



Progress Report of Activities

2013

Cape May Plant Materials Center

USDA-NRCS Plant Materials Program

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Introduction

The mission of the Cape May Plant Materials Center (PMC) is to provide plant materials and conservation technical assistance to the public, government agencies, non-profit organizations, and commercial growers in a nine-state area that includes Connecticut, Delaware, Maryland, Massachusetts, Long Island-New York, New Jersey, North Carolina, Rhode Island, and Virginia. The Cape May PMC was established in 1965 in response to shoreline restoration needs following Hurricane Donna, and has focused on developing plant technologies for specific concerns pertaining to coastal shoreline protection, sand dune establishment, restoration of mined lands and critical areas, and enhancement of Coastal Plain habitat. Because the Cape May PMC is uniquely situated near coastal dune communities, wetlands, and large tidal marsh estuaries, it is able to be a leader in product and technology development for coastal ecosystems and conserving the health and productivity of Coastal Plain soils.

Plant Development and Evaluation

CURRENT PROJECT STATUS

SEA OATS

NJPMC installed an increase block of sea oats (*Uniola paniculata*) from germplasm dating back to an original 1991 planting in Avalon, NJ. Don Hamer and Curtis Sharp salvaged plants from a 2012 installation, and these plants were divided, potted, and grown in the NJPMC greenhouse in 2013. Plants were installed in three off-center sites in the Borough of Cape May Point in spring, 2013. Evaluations will continue in 2014. Seed was also collected from the existent 1991 population in mid-November 2013. There was no observed natural recruitment from this 1991 planting.

SHORTBEARD PLUMEGRASS AND SUGARCANE PLUMEGRASS

Initial evaluations and selection will continue in Spring 2014 on 68 total accessions of shortbeard plumegrass (*Saccharum brevibarbe*) and sugarcane plumegrass (*Saccharum giganteum*) collected by Bob Glennon, former PMC manager.



...just the facts

Plant Development and Evaluation (continued)

AMBERIQUE-BEAN

NJPMC installed an increase block of 10 accessions of amberique-bean (fuzzy bean) (*Strophostyles helvola*) for the purposes of increasing seed production. The seed from these native annual legumes will be used in technology development for farmland and beach restoration seeding trials. These accessions were gathered from material collected by NJPMC staff in the 70's–80's and stored in the center's archived collection. NJPMC staff recorded date-of-bloom and seed set, spread, dry-weight, root-depth, and total seed production.

PRAIRIE CORDGRASS

In 2013, NJPMC released Southhampton Germplasm prairie cordgrass (*Spartina pectinata*) as a selected class ecotype from Long Island. This release was developed with the cooperation of the Plant Materials Center in Big Flats, NY. Southampton Germplasm was selected from a collection of 53 accessions assembled and evaluated at the Big Flats PMC from 1994 to 1997.

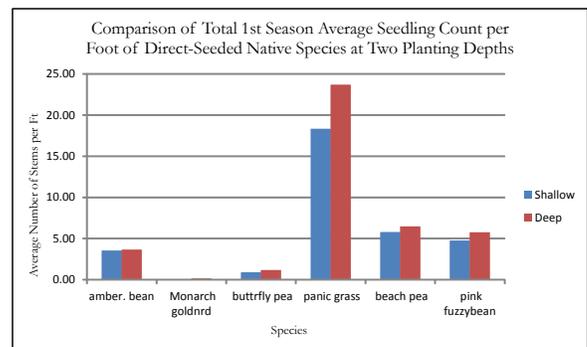
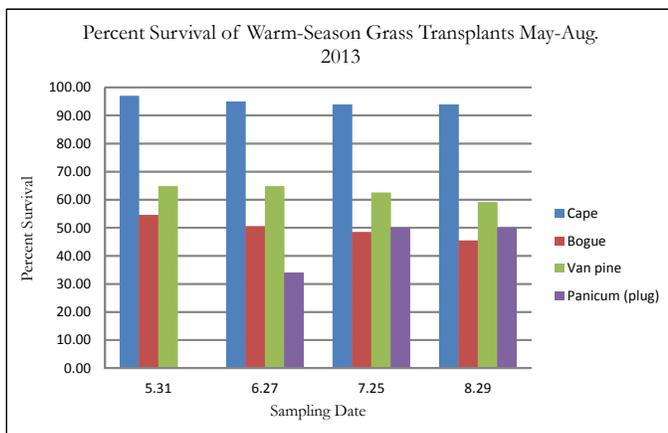
GIANT CANE

Giant cane, (*Arundinaria gigantea*) is a perennial, cool-season woody grass that was once widespread throughout much of Midwestern and Eastern North America. Current evaluations of this plant have been postponed pending the acquisition of more accessions from a wider distribution range.

Technology Development

DIRECT-SEEDING TRIAL FOR DUNE RESTORATION USING LEGUMES, GRASSES, AND FORBS

In early May 2013 a direct-seeding trial was installed on the back side of a newly constructed dune at Cape May Point, NJ. The goal was to find suitable plants that would help increase diversity in dune restoration projects. Six species were drilled at two depths in three replications each. The six species were: amberique-bean (*Strophostyles helvola*), pink fuzzy bean (*Strophostyles umbellata*), beach pea (*Lathyrus japonicus*), spurred butterfly pea (*Centrosema virginianum*), 'Monarch' seaside goldenrod (*Solidago sempervirens*), and 'Atlantic' coastal panicgrass (*Panicum amarum* var. *amarulum*). Staff also planted three varieties of American beachgrass: 'Cape', 'Bogue', and 'Van Pine', and bitter panicgrass (*Panicum amarum*) 'Northpa'. Staff performed evaluations each month from May–October 2013. For seedling counts, the average of three random samples of 1 ft was taken per row and recorded to determine average seedling count/foot.



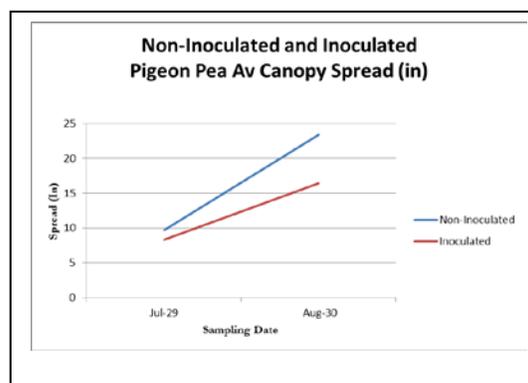
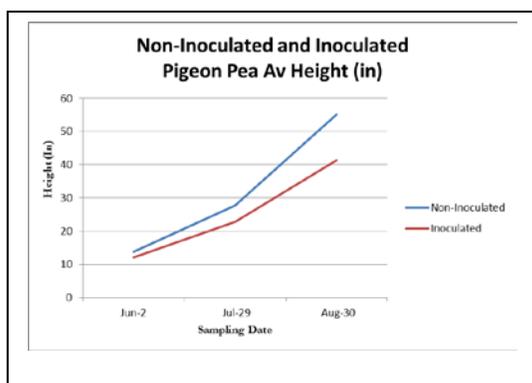
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COVER CROP FIELD EVALUATION

In support of the NRCS Soil Health Initiative the NJPMC continues to experiment with several cover crops more commonly used in southern, subtropical, and tropical regions. PMC staff direct-seeded pigeon pea (*Cajanus cajan*), velvet bean (*Mucuna pruriens*), lablab (*Lablab purpureus*), and cowpea (*Vigna unguiculata*). Although jack bean (*Canavalia ensiformis*) did grow, blossom, and initiate seedpod development during the summer of 2012, it was excluded from the 2013 study due to lack of growth and vigor. All four species were direct-seeded at a variety of seeding rates in several demonstration plots.

PIGEON PEA-Pigeon pea was seeded with and without inoculation in both the field and greenhouse. Staff counted and weighed root nodules of greenhouse plants, measured plant heights and spread, and counted number of seed produced from pigeon pea seeded in fields intercropped with lab lab and buckwheat. No noticeable difference/advantage was observed between using inoculated or non-inoculated pigeon pea in field or greenhouse. At the end of the season seed was collected for further development.

Pigeon Pea Root Nodules Measured at 69 DOP	Av # Nod	Av Size of Nod	Av Size of Nod (mm)	position of nod (tap root or fine root)	activity	Av Stem Diameter (mm)	Height (in)
Pigeon Pea Inoculated Seed	15.1	larg + small	11.4	tap and fine root	Y	6.5	29.84
Non-Inoculated Seed	13.7	larg	13.3	fine roots	Y	5.1	27.86



MUCUNA- Mucuna was direct-seeded into 1-year old, tilled, sunn hemp residue at two seeding rates into a former time trial block in late June 2013. Seed was not inoculated. Although the planting occurred at the late end of the planting window, plants produced viable seed in the fall. Seed was counted and collected for further development.

COWPEA '#83060'- This tropical cultivar has been developed and valued for its ability to grow well in poor and acidic soils and to be resistant to insects and disease. In 2012, seedlings grown in the greenhouse were transplanted into a replicated block trial. The plant demonstrated tremendous spread (>20 ft) and impressive seed production. Seed was collected in 2012 and directly drilled in late June 2013 into a disked crimson clover cover crop. The crimson clover had been allowed to go to seed before incorporation. The interest in this study was to see how well the crimson clover would return in the inter-rows of a spreading, summer cowpea cover crop; and how to manage weeds during the interim. Weeds in the inter-rows were periodically mowed. Half of the cowpea field was mowed to the height of 8 inches after 1 month of growth to simulate grazing and to test plant's recovery. Overall, although the cowpea established solid rows and put on good growth with a late-season planting, it did not spread well when direct-seeded at high seeding rates, and did not recover well after mowing. Only one or two plants produced seed in fall, suggesting that a June 28th planting date was a good date to use when establishing cover, but too late in the summer to produce seed in fall. In comparison, the very successful 2012 planting was on May 8th. In 2014, PMC staff will compare several seeding rates and dates of this cultivar.

LAB LAB- Lab lab is the only species of this 'Southern' cover crop mix that does not bloom or set seed at this latitude—yet its rapid growth, vine-like spread, and heavy biomass production makes this plant a suitable candidate as a cover crop/nurse crop in NJ. Both non-inoculated and inoculated seed was directly tilled in two combinations: 1) interseeded with buckwheat in the inter-rows of pigeon pea; and 2) inter-seeded with pigeon pea in the inter-rows of buckwheat. PMC staff recorded plant heights and canopy spread of inoculated and non-inoculated lab lab.

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DEVELOPMENT OF AGROFORESTRY DEMONSTRATION PLOTS

PMC staff continues to experiment with methods to convert a permanent understory of a cool-season fescue/grass mix with native, warm-season legumes to increase biodiversity, nitrogen fixation, and wildlife value. This year, partridge pea (*Chamaecrista fasciculata*) and Dillenius' ticktrefoil (*Desmodium glabellum*) were seeded in several alleys of a black locust agroforestry plot with a Truax no-till drill in the late fall/early winter. The alleyways were prepped by keeping the cool-season grass mowed low in the fall and then lightly disking in the late fall to open-up the seedbed prior to planting. PMC staff will keep the alleyways mowed low in the spring until summer emergence.

PROPAGATION OF HARDWOOD CUTTINGS OF BLACK LOCUST "STEINER-GROUP"

PMC staff conducted an experiment to propagate three "Steiner Group" accessions ('Appalachia' 9030613; 'Allegheny' 9030614; and 'Algonquin' 9030615) from hardwood cuttings. The rationale of this project was to find easier and more efficient ways of propagating black locust besides the traditional, more labor-intensive approach of using root cuttings. Small, pliable branches were taken in mid-April 2013, treated with Hormodin 3 rooting hormone, and placed vertically into trays with three different substrates as treatments: 100% Pro-mix; 50/50 Pro-Mix and sand; and 100% sand.

Black Locust Steiner Group Hardwood Cuttings (planted 4/11/13)													
Accession		Surviving (83 DAP)	% Survival (accession)	% Survival (treatment)	Accession	Surviving (83 DAP)	% Survival (accession)	% Survival (treatment)	Accession	Surviving (83 DAP)	% Survival (accession)	% Survival (treatment)	
Pro-Mix	9030614	0	0.00	9		50/50 Mix	9030615	1		11.11	9	Sand	9030615
	9030613	3	33.33		9030613		2	22.22	9030614	2			22.22
	9030615	0	0.00		9030614		1	11.11	9030615	3			33.33
	9030613	2	22.22		9030613		1	11.11	9030613	3			33.33
	9030615	0	0.00		9030615		0	0	9030614	2			22.22
	9030614	0	0.00		9030614		0	0	9030613	2			22.22

Field-Based Technology

ON-CENTER EVALUATION

INFLUENCE OF GRASS/LEGUME COVER CROP MIX ON SOIL HEALTH

PMC staff established a multi-year study to investigate the effects of a grass/legume cover crop mixture on soil health. Cowpea (*Vigna unguiculata*) and sorghum sudangrass (*Sorghum bicolor* x *S. bicolor* var. *Sudanese*) were drilled with a Truax no-till drill in mid-June, 2013. Cowpea and sorghum were planted alone and in combination at recommended seeding rates. The crop was terminated by mowing (m) or disking (d). Before seeding, soil microbial activity was analyzed for each of the treatment plots using the Soil Health Tool (SHT) developed by Dr. Rick Haney, USDA-ARS. Seeding rates, time of emergence, stems/sq ft, plant height, percent weed cover, and dry matter yield were recorded. A buckwheat and browntop millet mixture was used as a control. This project will continue in Spring 2014.

Total Average % Weed Cover Measured on 07/25/13		
Cover Crop Treatment Combination	% Cover Crop Average Coverage Across 3 Blocks (Reps)	% Weed Cover Average Across 3 Blocks (Reps)
Cowpea + Sorghum	78.58	39.3
Sorghum (alone)	48.17	56.25
Cowpea (alone)	77.67	41.67
Buckwheat+Brwnntp Millt (control)	78.17	42.5



ON-CENTER EVALUATION (continued)

CARBON SEQUESTRATION IN THE CONVERSION FROM C-3 TO C-4 PASTURE PLANTS

A study was initiated at the USDA-NRCS Cape May Plant Materials Center in 1999 to quantify soil carbon sequestration changes with the conversion from a cool season grass to native warm season grasses in a sandy, coastal plain soil (Downer sandy loam). Five native warm season grasses were studied: ‘Shelter’ switchgrass (*Panicum virgatum*); ‘Atlantic’ coastal panicgrass (*Panicum amarum* var. *amarulum*); ‘Niagara’ big bluestem (*Andropogon gerardii*); indiagrass (*Sorghastrum nutans*); and ‘Pete’ eastern gamagrass (*Tripsacum dactyloides*). Data reviewed in 2003 suggests that initial soil C concentrations in the upper 24 in of the soil profile may have already been near the saturation point for our sandy coastal soil with the previous cool season grass, but the deeper rooting of some warm season species creates the potential to increase sequestration at deeper depths where initial C concentration is very low. Data collection will continue in 2014.

OFF-CENTER EVALUATION

COMPARISON BETWEEN AMERICAN BEACHGRASS CULTIVARS ‘CAPE’ AND ‘BOGUE’

In late April 2013, PMC staff installed a randomized block design comparing the survival and growth between two varieties of American beachgrass: ‘Cape’ and ‘Bogue’ (the former from Cape Cod, MA; and the latter from Bogue, NC) at Cape May Point, NJ. A similar study was performed decades before with the predictable result showing ‘Cape’ more suitable for restoration projects in the region. However, due to the lack of ‘Cape’ availability and increased demand for dune restoration plants more generally, (also the influence of climate change pushing limits of what can be grown in the area), we thought another look at ‘Bogue’ was merited. Plots will be reevaluated throughout 2014.

Cape Vs Bogue % Survival 2013					
	3-May	31-May	27-Jun	25-Jul	29-Aug
Cape Avg.	na	97.5	96.8	96.5	91.8
Bogue Avg.	na	82.5	81.3	80.3	74.8

Cape Vs Bogue Average Stem Count 2013					
	3-May	31-May	27-Jun	25-Jul	29-Aug
Cape Avg.	1.0	1	4	5.4	5.7
Bogue Avg.	1.0	1	1.9	3.5	3.6

Cape Vs Bogue Average Stem Diameter (mm) 2013					
	3-May	31-May	27-Jun	25-Jul	29-Aug
Cape Avg.	4.7	4.8	4.5	5.4	5.5
Bogue Avg.	5	5.4	3.9	4.2	4.8

RE-ESTABLISHMENT OF SEA OATS EVALUATION TRIAL

In mid-June 2013 PMC staff (including former PMC manager, Don Hamer) installed three sites of seaoats (*Uniola paniculata*) in Cape May Point, NJ. This material was salvaged from a former planting site in Avalon, NJ that was destroyed in the aftermath of Superstorm Sandy. These plants represented early seed producers thought to be good candidates for development into a northernmost variety of seaoats. Staff will continue to monitor survival rate and seed production in 2014.

SPECIAL DEMONSTRATION PLANTINGS

GATEWAY NATIONAL RECREATION AREA SUPERSTORM SANDY RECOVERY

The Cape May PMC has been busy this year providing plant materials for Superstorm Sandy recovery efforts. Over 380,000 stems of American beachgrass (*Ammophila breviligulata*) were dispensed; with more stems slated to be grown, increased, and distributed for an ongoing National Park Service (NPS) reimbursable project in Gateway National Recreation Area, NY for FY 2013-15. PMC staff also collected seed from the refuge to propagate and increase for the project. These plants included: bayberry, beach plum, black cherry, eastern red cedar, seaside amaranth, eastern baccharis, American sea rocket, partridge pea, saltgrass, rosemallow, amberique-bean, Virginia rose, prickly pear cactus; and several others.

DIRECT SHRUB SEEDING TO BENEFIT MIGRATORY SONGBIRDS

The Cape May PMC is working together with the US Fish and Wildlife Service (USFWS) to direct seed native shrubs in efforts to restore 3 agricultural fields (45, 15, and 10 acres). This wildlife planting will help provide needed food and shelter for migratory songbirds during autumn migration. This project will continue in 2014.

ASSISTANCE TO RESOURCE-POOR FARMER IN ORGANIC TRANSITION

Many small growers interested in developing niche markets through organic farming face considerable challenges accessing the equipment, seed, and information technology required for the implementation of organic practices. The PMC, working together with the NJ NRCS Soil Quality Specialist, entered into a 3-year agreement (2010-2013) with a NJDA certified organic grower in Cumberland County, NJ to help restore 1 ½ acres by using cover crops for weed control and soil quality improvement. This project will continue in 2014.

INFORMATION-BASED TECHNOLOGY

PUBLICATIONS 2013

- Christopher Sheahan 2014. *Canavalia ensiformis* Plant Guide. Cape May, NJ. Jan 2014. 4p.
Christopher Sheahan 2014. Coastlines Winter Newsletter. Cape May, NJ. Winter 2014. 3p.
Christopher Sheahan, Scott Snell, Chris Miller 2013. 2012 Annual Technical Report. NJ. 2012. 27p.
Christopher Sheahan and Scott Snell 2013. 2012 Progress Report of Activities. Cape May Courthouse. 2012. 6p.
Christopher Sheahan 2013. *Cajanus cajan* Plant Guide. Cape May Courthouse, NJ. February 2013. 4p.
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Christopher Sheahan 2013. *Crotalaria juncea* Plant Guide. Cape May Courthouse, NJ. February 2013. 4p.
Christopher Sheahan 2013. *Lablab purpureus* Plant Guide. Cape May Courthouse, NJ. February 2013. 3p.
Scott Snell 2013. Notice of Release of Southampton Germplasm Prairie Cordgrass. Cape May Plant Materials Center, Cape May Court House, NJ. 2013. 9p.
Christopher Miller, Dr. Curtis Dell 2013. Quantifying the Role of Native Warm Season Grasses in Sequestering Soil Organic Carbon. 8th Eastern Native Grass Symposium, Charlottesville, VA. October 2012. 1p.
Scott Snell 2013. Southampton Germplasm prairie cordgrass. Cape May PMC, Cape May Court House, NJ. 2p.
Christopher Miller 2013. The Evolving Understanding of Grassland Restoration Seeding Protocols. Ecological Restoration, Madison, WI. June 2013, Vol.31:127-129. 3p.
Christopher Sheahan 2013. *Vigna unguiculata* Plant Guide. Cape May, NJ. 2013. 3p.

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