Plant Materials Long Range Plan
Brooksville Plant Materials Center Service Area
2011 – 2015

I. Introduction

The mission of the NRCS Plant Materials Program is to "*Deliver plant science technology to meet the Nation's natural resources conservation needs."* The strategic goals of the National Plant Materials Program are to: 1) Identify and evaluate plants and develop technology for their successful establishment and maintenance in order to solve natural resource conservation problems, which include improving air and water quality as well as enhancing wildlife resources; 2) Provide plant materials and plant technology that are economically feasible for solving conservation problems; and 3) Provide equal access to the Plant Materials Program to all Americans.

The Plant Materials Long Range Plan (LRP) identifies and prioritizes customer, resource, and program needs for the Brooksville, FL Plant Materials Center (PMC) service area. The LRP presents proposed action items to address identified conservation needs and supports the Agency's strategic plan.

II. Long Range Plan Development

The LRP was developed in accordance with the revised National Plant Materials Manual, Part 540.01. The plan is intended to be used as a guide for directing plant materials activities within the Brooksville, FL PMC service area which includes Florida, Puerto Rico, the U.S. Virgin Islands, and the coastal areas of Alabama, Georgia, and South Carolina. This plan will be used to develop a LRP for the Brooksville, FL PMC. This plan also serves as a reference to develop specific action items to be incorporated within PMC's annual Business Plan.

The list of identified customer, resource, and program needs was developed by the Brooksville Plant Materials Technical Advisory Committee, which is comprised of both NRCS employees and non-NRCS partners who have an interest in plant materials work (see Appendix A). Additional input was provided by either the State Resource Conservationists and/or the Plant Materials Specialist for Puerto Rico. Reference materials were used to help identify and prioritize conservation needs (see Appendix B). Conservation needs are categorized by NRCS goals as listed in the Natural Resources Conservation Service 2005-2010 Strategic Plan (http://www.nrcs.usda.gov/about/ strategicplan/#strategic%20plan

III. NRCS Objectives, Needs, Recommended Actions

A summary of conservation needs and recommended actions is provided in Table 1.

NRCS Foundation Goal: High Quality, Productive Soils

1. Cover crops are grown for a variety of reasons such as to protect the soil surface from wind and water erosion; to suppress weed, diseases, and pest development between crops; and, particularly in the case of leguminous cover crops, to improve soil organic matter and fertility. Sunn hemp (*Crotalaria juncea*) is such a crop. It is one of the most popular green manures for organic nitrogen in many tropical and subtropical areas of the world. In the U.S., there is interest in rotating sunn hemp with cotton in the southern United States because of its ability to directly suppress plant-parasitic nematodes. Little is known about the use of sunn hemp outside of the southern US. Expanded demand for sunn hemp seed would stimulate the development of a seed production industry in such areas as Puerto Rico or Central America where seed production is possible. In addition to more information on use, there is a need to develop appropriate technology for seed production in these new production areas.

Recommended Action: Expand existing information on the value of sunn hemp for use in the US via national sunn hemp study. Develop appropriate technology for commercial seed production in Puerto Rico. Transfer this information to identified customers.

Priority: Medium

2. Prior to the advent of cheap, readily available, synthetic nitrogen fertilizer in the mid-1900s, the US, like agricultural systems worldwide, was primarily dependent on biological nitrogen fixation that occurs in legumes for nitrogen inputs. By the start of the 21st century, issues with overproduction, soil erosion, water quality, expansion of organic food production, and increased energy costs have reawakened interest of US producers in legumes as a component of sustainable farming systems. The technology for production of legumes for direct consumption by humans or animals has never been lost, but the applied science of using legumes as a means for maintaining or enhancing soil fertility for subsequent crops, in large part, has been forgotten. Annual legumes grown during certain times of the year as cover crops or green manures on cultivated fields or overseeded on perennial grass pastures are examples of old techniques that are being revisited.

   Recommended Action: Review and summarize old literature on the use of legumes as a nitrogen sources. Demonstrate usefulness of legume cover crops or green manures for cropping systems. Develop management systems that facilitate the re-establishment of annual legumes in perennial grass pastures. Transfer technology.

   Priority: Medium

NRCS Foundation Goal: Clean and Abundant Water

Animal farming has become a major source of pollution and environmental degradation in the Southeast and the Caribbean. In the past 20 years, this is particularly true for the dairy industry, where land use pressures and population demand for milk products have necessitated increased intensification of production. Livestock production, particularly confined animal feeding operations, can result in adverse water quality impacts due to improper manure management. Recent studies in Puerto Rico showed that >80% of the dairy paddocks that received manure applications exceeded agronomic recommended rates of P, resulting on average about 150 lb/acre/year in excess P. Plant materials and management system are needed that take up high levels of P in areas where soil P levels are already an issue. Additionally, plant materials and management systems that better meet the nutritional requirement of high producing dairy cattle are needed to reduce P inputs from supplemental concentrate feeds.

Recommended Action: Identify and evaluate plant materials that are suitable for dairy animals that mitigate high soil P levels. Develop grazing management and forage harvesting systems that better meet year round nutritional requirements of dairy cattle.

Priority Ranking: High

NRCS Foundation Goal: Healthy Plant and Animal Communities

1. Livestock producers throughout the United States need better forage systems to reduce input costs and protect environmental quality. This is particularly true in the 25 million acres classified as grazingland in the subtropical (23.5 - 30° N Lat) United States due to climatically mediated dependence on tropical forages. This area supports about 30% of the U.S. beef herd. Livestock production efficiency in this area of the country suffers from a combination of periods of limited forage availability (quantity of feed) and low nutritional value (quality of feed). Identification of cool season grasses adapted to this

region would greatly reduce winter feeding costs. Additionally, tropical grasses, such as hybrid bermudagrasses (*Cynodon dactylon*), require high nitrogen inputs to maintain plant vigor and productivity. Although highly productive in terms of total forage production, the long term sustainability of such pasture systems, with increasing fuel and fertilizer costs, is questionable. Utilizing legumes in pasture systems is one method of improving livestock production. The need exists to identify better adapted cool and warm season forage species, particularly native legumes and grasses with higher nutritional value.

Recommended Action: Adapted plant material needs to be identified and evaluated. Establishment and management techniques need to be determined for identified plant material. Information needs to be made available to customers to foster decision making.

Ranking: Medium

2. Invasive plant species threaten the productivity of forest and grazinglands throughout the region. Of particular importance are such species as cogongrass (*Imperata cylindrica*), venezualagrass (*Paspalum fasciculatum*), tropical soda apple (*Solanum viarum*), and tall albizia (*Albizia procera*). All of these species rapidly colonize disturbed or abandoned range or cropland areas and inhibit the establishment of more productive grassland or rangeland plants. For example in Florida, tropical soda apple was first collected in 1988, and in less than 20 years is now a common weed on 500,000 acres of pastures, roadsides, ditchbanks, cultivated land and natural areas. If left un-checked, invasive species can become so widespread as to be considered naturalized. In Puerto Rico such is the case with tall albizia, a leguminous tree species that was introduced in the early 1900s. It is an aggressive colonizer of abandoned farmland, pastures, and roadsides. For many invasives that are established over large areas, chemical control alone has not proved very successful. Strategies which combine chemical or mechanical methods to essentially eradicate the invasive species and the planting of more desirable species, particularly natives, that compete with the remaining invasive population for light and nutrients can be an effective, though expensive, way to reduce the likelihood of exotic species reinvasion following removal of non-native species. The need exists to identify plant material that can be used as management tools for the control of invasive species and to determine the most effective ways to utilize plant materials to enhance the control of invasive species.

   Recommended Action: Additional plant materials need to be identified and evaluated. Establishment and management techniques, such as appropriate seeding rates and the use of cover crops prior to native plant establishment, needs to be determined and technology transferred.

   Ranking: High

3. Insects make up 99% of the more than 200,000 species (e.g., insects, birds, and bats and other mammals) that act as pollinators. When most people think of insect pollinators, they think of bees, in particular honeybees, but certain types of flies, beetles, moths, and butterflies are also important. The common honeybee, a species introduced to North America by the European settlers, has been managed by humans for centuries for its pollination benefits, honey, and other products. In recent years, populations of the European honeybee have declined by over 50% worldwide due to diseases and pests. Because of the simplicity of exploiting European honeybees, the importance of native pollinators to North American ecosystems and agriculture has been overlooked. Studies have shown that adequate populations of native pollinator species, particularly native

bee species, can provide 100% of the pollination activity needed for many farm crops. It has been estimated that wild, native bees pollinate over $3 billion worth of crops in the United States each year. Unfortunately, destruction and fragmentation of pollinator habitat by human activity has resulted in sharp declines in the populations of North American native pollinator species. New language in the Food, Conservation, and Energy Act of 2008 (the Farm Bill), makes preservation and restoration of pollinators and their habitat a priority for every USDA land manager and conservationist.

Recommended Action: Summarize and transfer existing technological information regarding pollinator food sources and habitat requirements. Identify, collect, and evaluate suitable native plant materials to improve pollinator habitat. Investigate propagation techniques, establishment methods, and maintenance requirements.

Priority Ranking: High

4. Florida is one of the world's largest producers of phosphate rock, accounting for approximately 75 percent of the United States' supply and 25 percent of the world's supply. This is because a layer of phosphate deposits, fairly close to the soil surface, covers much of peninsular Florida. By 1999, approximately 300,000 acres of land, or more than 460 square miles, have been mined. Wildlife in those areas have suffered because much of this area being revegetated with non-native plant species such as bahiagrass (*Paspalum notatum*) or encroachment of invasive species such as cogongrass (*Imperata cylindrica*). Mining operations now are mandated by law to have a reclamation plan that is submitted to the DEP and other local, state and federal agencies for approval. Technical issues associated with reclamation include hydrology, water quality, wetland and other wildlife habitat replacement and mitigation, native vegetation establishment, and exotic weed control. One of the deterrents to greater use of native vegetation, particularly in the uplands, is the cost. The high cost is associated with lack of seed sources and poor establishment success. There is a need to transfer native seed production technology and for improved establishment technology.

   Recommended Action: Transfer seed production techniques for native seed nurseries. Develop establishment technology to ensure greater likelihood of seeded native stands meeting customer needs in a timely, cost efficient manner.

   Priority Ranking: High

NRCS Foundation Goal: Clean Air

The importance of air quality to NRCS is demonstrated by supporting a national staff dedicated to air quality based at the West National Technology Support Center, development of an on-line Voluntary Reporting Carbon Management Tool (Comet), listing air quality as a national priority in the Environmental Quality Incentive program (EQIP) and Conservation Innovation Grants (CIG) program, as well as creation of national enhancements for addressing air quality in the Conservation Stewardship Program (CSP). Specific air quality concerns for NRCS are 1) minimizing emission of soil particulates (PM 2.5 and PM 10) resulting from agricultural activity; 2) minimizing odor and VOC (Variable Organic Compound) emissions to the environment, resulting from some agricultural activities; and 3) increasing the ability of agricultural lands to sequester soil carbon. Plants, particularly cover crops, are a key component in accomplishing goals one and two. Cover crops can reduce or eliminate PM 10 emissions and sequester carbon. Information concerning selection and species differences are needed for the different areas of the country.

Recommended Action: Summarize existing information on suitable plant materials and accompanying technology for use in appropriate conservation practices. Collaborate with university and other federal agencies in technology development.

Priority Ranking: Medium

NRCS Venture Goal: An Adequate Energy Supply

Due to recent increases in petroleum-based fuel costs, interest in biomass feedstocks to produce power, liquid fuels, and chemicals for the US is increasing. Biomass feedstocks fall under five general categories: forest residues, mill residues, agricultural residues, urban wood wastes, and dedicated energy crops. Dedicated energy crops include herbaceous crops and short rotation woody species. It is estimated that Florida could produce over one million tons of dry matter from dedicated energy crops. As with other production agricultural enterprises that utilize plants, they are generally more economically efficient if they are based on plant species or selections that are adapted to a specific geographic area. For example, switchgrass (*Panicum virgatum*) is a native grass species widely evaluated for use as a dedicated energy crop in the US because of its wide zone of adaptation and relatively high dry matter production under low fertilizer inputs. The Brooksville, FL, PMC has released three selections of switchgrass that have been shown to produce more dry matter under Florida conditions than selection that originated outside the state. Additionally due to the subtropical/tropical environment of Florida and Puerto Rico, crops such as sugarcane may be more practical than switchgrass. There is great interest in Puerto Rico about using sugarcane-based ethanol production to revive the depressed sugarcane market. It is estimated that approximately 1.2 billion gallons of gasoline are used annually in Puerto Rico, simply replacing the MTBE additive in that gasoline with a 10% ethanol blend would support the construction of a biomass/soluble sugar-based plant on the island.

Recommended Action: Continue cooperative biofuel projects, summarize existing information on plant materials as biofuels, and transfer information to identified customers.

Priority Ranking: Medium

NRCS Venture Goal: Working Farm and Ranch Lands

According to the 2002 Census, the national farmland base declined 7.8% in the 28-yr period from 1974 to 2002. In Florida, the rate of farmland loss was about 21% over the same time period. Loss of agricultural land raises concerns about dependency on foreign suppliers for food products from multiple perspectives including supply, food safety, and national security. Loss of agricultural land also raises concerns regarding agriculture remaining a viable industry in local economies and the desire for open spaces in and around high density population centers. Various policies have been adopted in Florida at state, county, and municipal governments to address concerns with agricultural land retention. But international and global conditions that affect agricultural inputs and prices impact such policies and their ability to ensure profitable or sustainable agriculture. Regardless of the policy, when traditional production systems become unprofitable, continued agricultural production cannot be ensured. Development of plant resources, such as native wildflowers and grasses, to supply niche market demands such as roadside beautification, wildlife habitat, and ecosystem restoration potentially offer much higher return per acre and thus retention of land in agricultural production. These crops would be particularly suitable for resource-limited producers. Plant material needs to be identified and evaluated, and establishment techniques need to be developed.

Recommended Action: Summarize existing information on plant materials as alternative crops for niche markets and transfer information to identified customers. Identify and evaluate locally suitable plant materials and determine establishment and production techniques.

Priority Ranking: Medium

NRCS Management Goal: Ensuring Civil Rights

An important part of the NRCS Strategic Management Plan is addressing civil rights issues. As part of this plan, activities of the Plant Materials Program need to be reviewed on a regular basis to determine if any systematic barrier exists that may result in disparate treatment of minority or small-scale and limited-resource groups. The groups should be identified and steps taken to assure that no barrier exists and determine what steps need to be taken to reach these groups to ensure that they are aware of our services.

Recommended Action: Working with the NRCS Outreach Coordinator and DCs, identify specific landowners/users that are representative of the diversity of the state, and establish demonstrations using plant materials and technologies on their properties.

Priority Ranking: High

NRCS Management Goal: Human Capital

Many NRCS employees have had limited exposure to the Plant Materials Program. Their understanding of the programs and the services available is severely limited. This lack of understanding hinders the effectiveness of the program in meeting employee, resource, and program needs. The need exists to provide awareness training to NRCS and other non-NRCS partners regarding the purpose and function of the Plant Materials Program.

Recommended Action: Develop an outreach training effort to provide awareness training of the Plant Materials Programs for NRCS employees and partners.

Priority Ranking: High

Appendix A. Listing of Florida State Committee Members

- Greg Hendricks, Chairperson, State Resource Conservationist, Gainesville, FL
- M.J. Williams, Plant Materials Specialist, Gainesville, FL
- Janet Grabowski, Plant Materials Center Manager, Brooksville,FL
- Mary Anne Gonter, Biological Technician (Plants), Brooksville, FL
- Edwin Más, Plant Materials/Grazing Lands Specialist, Mayaguez, PR
- Oghenekome Onokpise, Florida A&M University, University, FL
- Gary Knox, North Florida Research and Education Center, Quincy, FL
- Rosemarie Garcia, Mosaic, LLC, Fort Lonesome, FL
- Casey Beavers, Environmental Specialist, FL DEP, BMMR, Homeland, FL
- Steve Melton, Commercial Grower, Dade City, FL
- Andy Hopkin, Grazingland Specialist, Marianna, FL
- Ron Mathews, Soil Conservationist, Live Oak, FL
- Carlos Torres, District Conservationist, Sebring, FL
- Pete Deal, Rangeland Management Specialist, Kissimimee, FL
- Kim Mortimer, Florida Fish and Wildlife Conservation Commission, Lakeland, FL
- Mary Schneider, Nursery Production and Extension Educator (retired), Homestead, FL
- Gilbert Sigua, Res. Soil Scientist, USDA, ARS, STARS, Brooksville, FL
- Elide Valencia, University of Puerto Rico, Mayagüez, PR
- Tommy Socha, U.S. Army Corps of Engineers, Charleston, SC

Appendix B. Listing of References

- Florida Natural Resources Inventory Data (NRI)
- EQIP Priority Area Resource Inventory Data
- Florida Soil Surveys
- GLCI Florida Summary Data for Range Health Report
- Florida Nonpoint Source Inventory and Assessment Report
- Florida NRCS Field Office Technical Guide
- Florida Watershed Study Report for Riparian Health
- University of Florida, EDIS
- Florida Agriculture Statistics
- University of Puerto Rico (http://grad.uprm.edu/tesis/torresmelendez.pdf)

- Giller, K. E., and G. Cadisch. 1995. Future benefits from biological nitrogen fixation: An ecological approach to agriculture. Plant and Soil 174:255-277.
- Lal, R., R.F. Follett, B.A. Stewart, and J.M. Kimble. 2007. Soil carbon sequestration to mitigate climate change and advance food security. Soil Sci. 172:943-956.
- Marks, R. 2005. Native Pollinators. USDA, NRCS Wildlife Habitat Mange. Inst. Fish Wildlife Manage. Leaflet No. 34. (ftp://ftpfc.sc.egov.usda.gov/WHMI/WEB/pdf/TechnicalLeaflets/NativePolinators.pdf)
- Vaughan, M., and M. Skinner. 2008. Using Farm Bill Programs for Pollinator Conservation. USDA, NRCS Tech Note No. 78. (http://plants.usda.gov/pollinators/Using_Farm_Bill_Programs_for_Pollinator_Conservation.pdf)

Table 1 Summary of Needs and Action Taken

Problem	Plant Materials Needs	Ranking Priority	Action Planned: Evaluate Existing Technology	Action Planned: Transfer Existing Technology	Action Planned: Develop New Technology
NRCS Foundation Goal: High Quality, Productive Soils					
Cropland productivity in US is declining due to loss of soil organic matter.	Determine usefulness of sunn hemp on a nationwide basis and integrate this information into existing cover crop technical information.	Med	X	X	
High fossil fuel costs have made the use of synthetic N sources too expensive for most pasture-based farming systems.	Develop technology that ensures the successful introduction of legumes into pasture-based and traditional farming systems.	Med	X	X	
NRCS Foundation Goal: Clean and Abundant Water					
Animal farming, particularly the dairy industry, has become a major source of pollution and environmental in the Southeast.	Identify and evaluate plant materials and technology that can be used to mitigate high soil P levels.	High	X	X	X
NRCS Foundation Goal: Healthy Plant and Animal Communities					
Productivity of livestock dependant on grazinglands in tropics and subtropics is limited by low nutritional value of warm season grasses that dominate grazingland in those areas.	Identify and select grasses and legumes, particularly native species, that better meet the nutritional requirements of grazing animals and that are adapted to the tropics and subtropics.	Med	X	X	X
Invasive plant species threaten the productivity of forest and grazinglands throughout the region.	Identify and select plant materials, particularly native species, determine establishment and management techniques such as cover crops prior to establishment of permanent vegetation, and transfer technology.	High	X	X	X
Pollinator populations nationwide are threatened due to habitat losses.	Summarize and transfer existing plant materials and technology information. Identify and evaluate locally adapted grasses, legumes, and forbs that meet food and habitat requirements of various pollinator species.	High	X	X	X
Conventional mineland restoration efforts have centered on non-native plants in large part due to lack of native plant materials, particularly for wetland situations.	Develop and transfer seed production and establishment technology for important native grasses and forbs for wetland and upland restoration.	High	X	X	X

Table 1 Summary of Needs and Action Taken (Cont'd.)

Problem	Plant Materials Needs	Ranking Priority	Action Planned: Evaluate Existing Technology	Action Planned: Transfer Existing Technology	Action Planned: Develop New Technology
NRCS Foundation Goal: Clean Air					
NRCS air quality concerns include reducing production of soil particulates associated with agricultural activity, reducing odor and VOC, and increasing the ability of agricultural lands to sequester carbon.	Evaluate and transfer existing plant materials and technology information. Collaborate with universities other cooperators in technology development.	Med		X	X
NRCS Venture Goal: An Adequate Energy Supply					
Rising petroleum-based fuel costs have stimulated interest in bio-mass feedstocks to produce power, liquid fuels, and chemicals for the US is increasing.	Evaluate and transfer existing plant materials and technology information.	Med	X	X	X
NRCS Venture Goal: Working Farm and Ranch Lands					
Low return on investment of conventional agricultural enterprises results in job loss and hastens conversion of farmland to non-agricultural uses.	Identify, evaluate, and select plant materials that produce high value products for niche markets such as wildflower and native grass and legume seed production.	Med		X	X
NRCS Management Goal: Ensuring Civil Rights					
Some minority groups and limited-resource farmers may not be serviced equitably.	Work with Outreach Coordinator and field personnel to identify underserved groups and individuals.	High		X	
NRCS Management Goal: Human Capital					
Lack of understanding of the plant materials program by NRCS and partners.	Develop outreach materials and training efforts to enhance awareness for NRCS and partners.	High		X	