The Role of Micropropagation in Hawaiian Plant Conservation

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US Fish and Wildlife Service

Total number of taxa: 681

- 364 Endangered
- 11 Threatened
- 39 Candidate
- 267 Species of Concern
Summary of Native Vascular Plant Taxa

- 38%: 1-50
- 29%: 51-1000
- 13%: >1000
- 13%: Unknown
- 7%: Extinct
- 2%: In Captivity
IUCN Red List

224 Hawaiian Plant Taxa

- 21 Extinct
- 6 Extinct in the Wild
- 93 Critically Endangered
- 52 Endangered
- 43 Vulnerable
- 9 Near Threatened

International Union for Conservation of Nature
Hawaii Rare Plant Restoration Group (HRPRG) Agencies

- State
- Federal
- Conservation
- Environmental
- Private landowners
- Local Botanical Gardens
HRPRG

To prevent the extinction of native Hawaiian plants by:

• providing for their recovery through a cooperatively administered conservation system
• sampling, propagating, and reintroducing rare plants
• preserving native plants and their habitats through communication and public education
PEP Listing
(originally the Genetic Safety Net List)

- Generated by the Plant Extinction Prevention Program
- Approximately 242 critically endangered Hawaiian plant taxa
Plant Extinction Prevention (PEP) Program

To protect Hawai‘i’s rarest native plants from extinction

U.S. Army Natural Resource Management

Charged with managing rare plants and animals and the ecosystems upon which they depend upon
• Protect founders
• Monitor plants
• Collect propagules
• Reintroduction
• Survey for new plants and populations
Hawaiian Rare Plant Program

1. Prevent further extinction of native Hawaiian plant species and Polynesian introduced crop plants
2. Propagate plants for approved restoration projects and garden use
3. Initiate and maintain an *in vitro* and seed germplasm collection of these “critically endangered” Hawaiian plants
US Fish and Wildlife Federal Status Summary

- Total Number of Taxa: 681
- Number of PEP Taxa: 242
- Number in Ex situ Storage: 402
- Number Managed In situ: 301

- Endangered: 29%
- Threatened: 48%
- Candidate: 36%
- Species of Concern: (242)
Sexually Derived Explants

- Seed
- Embryos
- Ovules
- Pollen
- Spores
Vegetative Explants

- Apical meristem
- Axillary meristem
- Root meristem
- Stem internodes
- Inflorescence
- Leaves
Preservation of the Original Plant Genotype

- Selection of suitable plant material
- Post harvest handling
- Proper surface disinfestation
- Plant medium
- Culture conditions
Selection of Suitable Plant Material

- Time of harvest
- Juvenility
- General health

Post-harvest Handling

- Submit samples as soon as possible
- Factors affecting sample viability
  - Excessive temperatures
  - Anaerobic conditions
  - Microbial growth
  - Damage
Pre-treatments

- Water rinses
- Ultrasonic cleaner
- 70% ethanol dip
- 0.1% Physan 20 soak
- Zerotol™ dip (1:100 H2O)
Treatments

- 5% to 10% bleach (e.g. Clorox®) solution soaks
- Plant Preservative Mixture® (PPM) soaks
- Clorine gas sterilization
Plant Media

- Murashige and Skoog (MS)
- Woody Plant Medium (WPM)
- Knudson
- Modified mixes
In Vitro Seed Sowing

- 1/2 MS (no hormones)
Ovule and Embryo Culture

- $\frac{1}{2}$ MS
- Higher or lower sucrose concentrations
- Coconut water
- Charcoal
- Gibberellic acid

Pritchardia sp.
Organogenesis

- Modified Murashige and Skoog
  - Auxin
  - Cytokinin

Avoid or minimize callus stage
Greenhouse Establishment
Kokia cookei (koki‘o)
Saved from

EXTINCTION
(we hope)
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