

United States Department of Agriculture
Natural Resources Conservation Service
Hoolehua, Hawaii

HOOLEHUA PLANT MATERIALS CENTER LONG RANGE PLAN 2006-2011

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HOOLEHUA PLANT MATERIALS CENTER LONG RANGE PLAN

I. Introduction

The mission of the Plant Materials Program is to develop and transfer effective state-of-the-art plant science technology to meet customer and resource needs. The purpose of the Plant Materials Program is to carry out specialized activities in resource conservation, as part of the overall program of the Natural Resources Conservation Service (NRCS). It is the responsibility of the Plant Materials Center (PMC) to: 1) assemble, test, and release plant materials for conservation use, 2) determine techniques for the successful use and management of conservation species, 3) facilitate the commercial increase of conservation species, 4) provide for the development and transfer of state-of-the-art applied science technology.

This Long Range Plan (LRP) identifies, guides, and directs Hoolehua PMC operations toward solving high-priority resource problems identified throughout the Pacific Island Area (PIA).

II. Long Range Plan Development

The Hoolehua PMC LRP is consistent with goals and objectives identified in the NRCS Strategic Plan and were developed to address high-priority resource problems as identified in the PIA Plant Materials LRP. This LRP was developed in accordance with the revised National Plant Materials Manual, Part 540.22. Needs are categorized by the NRCS Goals and Objectives as listed in the revised National Plant Materials Manual, Exhibit 539-1 (NRCS Goals and Objectives).

III. General Description of the Service Area

Pacific Islands Area

The Pacific Islands area consists of two sub-areas: The East Area and the West Area. The East Area includes the State of Hawaii and American Samoa. The West Area, formerly called the Pacific Basin, includes the Territory of Guam, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Republic of Palau, and the Republic of the Marshall Islands.

Climate

The climate varies according to geographic area and elevation. Variations in temperature at a specific location are small throughout the year. Generally, 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 as well as threaten human life.

Topography

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 from coral reefs. Age and variety of parent material plus variation in rainfall have resulted in a complexity of soils.

Major Land Resource Areas

The Pacific Islands Area includes 21 Major Land Resource Areas (MLRAs) which are geographically associated land resource units. MLRAs include the following:

EAST AREA

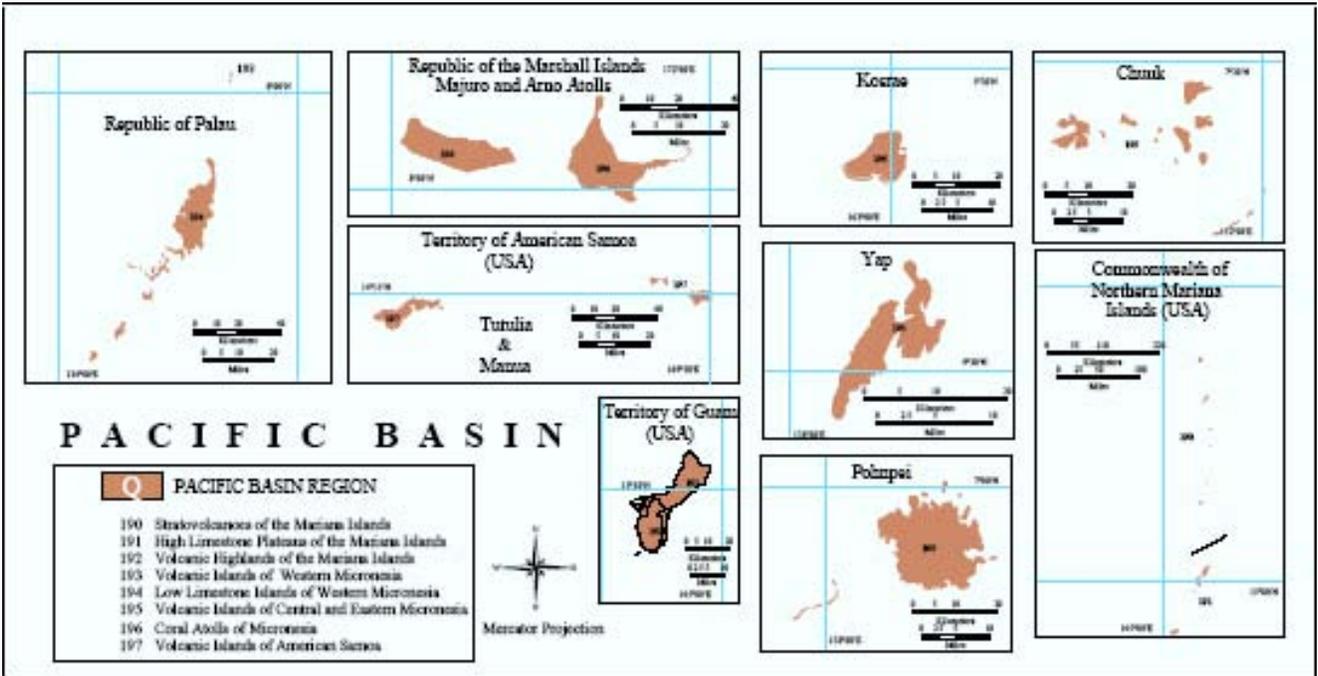
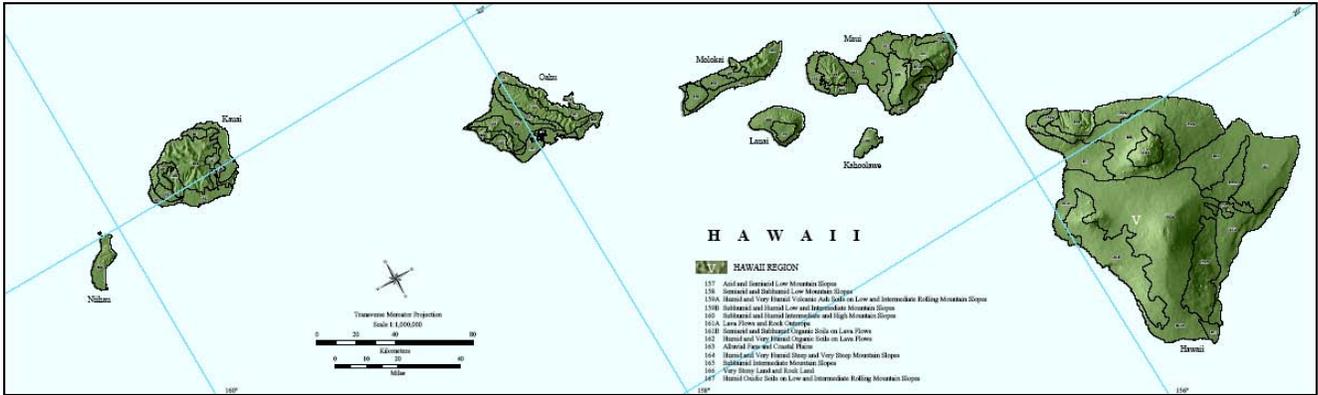
- 157 - Arid and Semiarid Low Mountain Slopes
- 158 - Semiarid and Subhumid Low Mountain Slopes
- 159A - Humid and Very Humid Volcanic Ash Soils on Low and Intermediate Rolling Mountain Slopes
- 159B - Subhumid and Humid Low and Intermediate Mountain Slopes
- 160 - Subhumid and Humid Intermediate and High Mountain Slopes
- 161A - Lava Flows and Rock Outcrops
- 161B - Semiarid and Subhumid Organic Soils on Lava Flows
- 162 - Humid and Very Humid Organic Soils on Lava Flows
- 163 - Alluvial Fans and Coastal Plains
- 164 - Humid and Very Humid Steep and Very Steep Mountain Slopes
- 165 - Subhumid Intermediate Mountain Slopes
- 166 - Very Stony Land and Rock Land
- 167 - Humid Oxidic Soils on Low and Intermediate Rolling Mountain Slopes
- 197 - Volcanic Islands of American Samoa

WEST AREA

- 190 - Stratovolcanoes of the Mariana Islands
- 191 - High Limestone Plateaus of the Mariana Islands
- 192 - Volcanic Highlands of the Mariana Islands
- 193 - Volcanic Islands of Western Micronesia
- 194 - Low Limestone Islands of Western Micronesia
- 195 - Volcanic Islands of Central and Eastern Micronesia
- 196 - Coral Atolls of Micronesia

Hoolehua Service Area Map

The following are maps showing the different islands of the Pacific Island Area region and also the Major Land Resource Areas. A larger map can be viewed at the following website: <http://soils.usda.gov/survey/geography/mlra/index.html>



IV. NRCS Objectives, Needs, Recommended Actions

The priority plant material needs of the Plant Materials Center fall into three categories according to the PM Long Range Plan

NRCS Objective 2.1: Healthy and productive croplands sustaining U.S. Agriculture and the environment.

A. Source of Seed and Vegetative Materials for Plants Recommended in the Technical Guide – Priority Ranking: High

Problem

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

Primary Concern is: 1) a small plant materials market.

Needs

The PIA needs readily available sources of seed and vegetative material of proven plants for approved conservation practices.

Targeted Action

Encourage commercial entities to produce recommended species.

Maintain plant material source for released accessions.

Maintain plant material source for accessions of common pastures grasses.

B. Living Mulch for Cultivated Crops – Priority Ranking: High

Problem

Maintaining soil fertility and controlling soil erosion is difficult when producing diversified crops on tropical soils using conventional clean culture, especially on sloping farmlands. Erosion control structures are costly to build and maintain. Field access and soil compaction are also problems when growing diversified crops under clean culture.

Primary concerns are: 1) sloping farmlands, and 2) the lack of commercial supplies of appropriate plant species.

Needs

The PIA needs commercially available quantities of plant varieties and the technology to establish them. Plant species selected should:

- not reduce crop yields
- be aggressive enough to compete with weeds
- be adapted to mowing

Targeted Plant Science Studies

Cooperate with the University of Hawaii (Dr. Joe DeFrank) on a study using low cost commercially available ground covers.

C. Windbreaks for Crop Lands - Priority Ranking: High

Problem

Many areas of cropland are subject to frequent strong winds. Velocities of 10 to 25 miles per hour are typical. Fire may destroy certain tree species that do not have the capacity for renewal after being burned. Typhoons or hurricanes may destroy crops during certain times of the year. 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. These plants could be used as primary windbreaks and for crops requiring additional windbreaks in fields already planted to windbreak trees.

Primary concerns are: 1) frequent, strong tradewinds, and 2) the lack of commercial supplies of appropriate plant species.

Needs

The PIA needs commercially available quantities of plant varieties and the technology to establish them. Plant species selected should:

- be rapid growing
- take up a minimum of space
- have low maintenance requirements
- produce minimum root competition
- have the capability of surviving severe storms and fire

Targeted Plant Science Studies

Evaluate, technology development, and release selections of *Panax*, *Polyscias guilfoylei*.

Evaluate, technology development, and release of selections of Alahee, *Canthium odoratum*

Evaluate and technology development of selections of *Bambusa spp.*

Evaluate and technology development of selections of *Garcinia spp.*

D. Cover Crops in Orchards – Priority Ranking: High

Problem

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

Primary Concerns are: 1) orchards on sloping land, and 2) the lack of commercial supplies of appropriate plant species.

Needs

The PIA needs commercially available quantities of plant varieties and the technology to establish them. Plant species selected should:

- be shade tolerant
- have rapid initial growth
- not interfere with harvesting operations
- require low maintenance
- add nitrogen and organic matter to the soil

Targeted Plant Science Studies

Evaluate and release of selections of dwarf St. Augustine, *Stenotaphrum secundatum*.

Evaluate and release of selections of *Desmodium heterophyllum*

Evaluate and release of improved selections of *Desmodium triflorum*

E. Bioengineered Solutions for Stream/Slope Problems – Priority Ranking: High Problems

Streambank protection is becoming increasingly important and plants that are easily propagated and established are needed. 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 hydrology.

Primary Concerns are: 1) highly erodible lands, and 2) the lack of commercial supplies of appropriate native plant species.

Needs

The PIA needs commercially available quantities of plant varieties and the technology to establish them. Plant species selected should:

- establish rapidly
- have good root structure and strength
- be adapted adverse conditions of low soil fertility, fluctuating soil moisture
- have low maintenance requirements

Targeted Plant Science Studies

Evaluate and release of selections of Akiaki, *Sporobolus virginicus*

Evaluate, technology development, and release of selections of Pohuehue, *Vitex rotundifolia*

Evaluate, technology development, and release of selections of Milo, *Thespesia polpunea*

Evaluate and release of selections of Ilihee, *Plumbago zeylanica*

F. Plants for Agroforestry – Priority Ranking: High Problem

Problem

Farmers interested in practicing sustainable agriculture and those interested in using natural, organic forms of fertilizers are in need of plants for agroforestry.

Agroforestry systems provide a sustainable form of agriculture through the simultaneous culture of crops and/or animals in combination with trees and/or shrubs. For example, a type a 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, and food products are other uses for trees and shrubs in the agroforestry system.

Primary concern is: 1) the lack of commercial supplies of appropriate plant species.

Needs

The PIA needs commercially available quantities of plant varieties and the technology to establish them. Plant species selected should:

- establish easily
- grow rapidly
- re-grow well after cutting
- high in nitrogen
- provide a useful product

Targeted Plant Science Studies

Evaluate and release of selections of *Gliricidia spp.*

Evaluate and technology development of selections of hybrid *Luecaena spp.*

Evaluate and release of selections of *Flemingia spp.*

G. Cover/Green Manure Crops – Priority Ranking: High

Problem

Continuous cultivation destroys soil structure, reduces water infiltration, reduces aeration, increases disease and insect presence. The popularity of organic farming is increasing. This along with the CSP increases the need for cover/green manure crops to improve soil quality. Cover/green manure crops are also needed by farmers who wish to reduce chemical fertilizer and pesticide use.

Primary concern is: 1) the lack of commercial supplies of appropriate plant species.

Needs

The PIA needs commercially available quantities of plant varieties and the technology to establish them. Plant species selected should:

- add nitrogen to the soil
- add organic matter to the soil
- reduce nematodes populations
- reduce soil disease and insect pests
- have rapid growth
- be able to compete with weedy species
- be non-toxic

Targeted Plant Science Studies

Evaluate and technology development of selections of 'Cahaba' white vetch.

Evaluate and technology development of selections of mustard.

Evaluate and technology development of selections of rapeseed.

H. Plants for Vegetative Barriers – Priority Ranking: High

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. 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. Primary Concerns are: 1) some farmlands are too steep to construct terraces, and 2) the lack of commercial supplies of appropriate plant species

Needs

The PIA needs commercially available quantities of plant varieties and the technology to establish them. Plant species selected should:

- form a tight hedge
- have a strong and deep root system
- be stiff-stemmed (generally grasses)

Targeted Plant Science Studies

Evaluate and technology development of Vetiver, *Vetiveria zizanioides*

Evaluate and release of selections of Pacific Lovegrass, *Eragrostis deflexa*

Evaluate and release of selections of Lemon grass.

NRCS Objective 2.2: Healthy watersheds providing clean and abundant water supplies for people and the environment.

A. Provide Plant Materials and Technical Assistance to the Kahoolawe Island Reserve Commission (KIRC) Priority Ranking: High

Problem

Kahoolawe has been highly degraded by overgrazing, military bombing and feral goats. The annual rainfall on Kahoolawe averages 20-25 inches per year. Vast areas of hard pan are windswept and make it challenging to get any plant to establish itself and many deep gullies only compound the erosion problem. The KIRC is faced with the overwhelming challenge to revegetate the island. Soil stabilization will be a key step in the revegetation process.

Primary Concerns are: 1) the presence of unexploded ordinance, 2) the lack of large commercial supplies of desired native plant species, and 3) funding.

Needs

The KIRC desires plant materials that are:

- native to the Maui Nui region
- drought tolerant
- wind tolerant
- fast establishing
- have low maintenance requirements

Targeted Plant Science Studies

Evaluate and release of selections of Piligrass, *Heteropogon contortus*

Evaluate and release of selections of Kawelu, *Eragrostis variabilis*

Evaluate and release of selections of Aweoweo, *Chenopodium oahuense*

Evaluate and release of selections of Aalii, *Dodonaea viscosa*

Evaluate and release of selections of Ilihee, *Plumbago zeylanica*

Evaluate and release of selections of Kamanomano, *Cenchrus agrimonioides*

NRCS Objective 2.3: Healthy and productive grazing land sustaining U.S. Agriculture and the environment.

A. Plant Techniques to Control Invasive Species – Priority Ranking: High

Problem

Undesirable plants have invaded grazing lands. They consume needed moisture, and are generally not as well suited for controlling erosion as other more desirable species. These invasive species lower the productivity of the land. Experimentation with high seeding rates of native and other desirable plants to provide cover when invasive species are replaced is needed. High seeding rates may provide a dense cover of desirable species that will be competitive and not allow the undesirable species to return.

Primary concerns are: 1) large areas have been affected and need management, and 2) the lack of commercial supplies of appropriate native plant species.

Needs

There is a need for plants to control undesirable species in pasture, range, and other lands. Plant species selected should:

- be generally grasses or legumes
- be able to compete and grow well with weedy species
- be palatable to animals

Targeted Plant Science Studies

Evaluate and technology development of Piligrass, *Heteropogon contortus*

Evaluate and technology development of Kawelu, *Eragrostis variabilis*

B. Improved Pasture and Range Grasses and Legumes – Priority Ranking: High

Problem

Many pastures are overgrazed and have low soil fertility. Existing plant species in these pastures are weedy and unpalatable.

Primary concerns are: 1) poor land management, and 2) the lack of commercial supplies of appropriate plant species.

Needs

The PIA needs commercially available quantities of plant varieties and the technology to establish them. Plant species selected should:

- Be primarily grasses and legumes
- Be adapted to low and high rainfall
- Be adapted to low and high soil pH
- Be palatable and nutritious to animals
- Recover rapidly after grazing

Targeted Plant Science Studies

Evaluate and technology development of 'Mulato' signalgrass.

Evaluate and technology development of Piligrass, *Heteropogon contortus*.

Evaluate and technology development of Kawelu, *Eragrostis variabilis*.

Evaluate and technology development of Pacific Lovegrass, *Eragrostis deflexa*.