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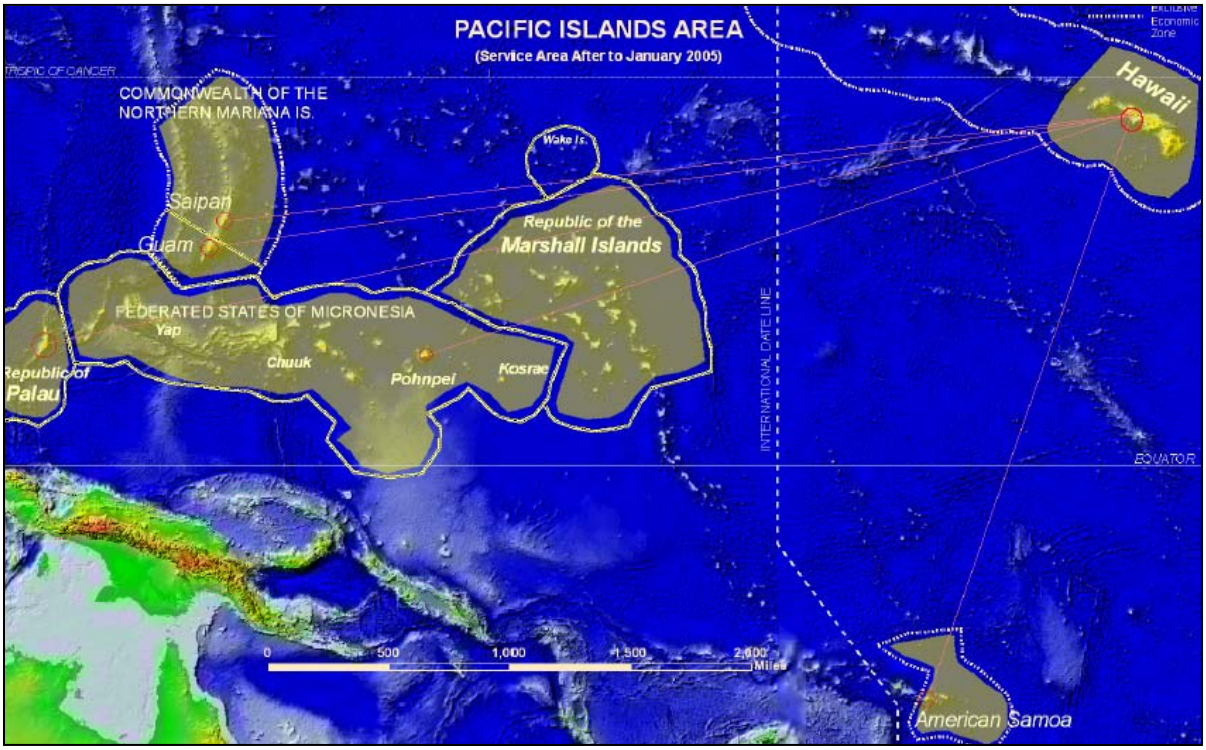
NRCS Natural Resources Conservation Service

Plant Materials Long Range Plan

for the Pacific Islands Area



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PLANT MATERIALS LONG RANGE PLAN FOR THE PACIFIC ISLANDS AREA

Introduction

This Long Range Plan is designed to effectively serve the Natural Resources Conservation Service (NRCS) clients in the Pacific Islands Area. The plan is the result of a questionnaire sent to each NRCS Field Office and based on the needs as expressed by Field Office personnel in consultation with Conservation Districts and other partners.

Description of the Area

The Pacific Islands Area is vast and consists of many islands making up Hawaii, Guam, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia, the Republic of Palau (Belau), the Republic of the Marshall Islands, and American Samoa. The islands range in latitude from approximately 22 degrees north (Hawaii) to 14 degrees south (American Samoa) of the equator. Distances between the islands can be great. For example, the approximate number of miles between Hawaii and some of the other islands is as follows: American Samoa - 2,600; Guam - 3,800; and Palau - 4,600. The islands are located in the Pacific Ocean, although Guam, the Northern Marianas, Yap, and Palau are bordered on the west by the Philippine Sea.

The islands owe their shape primarily to volcanic building and have been modified by erosion under strongly localized conditions. Elevations range from sea level to more than 13,000 feet. Topography ranges from flat to very steep. Soils are derived from volcanic ash, lava, eruptive deposits of tuff and cinders, and limestone and alluvial deposits form coral reefs. Age and a variety of parent material plus variation in rainfall have resulted in a complexity of soils.

The climate varies according to geographic area and elevation. Variations in temperature at a specific location are small throughout the year. Generally speaking, rainfall and wind conditions define the seasons. Some entire islands, and portions of islands such as the leeward sides, have distinct dry seasons making irrigation necessary for optimum growth of crops. Annual rainfall ranges from approximately 10 inches to over 390 inches, depending on location. Typhoons or hurricanes are fairly common during certain times of the year. These storms bring violent winds and flooding which can cause severe damage to vegetation and structures and threaten human life.

Land use is diverse and comprises many acres devoted to grazing, sugar cane, macadamia nuts, coffee, bananas, hybrid corn seed and diversified crops. There are many relatively small to medium size commercial and subsistence farms. Some of the products they produce include livestock, bananas, taro, yams, betel nuts, coconuts, papayas, citrus, mangoes, breadfruit, kava, cacao, cassava, sweet corn, cabbage, bittermelon, sweet potatoes, and ornamentals. Agroforestry techniques are used by some farmers.

When the effects of topography, soils, climate, and land use are combined, the problems concerning plant materials needs in the Pacific Islands Area become varied and complex.

Plant Materials Program

The NRCS provides specialized assistance in plant materials from the Plant Materials Specialist and Plant Materials Center (PMC) as part of its coordinated natural resources conservation program. A part of the plant materials activities of the Service is carried out at the PMC, Hoolehua, Molokai, Hawaii. The PMC has been established to provide a facility for effectively and systematically conducting needed observations and evaluations of plant materials to meet the needs of the natural resource conservation programs for the Pacific Islands Area. All plant materials work is conducted with the full cooperation of associated agencies. Testing is conducted in Hawaii, Guam and American Samoa in cooperation with the University of Hawaii, University of Guam, and the American Samoa Community College, Land Grant Program.

Major Objectives

1. To select and develop new or improved species, cultivars, and strains of grasses, legumes, forbs, and shrubs for use in natural resource conservation programs.

2. To develop techniques for propagation, establishment, management, and use of promising new or improved plants.

3. To produce seeds and plants of promising new or improved plant selections for evaluation of these species on clients' lands and with cooperating agencies.

4. To produce and provide seeds or plants of proven new or improved species, cultivars or strains so these accessions may be made available for commercial production.

5. To provide information gathered on superior new plants, commercial cultivars, and cultural techniques to NRCS Field Offices and others through plant guides, fact sheets, technical guides, and other means of communication.

Primary Functions

1. Assembly: Plant materials having potential for solving the needs of the area, as set forth in the Long Range Plan, are assembled on the PMC from local collections, other plant materials centers, plant breeders, universities, commercial seed companies, and others.

2. Initial observation: Plantings of assembled materials are made on the PMC and growth characteristics of these accessions are compared each other and to the standards now in use. Plants with better characteristics than the standard are selected for further testing.

3. Initial increase: Small increase plantings are made on the PMC of accessions selected from initial observation to provide sufficient planting material for further testing.

4. Secondary testing: Further observations and comparisons to the standard are made using appropriate techniques. These plantings are made on and off the PMC. Information on establishment, management, and seed production is gathered. Plants that continue to exhibit better characteristics than the standard are selected for further testing.

5. Large scale increase: Large increase plantings are made on the PMC of accessions selected from secondary testing to provide sufficient material for final testing in field-size plantings on clients' lands and, when plants are formally released, for commercial increase.

6. Field Plantings: The final step in testing under actual use conditions on farms and ranches. Field Plantings are the responsibility of the Plant Materials Specialist and Field Office personnel. In addition to testing, Field Plantings serve to demonstrate the new plant.

7. Release of the new improved plant: Plants superior in Field Plantings are named and formally released in cooperation with the University of Hawaii and other agencies. Seed and plants are made available for commercial production.

8. Commercial increase: The PMC provides seed or vegetative material of officially released plants to growers for planting increase fields. Commercial growers play a vital role in making the new cultivars available on the commercial market for purchase by farmers, ranchers and others and for rapidly moving an improved plant into standard use.

Plan of Action

Native plants will be selected to solve the high priority plant materials problems and needs whenever possible. Some native plants may require special consideration to maintain their genetic integrity. It may be necessary to identify sources of natives on each island for propagating and planting on that island. Some indigenous species are already well-distributed throughout most of the Pacific Islands Area and could be commercially produced and made available to the public.

The use of plants not commonly found in the Pacific Islands Area will be limited to those that are non-aggressive, sterile or non-seed producers. Commercially available plants will be tested at the PMC and in Field Plantings. This should accelerate the search for better plants, particularly for uses such as cover crop/green manure and living mulch.

Priority Plant Materials Problems and Needs

1. Source of Seed and Vegetative Materials for Plants Recommended in the Technical Guide.

   Problem: Although there is a need for new and better plants, there are good plants available for many areas. The maximum use of plants presently recommended is limited by the lack or unreliability of commercial seed sources. The problem is compounded by import regulations.

Need: Readily available sources of seed and vegetative material. These materials would be of proven plants for approved conservation practices.

Action: Commercial seed and plant production of the NRCS releases will continue to be encouraged. Efforts will continue to achieve closer cooperation with local and Mainland seed dealers, universities, the USDA Animal and Plant Health Inspection Service (APHIS), the Hawaii State Department of Agriculture (HDOA), and others in the Pacific Islands Area to expedite seed importation.

2. Living Mulch for Cultivated Crops

Problem: Maintaining soil fertility and controlling soil erosion is difficult when producing diversified crops on tropical soils using conventional clean culture. Much of the land is sloping and erosion control structures are costly to build and maintain. Field access and soil compaction are also problems when growing diversified crops under clean culture.

Need: Plants for use as living mulch and techniques to produce vegetable and other crops under living mulch culture.

Action: Develop a culture whereby the living mulch will not reduce crop yields, but will compete against weeds and be adapted to mowing. Stunting the living mulch using low rates of herbicides may be necessary. Cooperation with the University of Hawaii will continue and the possibility of a CIG project to demonstrate techniques developed to date will be explored.

3. Windbreaks for Crop Lands

Problem: Many areas of cropland are subject to frequent strong winds. Velocities of 10 to 25 miles per hour or more may be expected much of the time. Permanent and semi-permanent windbreaks are needed on much of this land. Fire may destroy certain tree species that do not have the capacity for renewal after being burned. Typhoons or hurricanes destroy crops during certain times of the year. The problem has been compounded by the attack of the erythrina gall wasp on ‘Tropic Coral’ tall erythrina (tall wiliwili) because it has become the most popular windbreak tree for crop lands in the Pacific Islands Area, East.

Need: Rapidly growing, compact plants for windbreaks. These plants could be used as primary windbreaks and for crops requiring additional windbreaks in fields already planted to windbreak trees. They should have the capability of withstanding severe storms and fire. They should take up a minimum of space, produce a minimum of root competition, and have a low maintenance requirement. There is a need for windbreaks for farmsteads, feedlots, and other

areas. Windbreak plants that produce edible or useful products would be more acceptable to farmers as they have expressed a need for multi-purpose windbreak species.

Action: Trials with panax using various cultural techniques to achieve maximum growth rates will continue. Cooperation with HDOA will continue on the control of the erythrina gall wasp. *Bambusa*, *Polyalthia*, *Garcinia*, and other species will be tested to determine their effectiveness and practicality as farm windbreaks.

4. Cover Crops in Orchards

Problem: A large percentage of the orchards are on sloping land. Suitable species for conservation cover are needed to prevent soil loss. Rank-growing weedy species naturally establish themselves in many orchards and their control is expensive.

Need: Plants that are easy to establish, make rapid initial growth, are easy to manage, shade tolerant, require low maintenance, add nitrogen and organic matter, and do not interfere with harvesting operations.

Action: Species with the desired growth characteristics will be assembled and tested. Grass-legume combinations will be evaluated.

5. Plants for Bioengineered Solutions to Stream and Slope Problems.

Problem: Rapid establishment of permanent vegetative cover on critical areas such as streambanks, roadsides, and steep hillsides is often difficult because of erosion, infertile soil, and unfavorable water relations. Streambank protection is becoming increasingly important and plants that are easily propagated and established are needed.

Need: Plants that establish and maintain themselves under adverse conditions of low fertility, fluctuating soil moisture, and minimum maintenance. They should establish rapidly and have good root structure and strength.

Action: Non-invasive species will be tested for their ability to establish using the live fascine and other techniques. Emphasis will be placed on native plants.

6. Plants and Techniques to Control Invasive Species.

Problem: Undesirable plant species have invaded grazing and other lands, lowering their productivity. In addition, these plants consume precious moisture and are generally not as well suited for controlling erosion as other more desirable species.

Need: Plants and techniques to control the undesirable species in pasture, range, and other lands. Plants that are palatable yet are able to compete and grow well with weedy species are needed.

Action: Experimentation with high seeding rates of native and other desirable plants to provide cover when invasive species are removed. High seeding rates may provide a dense cover of desirable species that will be competitive and not allow the undesirable species to return. Where grazing animals are involved, pasture and range management issues will be addressed.

7. Plants for Agroforestry

Problem: Farmers interested in practicing agroforestry are in need of suitable plants. Agroforestry systems provide a sustainable form of agriculture through the simultaneous culture of crops or animals in combination with trees and shrubs. For example, a type of agroforestry consists of planting hedges of nitrogen fixing trees spaced at specific intervals and growing crops in the alleys between the hedges. The hedges are trimmed to mulch the crop plants, providing nutrients and conserving soil and moisture. Windbreak, fodder, fuel, shade/nurse crops, natural chemical products, wood, and food products are other uses for trees and shrubs in the agroforestry system.

Need: Trees and shrubs that are easily established, grow rapidly, re-grow well after cutting and are high in nitrogen and/or provide a useful product.

Action: Field Plantings will continue with *Gliricidia*, hybrid *Leucaena,* and other non-invasive nitrogen-fixing trees. Trials will be conducted to demonstrate the various agroforestry technologies.

8. Improved Pasture and Range Grasses and Legumes.

Problem: Plant species in many pastures are unpalatable, weedy types which are mainly the result of overgrazing and low soil fertility. Few useful legumes are present in most pastures.

Need: Grasses and legumes adapted to low and relatively high rainfall, low soil fertility, and low and relatively high soil pH. They should be nutritious, palatable, and recover rapidly after grazing.

Action: Newly released cultivars such as ‘Mulato’ signalgrass will be tested. Results from trials on Palau, Guam, and Saipan will guide future work in those areas.

9. Cover/Green Manure Crops

Problem: Continuous cultivation destroys soil structure and reduces water infiltration and aeration. Diseases and insects tend to increase under continuous cultivation. The increasing popularity of organic farming and the CSP also increases the need for cover crops to improve soil quality. All farmers wishing to decrease chemical fertilizer and pesticide input are in need of cover/green manure crops.

Need: Soil improving crops that will add organic matter and nitrogen and reduce soil insect and disease pests. The plants should be rapidly growing to compete with weeds and should be non-toxic. Cover crops that will reduce soil nematode populations are especially needed.

Action: Root-knot nematode resistant cultivars that will add organic matter to the soil such as 'Cahaba' white vetch, mustard, and rapeseed will be tested.

10. Vegetative Barriers

Problem: Constructed terraces and other similar methods to control erosion are often costly and require large machinery to construct. They can make farming operations difficult and must be maintained or they lose effectiveness over time. They may also take a substantial amount of land out of crop production. In addition, some of the farmland is too steep to construct terraces.

Need: Plants that form a tight hedge and have stiff stems that will slow water flow causing silt to be deposited and form a natural terrace over time. Plants with a strong and relatively deep root system that will improve water infiltration are needed. Trials are needed to demonstrate the vegetative barrier practice.

Action: Field Plantings with vetivergrass will continue to demonstrate its effectiveness. Native and other non-invasive species will be tested. Stiff-stemmed grasses are generally considered the most suitable plants for vegetative barriers. Methods to propagate vetiver more efficiently will be explored.