086800	Lake Victoria, Shiawassee Co., MI
9086801	YMCA, Shiawassee Co., MI
9086802	Owosso River, Shiawassee Co., MI
9086803	Ingham Co., MI
9086873	Iron Co., MI

Observations Canopy spread and cover and canopy height were observed and recorded throughout the growing seasons (Table 16). However, observation plots were not replicated and randomized so analysis of variance was not run. Wildlife browse was observed in most plots. Observations may continue in 2012.

Table 16. Plant growth observations for ginger at Rose Lake PMC.

Accession	Canopy width (in)		Natural height of canopy (in)		Ground Cover (%)
	2010†	2011‡	2010†	2011‡	2011‡
9086800	15	20	7	8	58
9086801	10	20	4	7	85
9086802	7	14	5	7	58
9086803	7	20	5	6	70
9086873	7	9	5	5	63

†Observed on 18 Aug 2010.
‡Observed on 28 July 2011.

Plants for Restoration or Reclamation of Disturbed Areas

Numerous human activities have the potential to dramatically alter the natural resources in an area. Construction of roads, travel lanes or utility corridors, agricultural or mining operations, and municipal or recreational development often result in a drastic disturbance of the natural communities. Successful revegetation of these disturbed areas requires plant materials and the technology to use them.

Problems With the heightened interest and promotion of native species, the availability of regionally-sourced and adapted ecotypes has not kept pace with demand. This is especially true with native grass species for use in Conservation Reserve Program plantings and restoration work. Some non-native species traditionally utilized for conservation activities have come under scrutiny due to their aggressive nature. This has generated an even greater need for native plant material and the corresponding research to replace these conventional conservation species.

Needs The states served by RLPMC need commercially available quantities of regionally native or adapted, non-aggressive plant species and the technology to use them. Selected species should have proven capabilities for one or more conservation concerns.

Study No. MIPMC-P-0204-CR
Development of a Great Lakes Release of Bottlebrush Grass (*Elymus hystrix* L.)

Background Bottlebrush grass is a cool-season, perennial bunchgrass. It may be found growing in moist to dry woods from Nova Scotia to Manitoba in Canada and south to Arkansas and Georgia. Bottlebrush-shaped spikes may be up to 10-in long with 1-4 spikelets per node. Spikelets spread horizontally as they mature, often becoming nearly perpendicular to the rachis. Leaf sheaths may be smooth or hairy. Leaf blades may be up to ½-in wide with rough texture. Lemmas have rough, straight awns that reach 1½-in long. Plants grow to 4 ft.

Description of Study A collection of bottlebrush grass seed was assembled from native stands in Michigan, Indiana, Ohio and Wisconsin. Materials are being evaluated for potential release for conservation cover or streambank protection in the Great Lakes states and Midwest. Seed from the breeder field will be made available to growers as a selected or tested class if released.

Procedures Thirty collections of bottlebrush grass seed were made from native stands in 1998-2007 by RLPMC and field staff and partners. Each collection was accessioned. Bottlebrush grass evaluation plots were designed as randomized complete blocks and established at RLPMC in 2003 and 2009 as well as at off-center locations. The plot established in 2009 at RLPMC was in light shade to partial sunlight. Accessions were evaluated for survival, vigor, height, lodging, disease and insect damage, seed production, and other traits and results were subjected to statistical analysis. Preliminary selection decisions were made.

Results Table 17 shows bottlebrush grass growth data from accessions that will be considered for release if the decision is made to go forward with such. Bottlebrush grass was short lived for all accessions as is illustrated with accessions shown in Table 17.

Table 17. Bottlebrush grass growth data from plots established at Rose Lake PMC in 2009.						
Accession	**Origin**	**Survival (%)**		**First anthesis**		**Bulk seed yield/plot (g) in 2010**
		2010†	**2011‡**	**2010**	**2011**	
9084186	Polk Co., WI	85	24	14 Jun	30 Jun	26.1
9084191	Adams Co., OH	82	18	23 Jun	30 Jun	7.9
9084360	Polk Co., WI	82	18	23 Jun	26 Jun	7.1
9086418	Ft. Custer, MI	94	21	23 Jun	30 Jun	23.0
9086653	Ft. Custer, MI	97	42	10 Jun	23 Jun	8.1
9086655	Ft. Custer, MI	88	21	10 Jun	16 Jun	4.4
†Evaluated on 28 May 2010. **‡Evaluated on 19 May 2011.**						

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 18). 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. A small quantity of seed was hand harvested in October 2011.

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 18. 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

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.

Plants for Residential Sewage Treatment Systems

Study No. MIPMC-T-0801-WE
Evaluation of Species for Use in Vegetative Treatment Areas as a Component of Residential Sewage Treatment Systems

Logan County (OH) Health District approved a residential sewage treatment system that includes a 9 ft × 30 ft (270 ft^2) constructed wetland or vegetative treatment area. The Plant Materials Specialist was asked to recommend and evaluate plant species for this area.

Materials and Methods This procedure was outlined in the study plan:

1. review applicable NRCS Practice Standards and Specifications for wetland and/or vegetative treatment area construction in Ohio and other Great Lakes states
2. consult with Technical Support Disciplines personnel and others and to visit sites where similar technology has been attempted or employed and to visit proposed site in Logan County, Ohio
3. review rules and regulations for residential sewage treatment in Ohio and other Great Lakes states
4. develop selection and evaluation criteria for plants to be used in vegetative treatment areas
5. establish selected plants at vegetative treatment area site in Logan County, Ohio
6. evaluate according to criteria established in 3 above

Planting Plan Plants were installed on a grid, with 1 plant/ft^2. Rows were oriented across the wetland (perpendicular to water flow) with 9 plants/row. There were 27 rows. Plants included boneset (*Eupatorium perfoliatum*), Canada bluejoint (*Calamagrostis canadensis*), Iris (*Iris sp.*), prairie cordgrass (*Spartina pectinata*), prairie sandreed (*Calamovilfa longifolia*), sweetgrass (*Hierochloe odorata*), and woolgrass (*Scirpus cyperinus*).

Additional Plantings Additional plantings were established at another Ohio location in 2011, one with shrubs and the other with herbaceous plants. Shrubs included elderberry (*Sambucus nigra* ssp. *canadensis*), redosier dogwood (*Cornus sericea*), and silky willow (*Salix sericea*). Herbaceous plants included boneset (*Eupatorium perfoliatum*), Canada bluejoint (*Calamagrostis canadensis*), daylily (*Hemerocallis sp.*), Ironweed (*Vernonia sp.*), joe pye weed (*Eupatoriadelphus*), mint (*Menthe sp.*), New England aster (*Symphyotrichum novae-angliae*),and prairie cordgrass (*Spartina pectinata*). Treatments in these plantings included two weed barrier materials and a control without weed barrier.

Evaluation PMC staff requested that these data be collected:

- Number of growing (surviving) plants
- Plant height (in)
- Plant diameter at soil level (in)
- Overall vigor (1 – 9 scale, 1=excellent, 9=poor vigor)
- Notes on disease, insects, or other concerns
- Weather information – rainfall and high/low temperatures for each month.
- Site specific information – occurrence of floods, excessive drought, other conditions that may affect performance of the plants.

Results Canada bluejoint survived and performed well but prairie sandreed did not. Plant growth characteristics from 2009 are presented in Table 19. Data was not reported in 2010 or 2011 from the first location. At the second location herbaceous plants were mowed by the landowner. No evaluation of plants at the second location was performed in 2011.

Table 19. Height, diameter, survival, and vigor of plants in vegetative treatment area. Logan County, OH. 11 May 2009.

	Height (in)	Diameter (in)	% Survival	Vigor[†]
Canada bluejoint	35	10	100	1
Prairie sandreed	8	2	11	9
Sweetgrass	16	14	96	4
Prairie cordgrass	21	10	70	4
Wool grass	19	6	96	3
Iris	23	4	n.a.[‡]	1
Boneset	9	n.a.[‡]	n.a.[‡]	1

[†]scale: 1 = excellent vigor; 9 = poor vigor

[‡]n.a. = information not available

Data collection will continue in 2012.

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 (Tables 20 and 21). 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. See cover photo.

Observations Plants near the southwest end of the plot (*Fragaria virginiana* and *Salix interior*) generally bloomed first. Bloom times of perennial herbs are shown in Figure 4. *Solidago spp.* and others on the northeast end were still blooming after a frost.

The hedgerow and linear planting as well as the meadow planting (below) were featured in various RLPMC tours. A tour on 24 June 2010 was part of a short course on the establishment and importance of habitat for pollinator insects which was offered in cooperation with the Xerces Society and MSU. Some 50 guests included personnel from Michigan and Indiana NRCS, conservation district, and the State of Michigan as well as conservation partners from Michigan, Ohio, and Indiana. The National Program Leader for the Plant Materials Program and East and Central Regional Plant Materials Specialists were also on hand for the workshop.

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. Species and seeding rates are shown in Table 22. Bloom times of woody perennials are shown in Figure 5.

Observations PMC staff was assisted by NRCS State Biologist Chris Reidy in 2011 in informally inventorying species present in the meadow. The cover photo of this Technical Report [Speyer's cucullia (*Cucullia speyeri*) larvae feeding on Mare's tail (*Conyza canadensis*)] was taken by Chris Reidy while doing the inventory.

Table 20. Perennial herbs established in linear planning at Rose Lake PMC in 2008.
New England aster (*Symphyotrichum novae-angliae*)
Riddell's goldenrod (*Oligoneuron riddellii*)
Hairy goldenrod (*Solidago hispida*)
Showy goldenrod (*Solidago speciosa*)
Palespike lobelia (*Lobelia* spicata)
Missouri ironweed (*Vernonia missurica*)
Wild bergamot (*Monard fistulosa*)
Yellow giant hyssop (*Agastache nepetoides*)
Black-eyed Susan (*Rudbeckia hirta*)
Eastern purple coneflower *(Echinacea purpurea)*
Culver's root (*Veronicastrum virginicum*)
Butterfly milkweed (*Asclepias tuberosa*)
Hairy penstemon (*Penstemon hirsutus*)
Tall white beard-tongue (*Penstemon digitalis*)
Prairie spiderwort (*Tradescantia ohiensis*)
Golden alexanders *(Zizia aurea)*
Wild strawberry (*Fragaria virginiana*)

Table 21. Woody plants established in hedgerow planting at Rose Lake PMC in 2008.
Meadowsweet (*Spiraea alba*)
Common ninebark (*Physocarpus opulifolius*)
Choke cherry (*Prunus virginiana*)
Michigan rose (*Rosa setigera*)
American wild plum (*Prunus americana*)
Swamp rose (*Rosa palustris*)
Redbud (*Cercis canadensis*)
Common elderberry (*Sambucus canadensis*)
Buttonbush (*Cephalanthus occidentalis*)
Sandbar willow (*Salix interior*)
Serviceberry (*Amelanchier sp*.)

	April		May			June			July			Aug			Sept			Oct			Nov	
Fragaria virginiana	XX	XX	XX	XX	XX										XX	XX	XX					
Zizia aurea			XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX						
Penstemon digitalis					XX	XX	XX	XX	XX	XX												
Tradescantia ohiensis					XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX		
Penstemon hirsutus						XX	XX	XX	XX													
Echinacea purpurea						XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX		
Rudbeckia hirta							XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	
Asclepias tuberosa								XX	XX	XX	XX	XX	XX	XX	XX							
Monard fistulosa									XX	XX	XX	XX	XX	XX	XX	XX	XX					
Vernonia missurica									XX	XX	XX	XX	XX	XX	XX	XX	XX	XX				
Agastache nepetoides										XX	XX	XX	XX	XX	XX	XX	XX	XX	XX			
Solidago speciosa											XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	
Veronicastrum virginicum												XX	XX	XX	XX	XX	XX					
Solidago hispida														XX	XX	XX	XX	XX	XX	XX	XX	XX
Oligoneuron riddellii														XX	XX	XX	XX	XX	XX			
Symphyotrichum novae-angliae															XX	XX	XX	XX	XX	XX		

Figure 4. Bloom periods of herbaceous perennials at Rose Lake PMC. 2009-11.

	April			May			June			July			Aug			Sept			Oct			Nov	
Meadowsweet *(Spiraea alba)*				XX									XX	XX	XX								
American wild plum *(Prunus americana)*					XX																		
Sandbar willow *(Salix interior)*					XX	XX	XX	XX	XX	XX	XX												
Choke cherry *(Prunus virginiana)*					XX	XX	XX	XX	XX	XX	XX	XX	XX	XX									
Common ninebark *(Physocarpus opulifolius)*							XX	XX	XX														
Swamp rose *(Rosa palustris)*									XX	XX	XX												
Common elderberry *(Sambucus canadensis)*									XX	XX	XX	XX											
Michigan rose *(Rosa setigera)*										XX	XX	XX	XX	XX									
Buttonbush *(Cephalanthus occidentalis)*											XX	XX	XX	XX									
Redbud *(Cercis canadensis)*																							
Serviceberry *(Amelanchier sp.)*																							

Figure 5. Bloom periods of woody perennials at Rose Lake PMC. 2011.

Table 22. Species and rates for Rose Lake pollinator field planting. 2010.			
Genus species	Common Name	oz/a	Approximate seeds/a
Amorpha canescens	lead plant	1.0	16,000
Aquilegia canadensis	Columbine	0.3	9,500
Asclepias tuberose	butterfly milkweed	1.0	4,300
Asclepias verticillata	whorled milkweed	1.0	11,000
Aster ericoides	heath aster	0.5	100,000
Aster macrophyllus	big-leaved aster	1.0	27,000
Baptisia alba	white wild indigo	0.5	850
Bouteloua curtipendula	sideoats grama	20.0	120,000
Bromus kalmia	prairie brome	20.0	160,000
Carex brevior	plains oval sedge	2.0	58,000
Cassia fasciculate	partridge pea	2.0	5,400
Coreopsis lanceolata	lance-leaf coreopsis	2.0	40,000
Dalea purpurea	purple prairie clover	2.0	30,000
Desmodium sessilifolium	sessile-leaved tick trefoil	1.0	5,000
Echinacea purpurea	purple coneflower	2.0	13,200
Euphorbia corollata	flowering spurge	0.5	4,000
Geranium maculatum	wild geranium	0.3	1,250
Helianthus divaricatus	woodland sunflower	2.0	9,600
Helianthus occidentalis	western sunflower	1.0	14,000
Heuchera richardsonii	prairie alum root	0.5	350,000
Koeleria macrantha	Junegrass	2.0	400,000
Lespedeza capitata	round-headed bushclover	1.5	12,000
Liatris aspera	button blazing star	1.0	16,000
Liatris scariosa	northern blazing star	0.7	7,200
Lupinus perennis	wild lupine	2.0	2,200
Monarda fistulosa	wild bergamot	1.0	70,000
Penstemon hirsutus	hairy beardtongue	0.5	124,000
Potentilla arguta	prairie cinquefoil	1.0	230,000
Pycnanthemum tenufolium	slender mountain mint	0.3	94,500
Rudbeckia hirta	black-eyed susan	1.0	92,000
Schizachyrium scoparium	little bluestem	20.0	300,000
Sisyrinchium albidum	common blue-eyed grass	1.0	20,000
Solidago nemoralis	old field goldenrod	0.5	150,000
Solidago speciosa	showy goldenrod	0.5	47,500
Symphyotrichum oolentangiense	sky blue aster	0.5	40,000
Tradescantia ohiensis	Ohio spiderwort	1.0	8,000
Verbena stricta	hoary vervain	1.0	28,000
Vernonia fasiculata	prairie ironweed	0.5	12,000
Veronicastrum virginicum	Culver's root	0.5	400,000
Zizia aurea	golden alexanders	2.0	22,000

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 and releases are announced through publications, presentations, and other means. These papers appeared in a peer review publication:

Leif, Durling, and Burgdorf. 2011. Comparison of Seed Germination Techniques for Common Elderberry (*Sambucus nigra* L. ssp. *canadensis*). Native Plants Journal. 12(2):132-135.

Leif, Durling, and Burgdorf. 2011. Notice of Release of Vintage Germplasm Common Elderberry: A Selected Class of Natural Germplasm. Native Plants Journal. 12(2):129-131.

These were presented at meetings, posted to the website (http://plant-materials.nrcs.usda.gov/mipmc/) or otherwise disseminated:

Bischoff, Leif, Durling, and Burgdorf. 2011. Propagation Protocols for Plants from Apostle Islands National Lakeshore. RLPMC. September 2011. 5p.

Durling, Gieske, and Ackroyd. 2011. Results from a Brassica Variety Trial in MN and MI. Rose Lake PMC, Ada, OH. February 2011. 28p.

Durling, Leif, and Burgdorf. 2011. Rose Lake Plant Materials Center 2010 Technical Report. RLPMC. March 2011. 69p.

Grigar and Leif. 2011. Calibration of Truax No-Till Grain Drill. RLPMC. August 2011. 4p.

Leif and Gerona. 2011. Rose Lake Plant Materials Center Winter Newsletter 2011. RLPMC. Winter 2011. 2p.

Leif, Burgdorf, and Gerona. 2011. Rose Lake Plant Materials Center Summer 2011 Newsletter. RLPMC. Summer 2011. 4p.

Leif, Burgdorf, and Gerona. 2011. Rose Lake PMC Spring 2011 Newsletter. RLPMC. Spring 2011. 4p.

Leif, Durling, and Burgdorf. 2011. Final Project Report - FY2011, Apostle Islands National Lakeshore. RLPMC. July 2011. 3p.

Leif, Durling, and Burgdorf. 2011. Notice of Release of Vintage Germplasm Common Elderberry Selected Class of Natural Germplasm. RLPMC. August 2010. 7p.

Reidy and Leif. 2011. Michigan Supplemental Enhancement Activity Job Sheet: Plant Enhancement Activity − PLT01 Establishment Pollinator Habitat.

Leif, Durling, and Burgdorf. 2011. Notice of Release of Vintage Germplasm Common Elderberry: A Selected Class of Natural Germplasm. Native Plants Journal. 12(2):129-131.

Appendix C

Weather and Climate

Growing season temperature and precipitation data, 2011† and long-term‡, for Rose Lake PMC.						
	May	June	July	Aug.	Sept.	Growing Season
Average Daily Maximum (°F)	68.0	78.6	87.6	81.7	74.5	77.7
	69.7	79.9	83.7	82.0	74.4	77.9
Average Daily Minimum (°F)	47.6	57.0	61.9	58.4	50.3	55.1
	45.3	55.5	59.2	57.7	50.5	53.6
Precipitation (in)	9.22	2.35	4.15	3.82	2.42	21.96
	2.95	3.64	2.97	3.08	2.58	15.22
†2011 data as recorded by Campbell Scientific automatic weather station at Rose Lake PMC. ‡Long-term data as median of Clinton, Ingham, and Shiawassee values from respective soil surveys.						

2011 Weather Summary Precipitation exceeded the norm for the growing season with most of the excess occurring in May. Growing season temperatures were close to normal.

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

"The U.S. Department of Agriculture (USDA) prohibits discrimination in all of its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex (including gender identity and expression), marital status, familial status, parental status, religion, sexual orientation, political beliefs, genetic information, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD)."