



United States Department of Agriculture

Natural Resources Conservation Service

2014 Progress Report of Activities

**Big Flats Plant Materials Center
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The Big Flats Plant Materials Center (PMC) is one of 27 plant materials centers operated by the United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). The area served by the center include the Northeast, from Maine to northern West Virginia. The center is located in the Finger Lakes region of Central New York State. It is our mission to develop plant materials and state-of-the-art plant science technology for the conservation of natural resources and meet the objectives of USDA conservation farm bill programs. We focus on using native plants to solve conservation problems and to enhance the natural resources.

This is a brief summary of 2014 activities at the Big Flats Plant Materials Center. For additional information on the projects, please contact us at the center or visit our National Plant Materials Program Website at <http://Plant-Materials.nrcs.usda.gov> to view Plant Fact Sheets on conservation plants, information on how to obtain conservation plants, publications and technology development from PMC's across the United States and links to websites with additional or supporting information.

Cropland Erosion, Water Quality, Soil Health

Cover Crop Demonstration Plots

There are many benefits to the utilization of cover crops such as reducing soil erosion, improving water quality and soil tilth, alleviating soil compaction, recycling of nutrients, providing nitrogen, weed suppression, early spring forage, and food and habitat for wildlife. In 2014, over 350 plots with different species of cover crops and several mixes were seeded throughout various dates from May to October 2014. Also, 'new' cover crop species and varieties were seeded to assess their possible use in the Northeast and any species showing potential will be evaluated further in 2015. The purpose of the planting is to evaluate the recommended seeding rates and timing in the updated NRCS cover crop specification. Data on planting dates, seedling density, percent cover, heights, flowering time, and aboveground biomass were recorded at intervals throughout the season. The plots will continue to be sampled in the spring of 2015 for spring

biomass, growth and percent cover at different termination dates. This data will help determine the last allowable fall planting dates of cover crops for the purposes of erosion control, nutrient cycling, and soil health. In addition, part of this study utilized several techniques to evaluate the plantings to compare the results of the different sampling methods. Seedling counts and percent cover were evaluated visually, photographically, and transect line. We will compare these methods to come up with protocols for determining the success of cover crop plantings in the field. Most of the research on cover crop biomass and nutrient uptake has been conducted on cereal rye. There has been a need identified by the Chesapeake Bay Cover Crop Working Group to compare the biomass and nutrient uptake of other species of cover crops in relation to cereal rye, this study will start to provide some of this information for this area.

Cereal Rye Seeding Rate and Planting Date Comparison Study

Seeding winter hardy cover crops after silage corn is difficult in the Northeast US due to the short growing season. This study is intended to determine the relationship between rye seeding dates and lowering seeding rates on the fall and spring percent cover and biomass. The main goal is to maximize fall and spring percent cover and biomass production. If seeding rates can be reduced, this will reduce the cost of cover cropping and potentially increase the number of cover crop acreage planted. For this study, the seed was hand broadcasted into a clean tilled seedbed, lightly raked and cultipacked providing a near optimum seedbed. The seeding rates were 25, 50, 75, 100, 112, 125 and 145 lb/ac at three seeding dates: September 15, October 1, and October 15. There were 3 replications per treatment. Emergence dates, percent cover, heights, plant and tiller counts were obtained 15, 30 and 45 days after planting. On November 24, 2014, above ground biomass was harvested and percent cover for each seeding date and rate were determined. The data suggests that with proper seedbed preparation lower seeding rates can be used at earlier seeding dates in September while achieving adequate percent cover. When planted on September 15 all seeding rates

achieved near 100% cover. When planted on October 1, there was 50% and 65% cover for the 25 and 50 lb/ac seeding rates respectively with over 75% cover for seeding rates at or above 75 lb/ac, when evaluated 45 days later. This indicates that with very good seedbed preparation, seeding rates could be reduced. When planted October 14, results indicate that winter biomass, heights, and percent cover were reduced. There was approximately 40% cover for the 75 lb/ac seeding rate and there was approximately 60% cover on all seeding rates above 100 lb/ac. This data suggests, when in plant hardiness zone 5b, the October 14 planting date with optimum seedbed preparations and seeding rate of 100-112 lb/ac should provide adequate cover in the fall and potentially good biomass and nutrient uptake in the spring. This preliminary information suggests that further studies should be conducted with 'Aroostook' and common cereal rye to evaluate the planting dates of October 15 and November 1 to determine overwintering potential of the seedlings and spring vigor. Biomass and percent cover should be determined at multiple termination dates in the spring to determine the effectiveness of very late fall plantings.

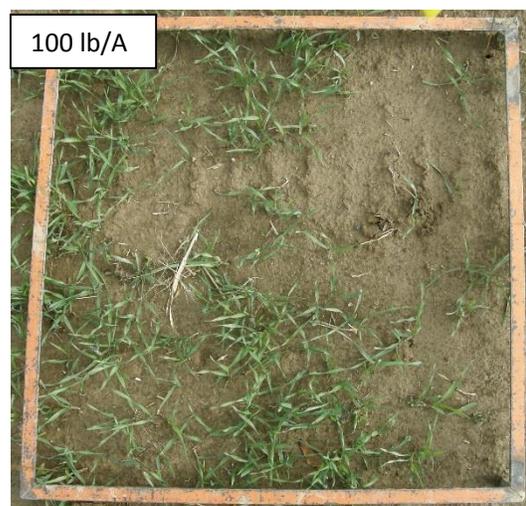


FIGURE 1. RYE SEEDED ON OCTOBER 14, 2014 AT VARIOUS SEEDING RATES. THESE PHOTOS DEPICT PERCENT COVER ON NOVEMBER 25, 2014 (HARVEST DATE), APPROX. 45 DAYS AFTER SEEDING. (145 lb/A rate not shown).

Native Willow Evaluation

Interest has arisen for propagating native species of shrub willow for restoration plantings in riparian areas, wetlands and for use in soil bioengineering techniques on stream banks. Native willows could also be used for living snow fences and windbreaks. Willows are used because they can grow quickly, stabilize soils and withstand flooding, improve water quality, and provide shade and cover for stream life. The species of interest are: Bebb's willow (*Salix bebbiana*), pussy willow (*Salix discolor*), silky willow (*Salix sericea*), shining willow (*Salix*

lucida) and heart-leaved willow (*Salix erioccephala*). A total of 122 collections from VT, NH, PA, and NY were planted July 2010 and have been evaluated for the past 5 years for survival, vigor, disease, and heights. Fencing had to be put around planting due to very heavy browse from deer and other small mammals. After evaluations performed this year, there are excellent accessions from each species that will be considered for moving into advanced evaluations in 2015.

Native Plants

Big Bluestem and Switchgrass Breeding Project

Switchgrass and big bluestem have a lot of genetic diversity within native populations. It is important to collect, evaluate and preserve this germplasm. Northeast collections of native switchgrass and big bluestem were collected in years 2008 and 2009. Samples of all collections were sent to USDA National Germplasm System. Approximately 80 collections each of switchgrass and big bluestem were made from 10 northeast states. The collections were predominately from areas such as banks of rivers and streams and coastal dunes in areas relatively free from tree and shrub growth. The collections were grown out to establish breeding evaluation blocks of 3,000 individual plants at Big Flats and Cornell University. Evaluations of

growth stage and form, heights, vigor, disease, stem and leaf abundance and leaf widths were conducted through 2013. The smaller stature switchgrass will be useful for critical area stabilization along highways and for wildlife habitat and other conservation seedings. Shorter stature (3.5 to 4.0 feet), upright, vigorous, and high disease resistance switchgrass plants were selected, dug and moved into an advanced evaluation block on June 2-5, 2014. In 2015, these 528 selected plants will be evaluated for heights, vigor and disease resistance. Big bluestem plants were evaluated in 2014 and decisions will be made on the need for selecting a local ecotype of big bluestem.



FIGURE 2. DIGGING UP SELECTED SWITCHGRASS PLANTS DURING THE FIRST WEEK OF JUNE 2014.



FIGURE 3. ADVANCED EVALUATION BLOCK OF SELECTED LOW STATURE SWITCHGRASS. THERE WAS A TOTAL OF 528 PLANTS.

Selecting Native Forbs for Pollinator Conservation



The Farm Bill emphasizes the importance and the need for conservation and management of native habitat for native pollinators. After 5 years, species that performed consistently well based on

vigor, ease of establishment, and survivability were seeded into small replicated plots at 2 different dates, early and mid-summer. The species listed below, are some that are being used in Conservation Reserve Plantings (CRP) throughout New York State. Species availability and cost will have a big impact on the overall species in a mix, and by no means is this list exhaustive.

Common Name	lbs/A (PLS) Seeding Rate	seeds/ft ² (PLS)
purple bergamot	0.06	1.61
blue wild indigo	0.15	0.12
partridge pea	0.5	0.75
lanced-leaved coreopsis	0.75	3.62
gray headed coneflower	0.5	6.31
early goldenrod	0.1	4.59
purple coneflower	1.15	3.04
tall white beard tongue	0.15	6.89
black-eyed susan	0.03	0.86
New England aster	0.1	2.57
wild bergamot	0.13	3.58
narrow-ldd mountain mint	0.1	6.89
oxeye sunflower	0.5	1.19
common milkweed	0.1	0.16
Total	4.32	42.17

Critical Area Stabilization/Improved Forages/Streambank Stabilization

Low Cost Methods for Establishing Forest Riparian Buffer Plantings

In collaboration with The Stroud Water Research Center in Avondale, PA, the Chesapeake Bay Foundation, Pennsylvania Department of Conservation and Natural Resources, Penn State University and Big Flats PMC, a multi-state project on developing low-cost methods for establishing forest riparian buffers was established in 2013 and 2014. The methods being evaluated include natural regeneration, direct seeding, live stakes and small container stock. In addition, the use of double rows of 4 foot fencing placed 10 feet apart will be assessed as a means of protecting plantings from deer, and the use of selective herbicides to help establish young woody plants from competing forbs and grasses is also being assessed. Overall, this project will develop methods that can improve reforestation success at lower costs, demonstrate methods that USDA can be utilized on CREP sites, and with reforestation success, and help improve the

adoption of these management practices by landowners.

In September 2013, the PMC site were direct seeded with no-till seed drill and fencing installed. On May 1, 2014, seedlings and live stakes were planted with all seedlings protected with 5 foot tree shelters. On August 14, 2014, direct seeded plots were evaluated for number of germinated seedlings per species, heights, vigor, and weed densities and seedling in tree shelters were evaluated for survival and height.

Collaborators from the above-mentioned agencies were present to assist in the planting and evaluations. Data is being tabulated from the sites participating in this study and plots will be evaluated again in 2015. Overall, plant densities in direct seeded plots were low at Big Flats, but some species may benefit from second winter of cold scarification for germination.



FIGURE 4. FIELD VIEW OF PLANTING DAY AT BIG FLATS.



FIGURE 5. BLACK CHERRY SEEDLING IN DIRECT SEEDING PLOTS, TAKEN IN AUGUST 2014.

Riparian Buffer Tree Establishment Trial

Establishing trees in riparian buffers areas is difficult due to weed competition, deer browse, and wildlife damage in these areas. Reports coming back from the field indicated that some tree seedling plantings, even when using tree shelters, had lower survival rates. So in June 2012, a field trial was established to evaluate and compare nine treatments for establishing trees utilizing tree shelters. The treatments were shelter vs no shelter, weed control methods including herbicides, mats and mowing alone or in combinations and fencing. There are 7 species with 3 seedlings per treatment. The treatments were as follows:

1. tree tube + weed control mat + mowing (3x/year)
2. No tree tube + herbicide (as needed) + fencing
3. Tree tube + weed control mat + herbicide (only initial spraying, no follow up spraying)
4. RPM (2-gallon planting stock) tree + herbicide (only initial application, no follow-up)
5. Control- just tree tubes
6. Tree tube + mowing (3x/year)
7. Tree tube + herbicide (apply as needed)
8. Tree tube + herbicide (only once) + weed control mat
9. RPM (2-gallon) tree + mowing (3x/year) + initial herbicide application before planting

So far, after the 3rd year of evaluation, species that received some form of weed control (herbicide and/or weed control mats) around the base of the tree are putting on the most growth. When mowing was used as a weed control measure, the cover composition changed to just grass, which may have resulted in more moisture competition. Overall, species growth and survivorship was good (above 90%), Treatment 4 and 9, planted the larger RPM tree stock with no tree shelters, had buck rub damage. In treatment 9, all trees had buck rub damage in the first year and resulted in the lowest growth rate after 2 years.

Willow Post-Dormant Planting Study

The use of willow for soil bioengineering continues to be a component in most streambank stabilization projects. Over the past couple years, there has been an increase in use and questions have been raised concerning the timing of planting/cutting of willows for soil bioengineering. It has been recommended to plant only dormant stock, but there has been no published data in the Northeast quantifying the effectiveness of non-dormant plantings. Previous

work at Big Flats showed similar performance between *Streamco* purple osier willow compared to the native sandbar willow when planted from dormant stock. *Streamco* purple osier willow was superior to sandbar willow when using stock cut during the growing season. This study was expanded to look at Heart-leaf willow and several other species listed in Table 1. A study was conducted with *Streamco* purple osier willow, *Greenbank* sandbar willow, heart-leaf

willow, aspen, *Spike* hybrid poplar and *Ruby* redosier dogwood. The study compared dormant harvested cuttings, stakes cut on December 15, 2013 and stored in a moist refrigerated cooler, with plantings that were harvested and planted outside of the dormant season. Planting dates were: July 16, and September 4, 2014. There are three factors at work, one is the physiology of the non-dormant planting stock at harvest, the second is the warmer and drier soil and the third is weather conditions when planting later in the season. This year there was adequate moisture following the July 16 planting. Plants were evaluated on August 8, 2014 for percent survival. Observations to date, suggest that the use of fresh or dormant willow planting stock planted in mid-summer with **adequate** soil moisture were not significantly different (Table 1) when comparing survival. Although results from previous years with drier soil conditions indicated that the stock cut in the dormant period resulted in more vigorous growth and were superior to materials cut during the growing season. The fresh stakes of non-willow species

treatment	Mean Survival (%)
Heart-leaf willow (dormant)	100 A
<i>Streamco</i> purpleosier willow (fresh)	87 A
<i>Greenbank</i> sanbar willow (fresh only)	87 A
<i>Streamco</i> purpleosier willow (dormant)	83 A
Heart-leaf willow (fresh)	83 A
Aspen (dormant)	20 B
<i>Ruby</i> redosier dogwood (fresh only)	20 B
<i>Spike</i> hybrid willow	20 B
<i>Spike</i> hybrid willow	10 B
Aspen (fresh)	0 B

TABLE 1. PERCENT SURVIVAL FOR SELECTED SPECIES, APPROX. 1 MONTH AFTER PLANTING. ONLY FRESH CUTTINGS OF SANDBAR WILLOW AND REDOSIER DOGWOOD WERE AVAILABLE.

such as redosier dogwood, *Spike* hybrid poplar or aspen had very low survival (20%) when compared to heart-leaf willow, sandbar willow, and purpleosier willow (83 – 100%). Both planting dates will be evaluated in 2015 for survival, emergence date, overall vigor, insect and disease resistance, and stems per stake.

Dormant Seeding of Cool-Season Grasses for Critical Areas

After construction activities where soil is disturbed, these critical area sites need to be stabilized. Depending on the project and time of year, a dormant seeding may be the only option for establishing or re-establishing vegetation cover to this area. In the Northeast US, this may be difficult when using ground equipment due to increased soil moisture at time of seeding and timing is the most important factor when doing a dormant seeding to prevent early fall germination that will result in seedling mortality. Mulching is also a critical component to prevent early spring germination and provide some soil erosion protection. On December 5, a dormant

seeding study was established using 10 single species and 2 mixes that were seeded and mulched in replicated plots to evaluate these species for winter hardiness, emergence, cover, and establishment. The species being evaluated are tall fescue, red fescue, perennial ryegrass, annual ryegrass, Kentucky bluegrass, red top, chewings fescue, common brome grass, white clover, bird’s foot trefoil and a mixture of tall fescue with perennial ryegrass and red fescue with perennial ryegrass. These species will be planted in the spring to provide a basis for comparing fall dormant seedings to spring seedings.



Seed and Plant Production

Plant materials of released conservation plants and new plants under development were grown and processed at the Plant Materials Center. Any seed grower or nursery business interested in producing any of our plant releases should contact us directly at the center. Landowners that need information on conservation uses of these varieties or local sources of plant materials can contact their local NRCS office.

Seed that was harvested in 2014 was ‘Aroostook’ rye, ‘Niagara’ big bluestem,

‘Shelter’ switchgrass, ‘Tioga’ deertongue, ‘Copper’ chinquapin, Canada and Virginia wildrye, Canada bluejoint, sideoats grama, New England collections of little bluestem, big bluestem, and Indiangrass, Glacial Lake Albany bush clover and intermediate wheatgrass. Seed of blue vervain, white flat-topped aster, nodding sedge and butterfly milkweed from the Northeast Native Seed Initiative working group was harvested and cleaned.

Kingston Germplasm Prairie Cordgrass ([Spartina pectinata Bosc ex Link](#))

Kingston Germplasm Prairie Cordgrass is a source-id tested class release made up of 7 accessions originally collected from Argyle, ME, Deer Isle, ME, Newbury, MA, Durham, NH, Hampton State Park, NH, and Rye Harbor State Park, NH. Many of these collections were from wetter areas located on or near rivers, creeks, coastal areas, and marsh lands, where they may have been inundated for a short period of time. These selections were made from 50 collections collected across 6 states in the Northeast and Canada and were selected for their superior performance based on overall vigor, disease resistance, spread, flowering time, and heights.

Kingston Germplasm prairie cordgrass is a tall (4-6 feet), robust, perennial, native warm season grass. It produces strong rhizomes that can grow 1-2 feet per year. Its sharp, long serrated leaf blades make it easy to distinguish from other grasses and grow to 30 inches in length. It produces very stiff

stems that can remain upright in the winter months. Kingston Germplasm prairie cordgrass seedheads are distinguished from other warm season grasses by their compressed spikelets attached to the main stem.

Conservation Uses

The stiff stems, vigorous rhizomes and robust size of this species make it useful for:

- wetland restoration and enhancement
- streambank stabilization
- riparian buffers
- prairie landscapes
- wildlife habitat-nesting cover
- spillway and pond shoreline cover

Due to low seed germination of this species, this plant will be sold as plants or rhizomes. Any nursery interested in growing and establishing a production block of Kingston should contact the PMC directly to arrange to receive rhizomes.

Tours/Workshops/Meetings

2014 Perennial Biofeedstock Energy Tour

On July 23, 2014, we held our 10th biofeedstock tour and presentations. Over 100 participants enjoyed a morning tour of our field plots pertaining to biofuels. They received a great look into the many cooperative projects currently being conducted on the PMC, including switchgrass breeding, bioenergy grass cultivar comparisons, willow breeding program for biomass production, seed trials for establishment on marginal soils, and

diseases/pests associated with bioenergy grasses that reduce plant vigor and yields. Three demonstrations of a small-scale biomass gasification for powering a generator by SUNY Morrisville, a syngas generator operated from biomass pellets to run a generator by SUNY Cobleskill and a powdered biomass burner was on-hand for participants to observe in operation.

2014 Cover Crop and Soil Health Presentations and Tour

On November 14, 2014, over 115 participants attended our annual cover crop-soil health workshop and tour. For the field portion, they toured our 350 plots of cover crop seeding trial and there were field demonstrations of an AerWay® vertical tillage implement and a Zone-Builder sub-soiler. Using zone tillage to alleviate compaction issues is easy to implement and can help improve soil health. Using reduced tillage on their land, farmers have noticed greater moisture retention, less runoff, and less erosion with more efficient use of their time, fuel and fertilizer. Cornell's interseeder was on

display next to our corn field (conventional and no-till) which was interseeded with cover crops in June. The day continued speakers inside and concluded with farmers from NY and PA sharing their experiences with cover crops and responded to questions asked by the audience. The ecology of soil biota and how it relates to soil health, herbicide management, and a cover crop decision making calculator was discussed. To access the cover crop design making tool please visit the following link:

<http://covercrops.cals.cornell.edu/decision-tool.php>



FIGURE 6. COVER CROP PLOTS



FIGURE 7. PRESENTATION ON INTERSEEDER

2014 Riparian Buffer Tour and Presentations

On Thursday, September 17, 2014 over 85 participants attended our Forest Riparian Buffer Plantings Workshop and Field Tour. Dr. Bern Sweeney from Stroud Water Research Lab started the day with an excellent presentation on stream ecology and role of forest riparian buffers for improving water quality. Other presentations covered topic on the establishment and management of forest riparian buffers. Also touched upon were projects currently being implemented in the northeast and mid-Atlantic states including the NRCS-US Forest Service



FIGURE 8. RIPARIAN BUFFER PLANTING TRIAL.

Chief's Joint Landscape Restoration Partnership, NYSDEC Trees for Tribes Program, the Chesapeake Bay Riparian Forest Buffer Initiative and the Upper Susquehanna Watershed Riparian Buffer Enhancement Project. A tour of our field plots relating to riparian buffers and water quality, rounded out the day. This workshop was well attended by many professionals including participants from numerous USDA agencies (NRCS, FSA and USFS), SWCDs and state agencies.



FIGURE 9. DR. BERN SWEENEY FROM STROUD WATER RESEARCH LAB IN AVONDALE, PA DISCUSSING STREAM ECOLOGY AND BENEFITS OF RIPARIAN FOREST BUFFERS.

The People's Garden

Since 2012, we have provided support and seeds to the Erwin Child and Family Center and Pathways Adventure Club, in Corning, NY. We helped them register and become a People's Garden. Over the past years, we have seen their garden grow with the pollinator garden becoming fully established to support pollinator habitat for their vegetable gardens. Their objective is to use garden-based learning to guide the children to learn and explore where their vegetables come from and can experience first-hand the fruits of their labor. It will have a lasting impact about gardening and healthy eating for many years to come.

***For any additional information on the material presented here please contact us at 607-562-8404.**

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