United States Department of Agriculture
Natural Resources Conservation Service

Plant Materials Program

Big Flats Plant Materials Center: Progress Report of Activities, 2011

3266 St Rt.352, Corning, NY 14830 • P 607.562.8404 • F 607.562.8516 • http://plant-materials.nrcs.usda.gov/nypmc/

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. Areas 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 environmental programs. We focus on using native plants to solve conservation problems and protect ecosystems. Six major objectives addressed are:

- Cropland Erosion and Water Quality
- Native Plants for Conservation Systems
- Biofuels/Agroforestry
- Protecting and Improving Water Quality
- Wildlife Habitat Improvement
- Critical Area Stabilization
- Improving Air Quality

This is a brief summary of 2011 activities at the center. For additional information on the projects, please contact us at the center. Visit our 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; new improved plant uses and technology, and links to websites with additional or supporting information.

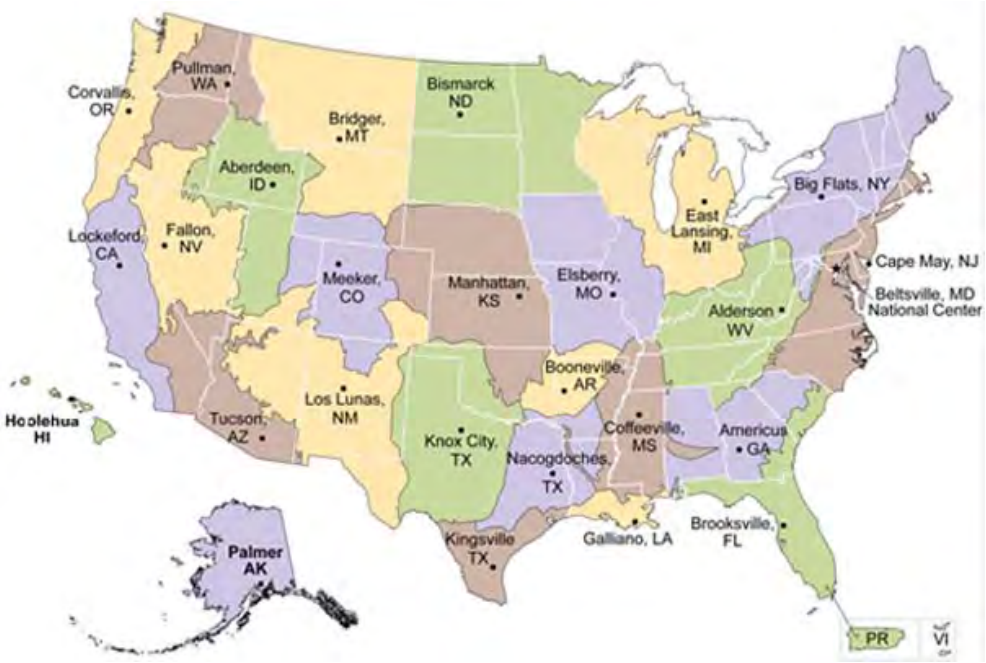

Figure 1: Locations of Plant Materials Center in the US.

IN THIS ISSUE

Cropland Erosion and Water Quality

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. All of these benefits rely on the planning of the cover crop system. 35 different species of cover crops and several mixes were seeded throughout various dates from June to October 2011. Some mixes had over 10 species of cover crops seeded together, using a Tye Drill. These 'cocktail mixes' are proving to increase soil health and structure at a faster rate.

The diverse species used creates an environment that is very beneficial to soil organisms, improve soil structure and increase soil moisture content. Research is showing using these mixes will help reduce economic inputs to the system by decreased fertilizer and pesticide use as well as reducing the need for irrigation in drier parts of the country. Data on planting dates, percent cover, soil nutrients, heights, disease, vigor, and above and below ground biomass were recorded throughout the season, and will be looked at again in the spring of 2012.

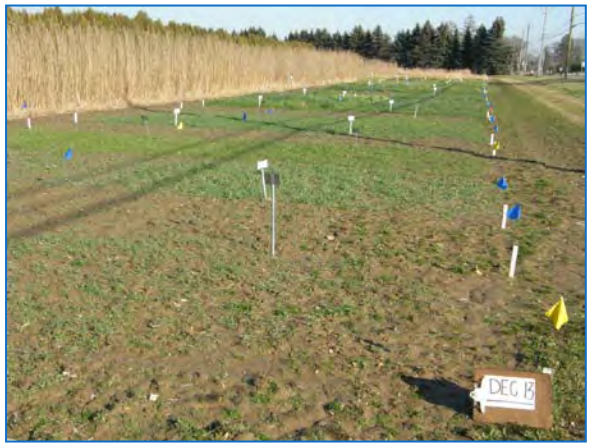

Figure 2: Tillage Radish Growth into December.

Figure 3: Cover Crop Demostration Plots showing different species at various planting dates.

Figure 5: Forage Turnip in December 2011

Figure 4: Mix of Tillage Radish and 'Aroostook' Rye in December 2011

Native Plants for Conservation Systems

Selecting Native Forbs for Pollinator Conservation

The New Farm Bill of 2008 emphasizes the development and conservation of native habitat for managed and native pollinators. In January 2009, we started over 50 native species in the greenhouse. We looked at which species would germinate readily without cold-moist stratification as well as seeding depths for increased germination and vigor of plants. Pictures of the seedlings, for an identification guide, in the Northeast, were obtained. In addition to the greenhouse seeding, individual species and mixes of species were seeded in the field with three replications, 4 seeding dates, and three different weed control methods for potential seeding recommendations. In 2011, we seeded 11 different mixes at 5 different dates from July to Sept, approximately 2 weeks apart. All plots are still being evaluated for percent cover, heights, vigor, flowering date and abundance (seeds per square foot). We also have large plots at ¾ and ½ acres, and are looking at these for ease of establishment and maintenance. Mowing was utilized at various dates throughout the growing season to keep annual and perennial weeds down before going to seed, with good results!

Figure 6:Pollinator Fields planted in June 2009

Figure 7: Pollinator Planting Plots seeded in Aug 2009

Figure 9: Pollinator Plots seeded in June 2009.

Figure 8: Pollinator Plots showing the differences in growth, with and without weed control

Northeast Native Seed Initiative

There is a growing need in the Northeastern States for seed of local ecotypes of native plants, suitable for habitat restoration. The Northeast Native Seed Initative was formed with cooperators from US Forest Service in the Green Mountains, and the White Mountains National Forests, USDA-NRCS, State Departments of Transportation in NY, VT, NH, and ME, New England Wild Flower Society, state foresters, cooperative extensions, natural heritage programs, and interested NGO/citizens. With little or no native seed available, in the commercial market, the goal of this intitative is to collect seed of selected native species from across the region and grow out in increase blocks. Once harvested, this seed will be provided seed companies for commercial seed production. For the initial collection, 5 grasses (Canada and Virginia Wildrye, fowl bluegrass, upland bentgrass, little bluestem), 1 sedge (nodding sedge), and 5 forbs (common milkweed, boneset, NE aster, blue vervain, flat-topped white aster) were selected by the group. Collections were made in 2009, 2010, and 2011 and will continue in 2012

Biofuels/Agroforestry

Switchgrass Smut Study with Cornell University

Switchgrass Smut is a fungal disease caused by *Tilletia maclaganii* and results in stunting, premature flowering, and seeds that are replaced by fungal sori. Dr. Gary Bergstrom and Christine Layton of Cornell University have set up test plots, in 2009 and 2010, on the center looking at different seed treatments and fungicides that will help in eliminating this stand-depleting fungus. In 2010, a switchgrass variety trial was established, to see if any of these showed resistance to smut infection. Varieties from various sources being tested are Kanlow, Bomaster, Shawnee, Shelter, Blackwell, Cave-in-Rock, Hightide, Carthage, some hybrids and 'Atlantic' Coastal Panicgrass. So far, all varieties are quite susceptible to the smut disease. In 2011, Christine collected all the seed from these plots and will see if any varieties are showing resistance to this disease, and establish additional plots.

Species Evaluation for Biofuels: New York

A New York Farm Viability Institute Grant, "Accelerated Evaluation of Perennial Grass and Legume Feedstocks for Biofuel Production in New York State" was accepted in cooperation with Cornell University. This project evaluated warm and cool season grasses for potential use as a biofuel. There are 24 entries of warm season grasses consisting of switchgrass, big bluestem, indiangrass and eastern gamagrass and nine cool season entries of tall wheatgrass, tall fescue, reed canarygrass and smooth bromegrass, at four locations including one site at the Big Flats PMC. Larger farm plots were planted utilizing the Big Flats PMC Truax native seed drill. Biomass yields were collected in 2009, 2010, and 2011. First year data indicates 'Cave-in-Rock' switchgrass yielded 4.5 DT/acre. The biomass of all entries will undergo chemical composition analysis

Tall Wheatgrass Time of Cutting Study

We evaluated two varieties of tall wheatgrass, 'Alkar' and 'Szarvasi-1', with 5 cutting dates cuttings and 1 recut date with two seeding rates of 20 and 40 N lb/ac. The first cutting dates were 7/09/11, 7/20/11 and 7/29/11, 8/09/11; the re-cut date for all was 10/22/11. In the cutting study for 'Alkar', there was a tendency for higher yields with the lower seeding rate and for increased yield later in season: July 29,2010 yielded 4.06t/ac and Aug 9, 2010 at 3.59 t/A. There was a yield reduction for the cutting date on 10/25/10, with an average yield of 2.9 t/ac. The second cutting yield for 'Alkar' for both seeding rates, averaged 0.27 t/ac. There is a potential for high one cut yields for tall wheatgrass, and samples are being dried and weighed for biomass yields for 2011

Figure 11: Tall Wheatgrass plot after forage cutting.

Figure 10: Using a Carter Harvester for biomass clippings.

Evaluation of Ken Vogel's and Mike Casler's Switchgrass Breeding Lines

Conventional plant breeding and molecular genetics techniques provide opportunities for improving switchgrass for bioenergy. Current switchgrass research is focusing on breeding and genetics to improve biomass yields for energy production as well as ecosystem uses. A potential mechanism for increasing biomass yield is by producing hybrids based on the upland and lowland ecotypes. Current research by Mike Casler, USDA-ARS in Wisconsin, and Ken Vogel, USDA-ARS Nebraska, indicate hybrid cultivars can increase biomass yield by more than 40% compared to the parental lines. Switchgrass species have 2 distinct ecotypes, lowland and upland. Lowland ecotypes, i.e. 'Kanlow' are found in riparian areas and wetlands whereas, upland ecotypes occur in drier areas that are not subject to inundation, such as 'Cave-in-Rock'. Most switchgrass cultivars that were previously developed for pastures were upland types because they generally have smaller stems and generally more leaves. The lowland ecotypes, because of their higher yield potential, are more suitable for biomass energy production. It is possible to produce hybrid cultivars of lowland and upland parents which could result in additional yield improvements. In 2009, we seeded 13 different breeding lines, from Ken Vogel. In 2010 and 2011, biomass yields were calculated and ranged from 3.2 T/A-5.06 T/A. In 2009, hybrids of upland and lowland types, from Mike Casler were seeded and compared with 'Timber', 'Bomaster', and 'Kanlow' cultivars of switchgrass. 2011 was the first year for biomass yields, and will be analyzed this winter.

Big Bluestem Breeding project for Biofuels with Cornell University

Figure 12: Over 4000 native switchgrass and big bluestem plants are being evaluated for their potential use as a Biofeedstock source or wildlife and roadside plantings.

Switchgrass and big bluestem have a lot of genetic diversity within native populations. It is important to collect, evaluate and store this germplasm. An effort was made to collect Northeast native switchgrass and big bluestem to develop breeding lines which originated in the Northeast. Approximately 80 collections each of switchgrass and big bluestem were made from 10 states. They were grown at both the Big Flats PMC and Cornell University. The collections were grown out to establish breeding evaluation blocks of 3,000 individual plants at both locations. Collections that were received late in 2008, were added in 2009 to the existing plot. Evaluations of flowering dates and growth form, heights, vigor, disease, stem and leaf abundance, and leaf widths were continued in 2011. Plants are now being selected based on potential use for biofuel and wildlife plantings, and will be moved to seed increase blocks and advanced evaluation in 2012.

Inter-Center Evaluation of Tall Wheatgrass for Biofuels

Figure 13 Plot showing the different cool season grasses.

Tall wheatgrass is a non-native cool season grass from Southern Europe and Asia Minor; it flowers later with stiffer stems than most forage type grasses grown in the Northeast. It has been used in Hungary for burning for heat. We are evaluating four cultivars of Tall wheatgrass – 'Largo', 'Alkar', 'Jose' and one from Hungary, 'Szarvasi-1', as well as two cultivars of reed canarygrass – 'Chiefton' and 'Bellevue' and one accession of intermediate wheatgrass, #9051920. All are at two seeding rates, 20 and 40 lb/ac except the reed canarygrass which is only seeded at 20 lb/ac. The following centers are cooperating in this study: AZ, CA, ID, MD, MI, MT, NY OR and WA. It appears that it is possible to harvest the majority of yearly growth with a single cutting. First year yields of the intermediate wheatgrass, tall wheatgrass and reed canarygrass with a 2 cut system were 4.1, 3.6 and 2.8 t/ac respectively.

Water Quality/Streambank Stabilization/Buffers

Japanese Knotweed Control Study with ARS Pasture Lab, USA-COE and Penn State University

Figure 14 Japanese knotweed leaves and flowers.

Japanese knotweed is a tall growing perennial herbaceous plant that forms dense monocultures on many different sites, from road cuts to streambanks. This invasive plant grows to 8-10 foot heights, smothering out all vegetation. Herbicide studies have been done to determine the best method to try to control this plant. Japanese knotweed has a rhizomatous root system, so controlling this plant's rhizome system is the key. The objective of this study is to test different warm and cool season grasses and methods of establishment to rehabilitate sites after controlling Japanese knotweed with herbicides. A site at the Corps of Engineers Tioga-Hammond Dam, near Mansfield, PA, was sprayed in 2006 and plots established in the spring of 2007. Part of the study involves treating the plots with herbicide for two years (2006 and 2007) and then establishing plots in the spring of 2008. Due to dry weather conditions, the plots established poorly and were reseeded in 2009. Initially, there was good control of the knotweed in the plots with prairie cordgrass and Canada bluejoint, and the riparian buffer mix. In 2011, we concluded that Japanese knotweed has reinvaded all plots (72%-96%) with only one year spraying. Only 2 species mixtures adequately established after 2 years of spraying, the riparian buffer mix and prairie cordgrass/Virginia wildrye mix. Both mixes were 50% or greater after 37 months. Plots will be monitored in 2012 and it appears further management will likely be needed to prevent complete Japanese knotweed re-colonization.

Critical Area Stabilization/Improved Forages/Streambank Stabilization

Critical Area Seeding Mix Study

Critical area stabilization plantings are utilized to stabilize areas that are highly susceptible to erosion. These areas include very steep or long slopes, highly erodible soils, droughty or excessively wet soils, and slopes adjacent to waterways or wetlands. On June 28, 2011, 20 mixes of warm and cool season grass species were seeded. Later in the season, on August 22, 2011, 30 mixes of native and non-native cool season grasses, legumes, and with some wildflower species were seeded as well as, all with various seeding rates. The cool season grasses may be seeded almost year-round, except during the typical midsummer dry period, where warm season grasses need to be seeded in spring or early summer. All plots are being evaluated for percent cover, competition with weeds, ease of establishment, overall vigor and heights, to further improve seeding recommendations and for a field day in 2012.

Beachgrass for Great Lake Dune Ecosystem

The release of 'Cape' American beachgrass (Ammophila breviligulata) has proven useful in the Great Lake dunes as well as the Atlantic Ocean. 'Cape' originated from Cape Cod, Massachusetts. A study at the University of Vermont found the Champlain type (Great Lake) is genetically different from the North Atlantic type (includes 'Cape'), and the South Atlantic type. Champlain appears to be a sub-species. Therefore, the use of 'Cape' may pose a situation to the Champlain species by occupying sites that were originally populated by the local native type. Collections were made of the Champlain sub-species in 2002, with the Nature Conservancy at El Dorado Preserve, Southwick State Park and Sandy Island Beach (all on the eastern shore of Lake Ontario) and evaluated for their performance. This sub-species was planted in 3 separate locations along Lake Ontario, for dune stabilization. Continuous visits to these sites will monitor the success of these plantings. Culms are still being increased, on the center from this population.

Native Cool Season Grasses for Conservation Systems

There has been increased emphasis in recent years to use native plants for conservation planting projects. The Big Flats PMC, in conjunction with the Cape May, NJ and Beltsville, MD PMCs, is developing new native grasses for the eastern U.S. The following cool season grasses are being evaluated: Canada wildrye (*Elymus canadensis*), Virginia wildrye (*Elymus virginicus*), and Canada bluejoint (*Calamagrostis canadensis*). Seed increase fields were established in 2008. These grasses will be released as source-identified seed to meet the need for native eastern eco-types to be utilized in conservation seedings for farm bill practices, wildlife habitat, critical area stabilization, wetland plantings and ecological restoration.

Native Willow Collection

Figure 15 Close up of willow flower

Interest has arisen for collecting native species of shrub willow for restoration plantings in riparian areas, streambanks, and wetlands. Willows are used because they can grow quickly, stabilize soils and withstand flooding, improve water quality, and provide shade and cover for stream life. Four willow collection identification workshops were held to train NRCS and Cooperating agencies on how to identify and collect willows for use in streambank erosion control. Willows were also obtained from SUNY ESF. The species of interest are Bebb's willow, pussy willow, silky willow, shining willow and heart-leaved willow (Salix bebbiana, S. discolor, S. sericea, S. lucida, and S. eriocephala). A total of 122 collections, from VT, NH, PA, and NY, were obtained and were grown in a nursery bed at the PMC. Then in July 2010, these collections were planted in three replications for evaluation. In 2011, we evaluated each plant for survival, vigor, disease, and heights.

RPM Trees Study

Figure 16 RPM Trees

The "Root Production Method" (RPM) a proprietary process for producing trees, is very visible in the nursery trade. RPM process includes air pruning of seedlings grown in well aerated soil medium to encourage a dense fibrous root system that promotes rapid growth of the plant. Planting tree seedlings in agroforestry practices can be a problem with weed competition, wildlife browsing and possible flooding and wet soils. The question "should RPM trees be utilized instead of regular nursery seedlings, understanding that the RPM trees are much more expensive?" This study was initiated in the fall of 2006 where five species of hardwoods – Pine Oak, Red Oak, Swamp White Oak, Sugar Maple and Shadbush Serviceberry – were compared to three types of nursery stock: RPM trees, one-year-old seedlings and two-year old seedlings. These trees were evaluated for a number of years to monitor the rate of growth and performance. Also, a field evaluation planting was established in the spring of 2007 on a Wetland Reserve Program site in Madison County, NY, to evaluate RPM hardwood trees of wetland species. Their performance will be compared to regular nursery seedlings. Evaluations performed in 2011 as well as past years, are showing that although, RPM trees were taller at planting date, 1-yr old and 2-yr old trees were almost as tall after 4 years, but not larger in caliper width. Long-term success of tree plantings and economic benefit, for restoration and conservation practices, are the main objectives and will be looked at over the next few years.

Figure 18: Photo of plot with RPM trees, 1-year old bareroot cuttings and 2- year old nursery stock.

Figure 17: Photo of tree seedlings at initial planting date in 2006. Left tree shows RPM, middle 2-year old nursery stock, and far right is 1-year bareroot cutting.

Ash Germplasm Preservation Project

Ash trees provide substantial economic and ecosystem benefits throughout the US. The emerald ash borer has been attacking and killing ash trees in the Great Lake States and is spreading. A cooperative project was developed to preserve ash germplasm with NRCS, USFS and ARS Genetic Resource Preservation Unit in Fort Collins, CO. On July 30, 2011, Dr. Mark Widriechner, USDA ARS North Central Regional Plant Introduction Station and Dr. Mike Dosmann, Curator of Living Collections at The Arnold Arboretum of Harvard University, travelled the southern tier of NY and part of northern tier PA locating and marking seed collection site of green white and black ash and came back in September of this year, to collect this seed.

Figure 20: The characteristic d-shaped exit hole. If you this on any ash trees, please contact your local wildlife office immediately.

Figure 19: Photograph from USFS website, showing the size of the emerald ash borer.

Vegetative Buffers/Windbreaks for Improved Air Quality on Concentrated Animal Operations

What can be done to minimize the conflict between residential landowners living near a concentrated animal operation? There are problems with odors, flies, noise, dust and normal agricultural activities. There is information from the Midwest that needs to be adapted to the east where space is limited. A group of cooperators (including NRCS in PA, Penn State University Poultry Science and Horticulture departments, PA Bureau of Forestry, Cooperative Extension, Wenger Feed, Big Flats and the National PMC and farmers), was organized to establish windbreak demonstration sites to evaluate potential benefits for windbreaks and air quality. More than 20 demonstration sites have been planted on poultry, dairy and swine operations. In 2010 a site at Hillendale Farm, Gettysburg, PA, was established. Many species of trees, shrubs, and grasses, such as Northwind Switchgrass, Streamco purpleosier willow, Red Maple, Northern White Cedar, Miscanthus, and Valley Forge Elm, were planted in front of large exhaust fans Studies at Penn State University are being conducted to evaluate the effect of trees to absorb ammonia, dust and other pollutants. Fast growing species, such as 'Streamco' purple osier willow and 'Spike' hybrid poplar are being studied to establish visual screens in two to four years, while also acting as an air filter and a living snow fence. Windbreaks may have the ability to reduce odor concentrations and this cooperative group will be monitoring the plantings to determine their effectiveness. In 2011, another field evaluation site was planted at Flintrock Farm, in Lancaster PA. A variety of grasses, trees, and shrubs for their potential use as windbreaks for odor control were planted in different configurations by exhaust fans to test their performance.

Figure 21: Large Fans release odors and particulate matter from inside the barn.

Native Grass Studies at Cornell University Arnot Research Forest

Three studies were started at the Cornell University Arnot Research and Training Forest in cooperation with Cornell University, Dept. of Natural Resources in 2006. The first is a Native Cool Season Grass Mix study to determine optimum seeding rates of the mixes and evaluate their establishment. The grasses were: bentgrass, fringed bromegrass, fowl bluegrass, intermediate wheatgrass, red fescue and rough bentgrass. At this site, some of the species initially established in the first year but within a year, reverted back to original field conditions. Second is a Native Cool Season/Warm Season Grasses Mix study. The warm season grass mix that was seeded consisted of big bluestem, indiangrass, switchgrass, and deertongue with the cool season grasses consisting of Virginia wildrye, Canada wildrye, Riparian wildrye and intermediate wheatgrass. Initially both warm and cool season grasses established well but after 4 years is now a solid warm season grass stand. The third study at the site is a switchgrass variety trial for biofuels. At this 1900' elevation, 'Kanlow' switchgrass and 'Atlantic' coastal panicgrass had 80% winterkill while 'Cave-in-Rock', 'Cartage', and 'Shelter' switchgrasses had significantly less winterkill, with nice stands. A 2.6 acre section of the field was seeded with a warm season grass mix of 'Niagara' big bluestem, Indiangrass, 'Tioga' deertongue, and 'Shelter' switchgrass. Evaluation of this field, in 2011, showed an excellent, solid stand of the war, season grasses. The original field had extensive goldenrod that has not re-invaded this planting after 5 years.

Figure 23: Cool Season grass mix at Arnot Forest.

Figure 22: Different Plots of Cool season grasses.

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. Any 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 2011 was, 'Aroostook' Rye, Canada and Virginia Wildrye, Canada Bluejoint, Sideoats grama, 'Niagara' Big Bluestem, New England collections of Little Bluestem, Big bluestem, and Indiangrass, 'Tioga' deertongue, 'Copper' Chinquapin, Bur oak, Albany Pine Bush's' bush clover, lupine, and butterfly milkweed, blue false indigo, intermediate wheatgrass. There were visitors this year to the PMC to learn about our seed cleaning operations. We had 2 people from the Albany Pine Bush Preserve Commission bring seed they collected and learn about the processes and equipment required to successfully clean seed for future use at their site. We also trained 2 SCA personnel from the Cuyahoga Valley National Park, in Ohio, on our seed cleaning equipment and processes. They had some challenging seed to clean such as big bluestem, various goldenrod and aster species, spotted joe-pyeweed and boneset. These species with their very fluffy seed heads, required several steps. They will use their seed for restoration and plantings in the national park in 2012

Tours/Workshops/Meetings

Cover Crop Workshop 2011

On November 4, 2011, 90 people attended this workshop which provided the opportunity to examine 40 different cover crops and mixes, some with several seeding dates, and observe the results. After a brief reception in our seed barn, attendees viewed our field plots and roller crimper demonstration. David Brandt, a long-term no-till farmer spoke about his successes with cover crops. For information on the day's activities, click here. We finished the day out with a soil health demonstration from Ray Archuleta, and presentations from an array of speakers on their experiences and studies of cover crops (see below).

- **Ray Archuleta**- National Technology Center-East; Soil quality, health, biology and cover crops. Reduction of chemical inputs through soil health.
- **Tom Kilcer-** Consultant and former Cornell Cooperative Extension Specialist; The economics of using short rotations and cover crops for harvest.
- **Dr. Tom Bjorkman-** Cornell Dept. of Horticulture, NY Exp. Station, Geneva; Review of *Brassica* cover crops.
- **Dr. Quirine Ketterings-** Cornell University Dept. of Animal Science, Associate Professor, Nutrient Management Spear Program; Fall accumulation of nitrogen and carbon for cover crops seeded in August following small grain and in September following corn silage; and the spring nitrogen and carbon pools.
- **Ray Styer-** North Carolina farmer; 30 years of cover cropping and no-till experience. No chemical fertilizer used for 16 years, 75% reduction in herbicide use.
- **David Brandt-** Ohio farmer; No-tilling since 1971 and cover cropping since 1978 on 900 acres.

Figure 25: Attendees to the 2011 Cover Crop meeting at the Big Flats PMC, listened to the importance of diverse cover crop mixes. The mix in the photo, was planted at the end of August.

Figure 24: 2011 Cover Crop Meeting attendees, inspect the time of seeding cover crop plots, seeded at various dates throughout the growing season. They got to see first-hand the effects the planting date has on cover crop establishment.

Biofuel Field Day

The Big Flats PMC conducted its annual Biofeedstock Field Day on August 3rd, 2011 for approximately 125 people. The tour allowed attendees to observe research and demonstration plots of many warm and cool season grasses including herbicide treatments, seeding techniques, time of seeding and cutting studies, breeding nursery, cultivar and seed treatment studies, plant pathology studies as well as seed production fields. Establishment and management of hybrid willows will be discussed and observed. Presentations were given by:

- **Dr.Curt Dell- USDA-ARS,** The effects of warm season grass roots on carbon sequestration
- **Dr. Brian Richards-** Cornell Dept. of Biological and Environmental Engineering; sustainable development of perennial grass bioenergy on marginal soils of New York
- **Dr. Larry Smart-** Cornell Plant Breeding Department, willow breeding project
- **Dr. Gary Bergstrom and Christine Layton-** Dept. of Plant Pathology, switchgrass disease management
- **Hilary Mayton-** Cornell Plant Breeding Department, summary of bioenergy grass cultivar study
- **Philip Kear-** Cornell Plant Biology Department, the role of plant enzymes for cellulosic ethanol
- **Calvin Ernst -** Ernst Conservation Seeds, pellet plant development at Ernst Conservation Seeds
- **Dr. Phillip Hopke-** Clarkson University Chemistry Dept., air quality testing of pellet boilers.
- **Dr. Philip Christiansen-** Clarkson Univ. Chemistry Dept., the effects of leaching on pellet composition
- **Kim McNight-** Summerhill Biomass System, demonstration of powdered biomass burner
- **Paul Lawson-** Biomass Solutions, small scale and mobile pellet mill
- **Bob Houser**- Full Circle Farms Enterprises, seed oil portable press demonstration

Northeast Buckwheat Growers Association Field Tour

On August 25, 2011, the 17th Annual Northeast Buckwheat Growers Association held its meeting at the PMC. The program was organized by Cornell University researcher, Thomas Björkman, in cooperation with Cornell Cooperative Extension and Birkett Mills. Thomas Bjorkman, professor in the Horticulture Department at Cornell University, and Cliff Orr spoke about the industry's situation in 2011, and how drought affected the grower's buckwheat crop. The program consisted of field demonstrations on the effects of planting methods and rates, in achieving a good stand at minimum cost, and particular methods that will reduce fuel requirements. Farmers were given the opportunity to network and exchange knowledge on production issues. **For more information, click here**

Figure 26: Participants enjoyed a beautiful day while observing the buckwheat demo plots.

Figure 27: Plots of Buckwheat showing the differences in planting techniques and seeding rates on establishment.

Other Tours and Public Outreach Conducted in 2011

In 2011, many groups and organizations, from a variety of disciplines, contacted us for a tour of our facilities, field projects, and equipment. See below:

- **June 28, 2011**- Volunteers from New York's NRCS State office, potted over 1000 plants of many wildflowers, grasses, and shrubs for a restoration project at Kirk Park in Syracuse, NY.
- **July 12, 2011**, 16 summer interns for NRCS, NY toured the facility and field plots.
- **July 21, 2011,** Cornell Plantations toured our seed processing facilities for a demonstration of seed cleaning techniques, equipment, and storage facilities.
- **July 26,2011,** Participants in the Boyce Thompson Institute Biofuel 'Train the Trainer' Program, spent the day viewing our field plots dealing with biofuel research as well as a tour of all of the facilities here at the PMC.
- **September 6-7, 2011**, PMC hosted the State Resources Conservationists staff meeting
- **September 22, 2011,** Cornell University's Seed Science and Tech class, toured the PMC, observing seed cleaning techniques and equipment, seed collection implements, and seed storage facilities. There were students from as far away as Mexico, Indonesia, and Japan,
- **October 25, 2011,** Elmira College students visited the PMC and learned about the USDA's Natural Resource Conservation Service Farm Bill Programs and other conservation initiatives as well as the Plant Materials Centers role in implementing these programs and initiatives.

Permanent Exhibit at the NYS Fairground in Syracuse

NRCS New York developed a permanent exhibit site at the New York State Fairgrounds in Syracuse, NY. The Big Flats PMC staff was recruited to construct the site in 2005. In 2011,the fence between NRCS and NYSDEC exhibit was removed. The PMC mulched before the fair and new forbs planted. A plot map and a plant identification book were available for thousands of viewers as they walked through the area, which promotes conservation of our natural resources. In another area of the fair, plants were given to officials for a rain garden exhibit. Rain gardens allow rainwater runoff from impervious surfaces like roofs, driveways, parking lots, and compacted lawn areas, the opportunity to be absorbed. This reduces rain runoff by allowing stormwater to soak into the ground, when normally it would flow into storm drains and surface waters, which can cause erosion, pollution, and flooding.

Figure 28: NRCS display at the New York State Fairgrounds.

Empire Farms Days

Empire Farm Days occurs every year in Seneca Falls, NY. The site covers over 200 acres of working farm fields, at the Rodman Lott & Sons Farm and is the Northeast's largest outdoor agricultural show. Six hundred or more exhibitors are in attendance each year. For three days in August, tens of thousands of farmers gather here to view the event. The Plant Materials Center maintains a demonstration plot every year, which showcases many warm and cool season grasses, shrubs for restoration work and some newly planted pollinator beneficial plants

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Figure 30: Empire Farm Days, PMC site, front entrance.

Figure 29: Empire Farm Days, PMC site

Ag Progress Days

Pennsylvania's largest outdoor agricultural exposition, is held annually during three days in August. Sponsored by Penn State's College of Agricultural Sciences, the event is held at the Russell E. Larson Agricultural Research Center at Rock Springs, nine miles southwest of State College, PA. Ag Progress Days features the latest technology and research exhibits, educational programs, and guided tours. These showcase the latest in Penn State research, as well as information on best management practices and changing regulations in the agricultural industry. With over 400 exhibitors from 31 states and 4 provinces of Canada, they reel in over 45,000 attendees each year. In 2011, the PMC and Ernst Conservation Seeds supplied over 200 wildflower plants for a permanent pollinator enhancement conservation planting demonstration. The warm season grass plots established in 2010 are growing well.

Figure 32: Wildflower planting in August 2011.

Figure 31: Initial planting of wildflower plugs in June 2011