

## Koa improvement plan

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The purpose of this plan is to establish a set of guidelines to ensure the genetic integrity of *Acacia koa* and its sub-species in Hawaii.

### I. Objectives of the plan:

- A. Establish seed collection zones
- B. Develop seed collection guidelines
- C. Establish guidelines for certifying the seed source
- D. Establish guidelines for research and plantation minimums for seed collection and seed source population sampling
- E. Establish primary and secondary seed repositories

### II. Establish a core committee for recruiting help and see to preparation of a draft of the plan for presentation to a community of stakeholders for completion and acceptance

- A. The core committee should be made up of 4 to 5 people with skills needed for organizing information to meet the objectives of this project.
- B. Professional knowledge in the core committee should include Hawaiian botany, ecology, genetics, and mapping.
- C. The core committee will need to enlist the help of researchers, managers, policy makers, and GIS specialists to carry out the task.

## SEED ZONE MAP OF ACACIA KOA: THE FIRST APPROXIMATION

I. It has long been recognized by foresters that seed from different geographic origins used for planting can lead to substantial differences in growth, form, health, and wood quality of the resulting seedlings. The differences within a species can be so significant that one source will establish successfully and the other fail completely. What seed source of *Acacia koa* can be recommended for planting? Where can these seeds be obtained? At present, the answer to these questions is we don't know. One of the first steps towards answering these questions is to develop a seed zone map.

II. The objective of developing a seed zone map is to give some geographic structure to the genetic variation that exists among the native *Acacia koa* population. This will assist future seed collection efforts to ensure that a broad genetic base is sampled systematically and well documented seed of known parentage is available for further testing and distribution for planting. A second objective, collecting seed of known parentage that is then source certifiable, would follow naturally. This source certified seed would have labelling information relating to origin, seed size, germination, quality of parent trees. With this process, *Acacia koa* seed of known genetic quality would then be available for research and further commercial planting.

### III. PROPOSED SEED ZONE MAP OUTLINE OF ACACIA KOA:

- A. MAJOR DIVISIONS
  - 1. PRIMARY, BY ISLAND: HAWAII
    - i. MAUI
    - ii. MOLOKAI
    - iv. OAHU
    - v. KAUAI
  - 2. SECONDARY, BY GREATER CLIMATIC ZONE:
    - i. WINDWARD ZONE
    - ii. LEEWARD ZONE
- B. SUB-DIVISIONS
  - 1. BY ECOLOGICAL DIVISION OR FOREST TYPE:
    - i. LOW ELEVATION/UNIQUE HABITAT
    - ii. OPEN GUAVA FOREST
    - iii. MIXED OPEN FOREST
    - iv. CLOSED GUAVA FOREST
    - v. CLOSED OHIA FOREST
    - vi. OPEN KOA FOREST
    - vii. OPEN KOA AND MAMANI FOREST
    - viii. OPEN MAMANI SUBALPINE FOREST
  - 2. BY POPULATION CENTER WITHIN FOREST TYPE  
TO BE DETERMINED AT A LATER DATE.
  - 3. BY ELEVATIONS LIMITATIONS (+/- 250 FT.)
    - i. 0-500 FT.
    - ii. 500-1,000 FT.
    - iii. 1,000-1,500 FT.
    - iv. 1,500-2,000 FT.
    - v. 2,000-2,500 FT.
    - vi. 2,500-3,000 FT.
    - vii. 3,500-4,000 FT.
    - viii. 4,000-4,500 FT.
    - ix. 4,500-5,000 FT.
    - x. 5,000-5,500 FT.
    - xi. 5,500-6,000 FT.
    - xii. 6,000 FT. AND ABOVE

Sampling guidelines (to meet source certified standard)

I. Establish a minimum number of trees to include in the sample

II. Establish standards for defining sample tree architecture

- A. determine minimum general standards
- B. determine what variances from the general standards will be allowed for individual seed trees

III. Sampling structure

- A. Define and make a photographic record of the population that is being sampled
  - 1. record elevation and approximate area considered to be in the population sampled

2. classify stand characteristics (density, crown cover composition, vigor of the dominant species, age class of the koa, etc.)
  - B. Locate the sample site.
  - C. mark the location on a quad map
  - D. give GPS coordinates or give the nearest longitude and latitude information possible
  - E. record road and trail directions to reach the location
  - F. mark, photograph, and record each seed tree sampled
  - G. classify each tree on a prepared form (structural features such as height, dbh, crown size and shape, foliar characteristics (percent of the crown structure and degree of foliation, and phyllode features (size, shape, turgidity), lowest live branch and its base diameter.
  - H. record neighborhood characteristics (number of koa in the same age and or size class that are within a predetermined distance, number of other trees in approximately the same height class by species that are within the same area)
  - I. record tree health (type, parts, and severity of damage)
- IV. Seed record and storage
- A. Seed lot tag record and data base record
    1. seed tree information
    2. date cleaned
    3. total seed weight and wt/100 seeds
    4. record storage location
    5. record of seeds taken from the seed lot
      - i. where were they sent and to whom
      - ii. if seeds were germinated, record the %germination and the % of the germinated seeds that were outplanted and the location of the outplanting
- V. Establish repositories for seed bank maintenance
- A. Repository for seed supplies available for seedlings to supply for normal plantation forestry should be the DOFAW state nursery. This supply could be backed up with some seeds maintained at district headquarters
  - B. Repository for source certified seed could be maintained at an Hawaiian research or tropical botanic garden location on several islands and these repositories could be backed up with a supply at the Institute of Forest Genetics at Placerville, CA.
- VI. Seed Plantation development
- A. Koa trees commonly begin producing sizeable quantities of seed by age 5 to 10 years depending on growing conditions
  - B. The potential for crossing between individual trees is thought to decrease with distance and barriers between stands.
  - C. If f2 generations are to maintain seed source integrity, guidelines will be needed.