

# ***The Role of Micropropagation in Hawaiian Plant Conservation***

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# **US Fish and Wildlife Service**

**Total number of taxa: 681**

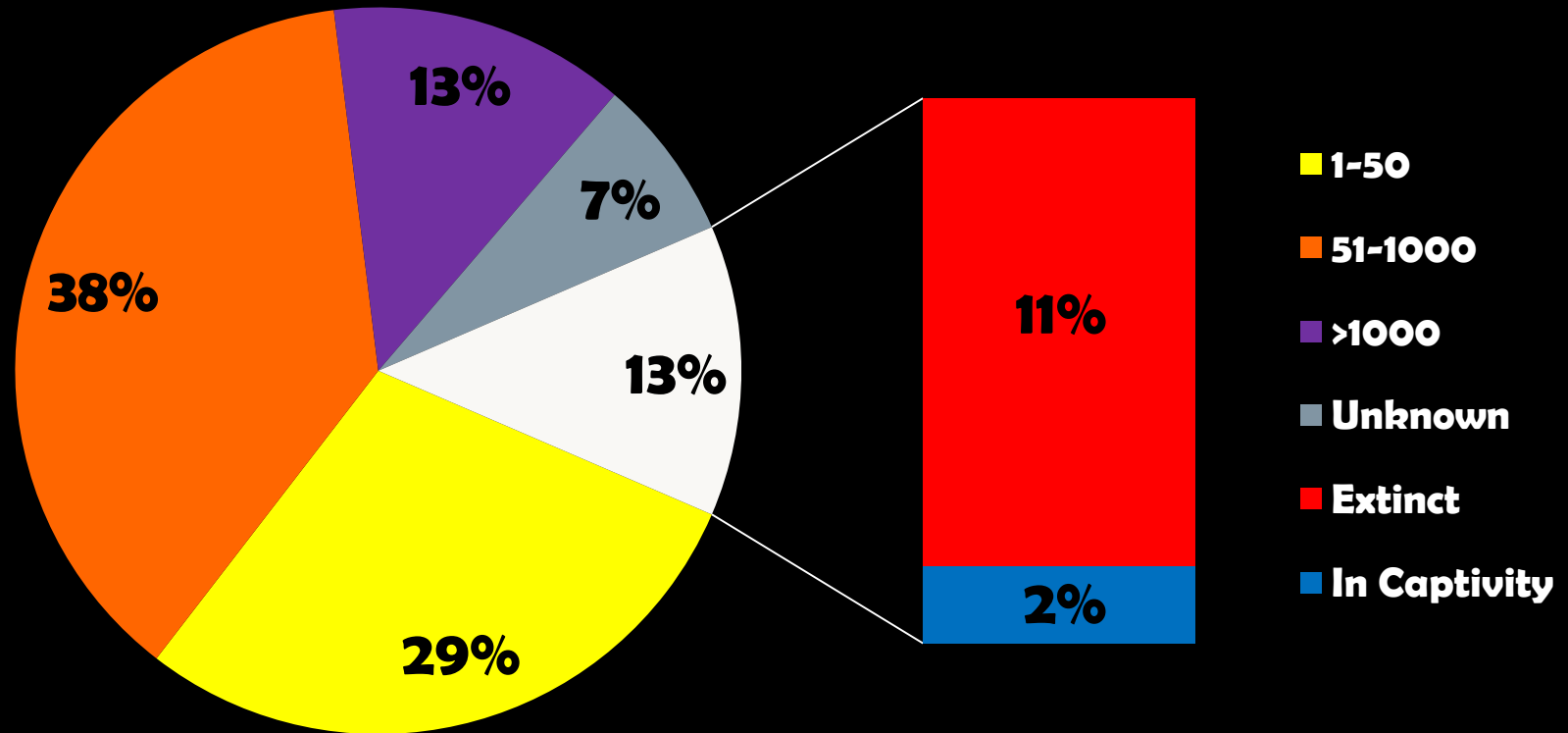
**364 Endangered**

**11 Threatened**

**39 Candidate**

**267 Species of Concern**

# Summary of Native Vascular Plant Taxa



# **IUCN Red List**

## **224 Hawaiian Plant Taxa**

**21 Extinct**

**6 Extinct in the Wild**

**93 Critically Endangered**

**52 Endangered**

**43 Vulnerable**

**9 Near Threatened**



# **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**



The background of the slide features a close-up photograph of several small, white, five-petaled flowers with prominent green stamens. The flowers are in various stages of bloom, and the background is a soft, out-of-focus green, suggesting foliage.

# PEP Listing

(originally the Genetic Safety Net List)

- **Generated by the Plant Extinction Prevention Program**
- **Approximately 242 critically endangered Hawaiian plant taxa**

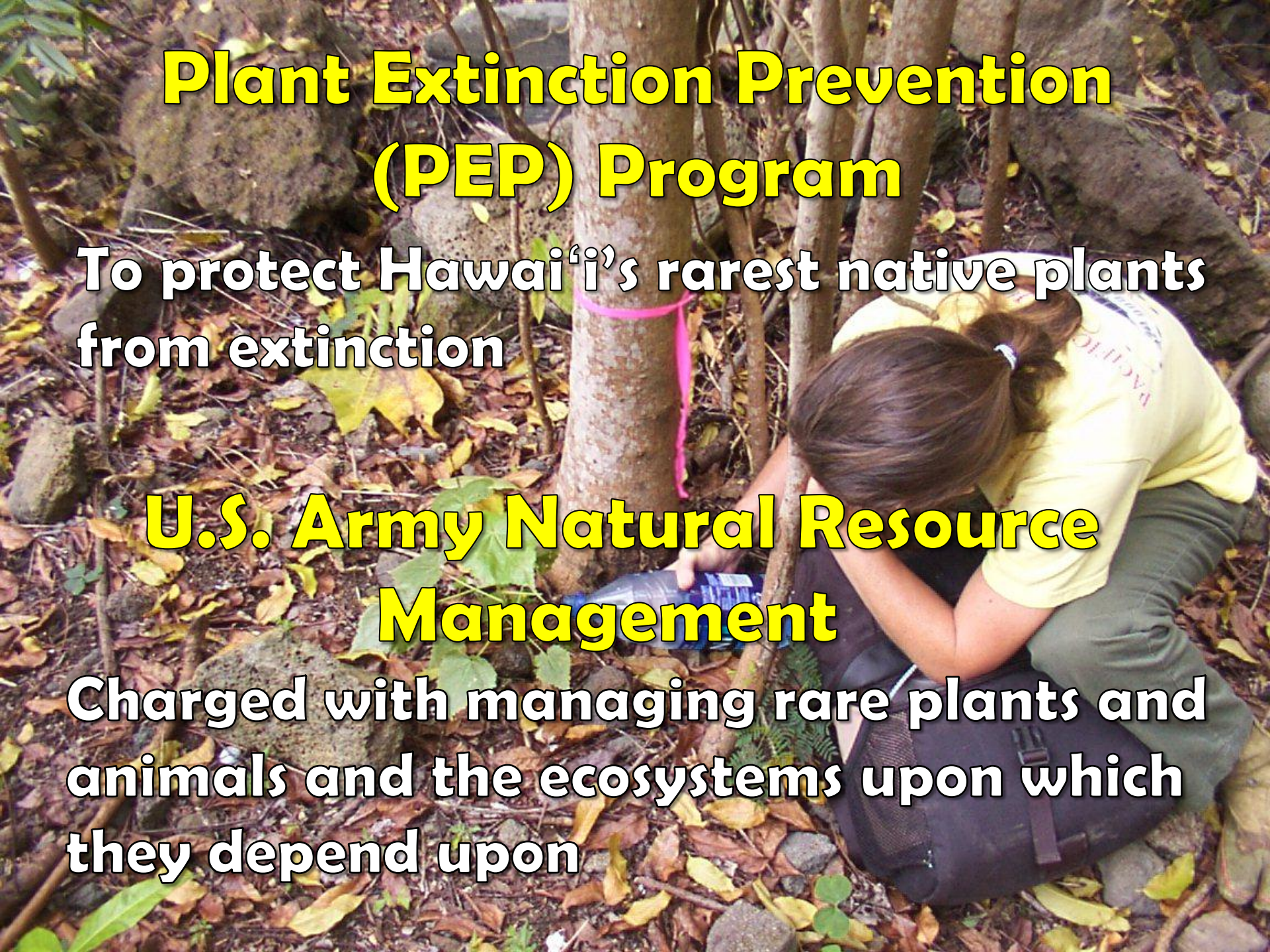


# **Plant Extinction Prevention (PEP) Program**

**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**



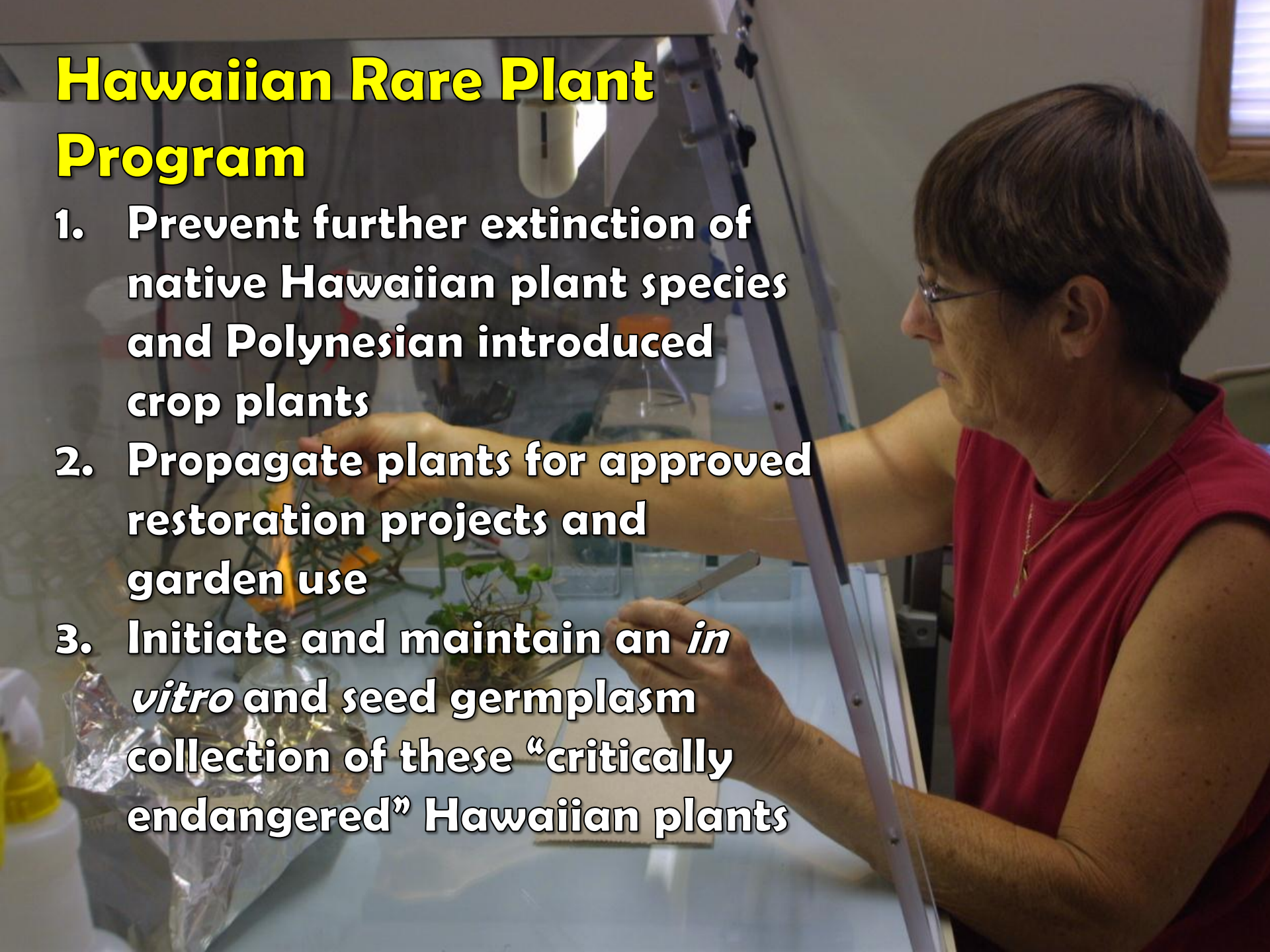


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- A photograph of three people in a forest. On the left, a man in a green cap and white shirt. In the center, a man in a camouflage shirt and blue jeans. On the right, a woman in a white long-sleeved shirt and orange pants. They are standing in a wooded area with trees and green plants. A list of five tasks is overlaid in the center of the image.
- **Protect founders**
  - **Monitor plants**
  - **Collect propagules**
  - **Reintroduction**
  - **Survey for new plants and populations**



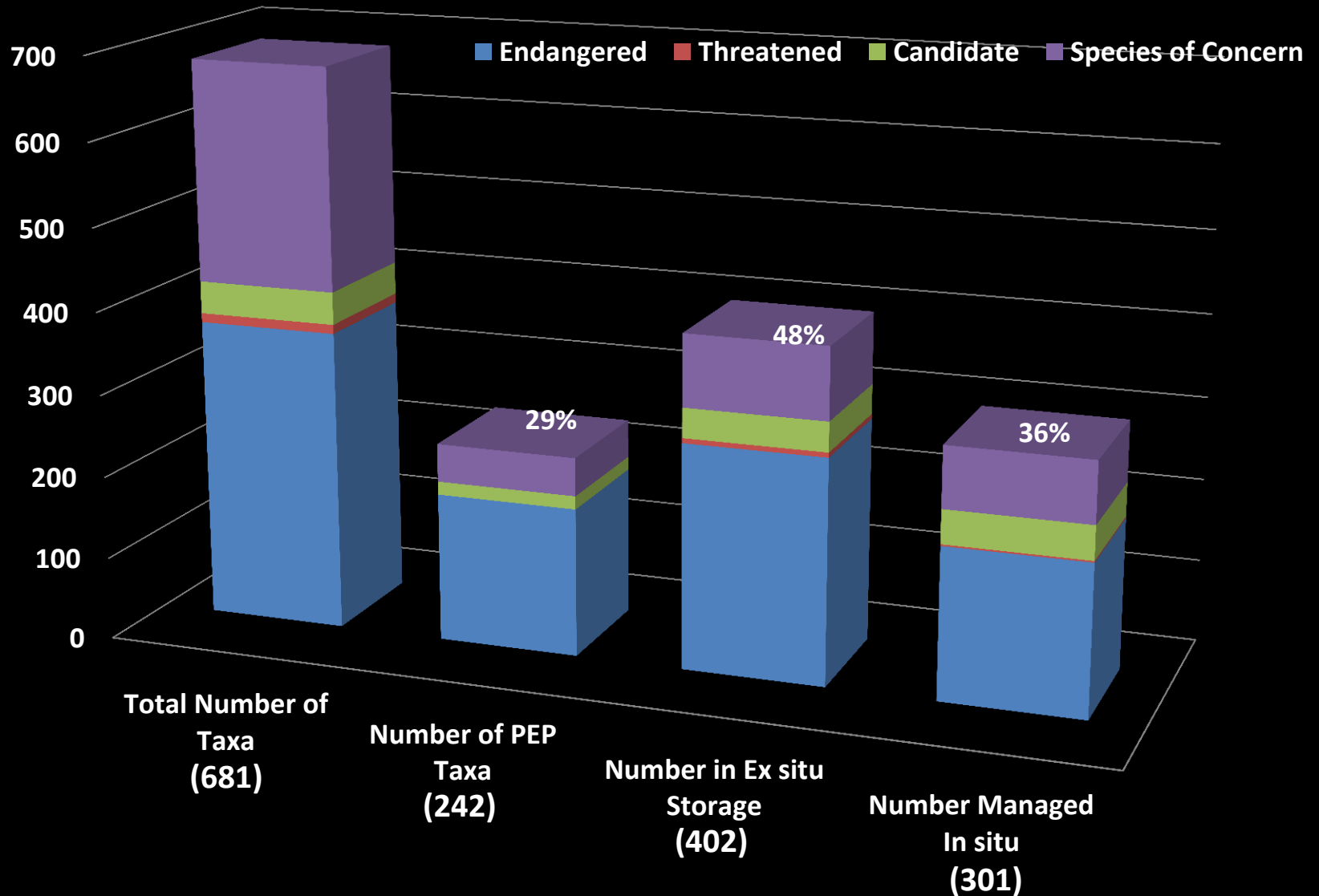
# Hawaiian Rare Plant Program

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











***Ex-situ* Conservation**



Tet Lyd 10-01  
1/07 Kipana O. PEP



# Sexually Derived Explants

The background of the slide features several dried, star-shaped plant structures, likely from a species like Mimulus, scattered across a light-colored surface. These structures are greenish-brown and have five lobes. Interspersed among these are numerous small, dark, oval-shaped seeds or fruits.

- 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

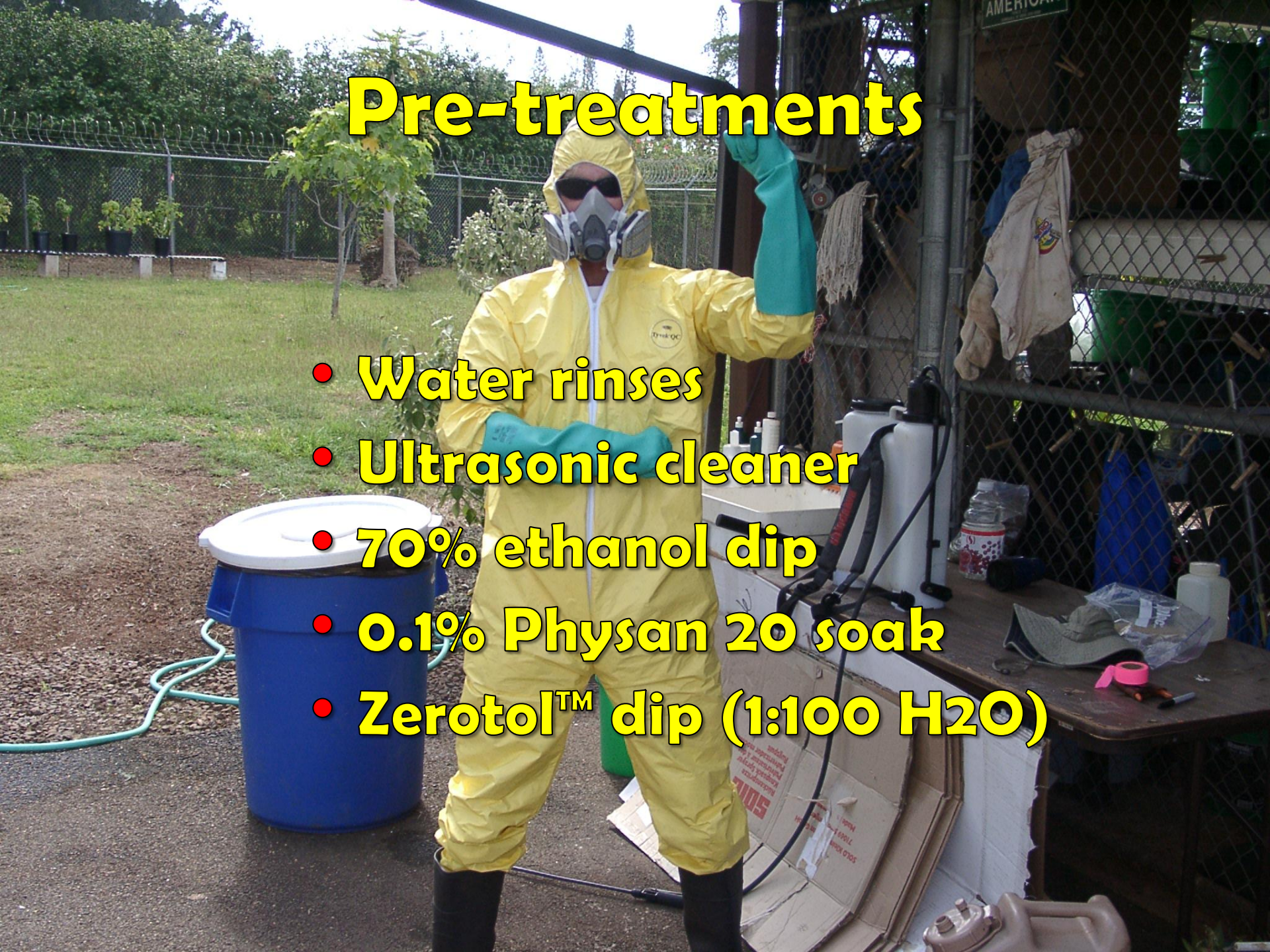
- Submit samples as soon as possible
- Factors affecting sample viability
  - Excessive temperatures
  - Anaerobic conditions
  - Microbial growth
  - Damage





# Pre-treatments

- Water rinses
- Ultrasonic cleaner
- 70% ethanol dip
- 0.1% Phytosan 20 soak
- Zerotel™ dip (1:100 H<sub>2</sub>O)





# Treatments



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

# Plant Media

- Murashige and Skoog (MS)
- Woody Plant Medium (WPM)
- Knudson
- Modified mixes

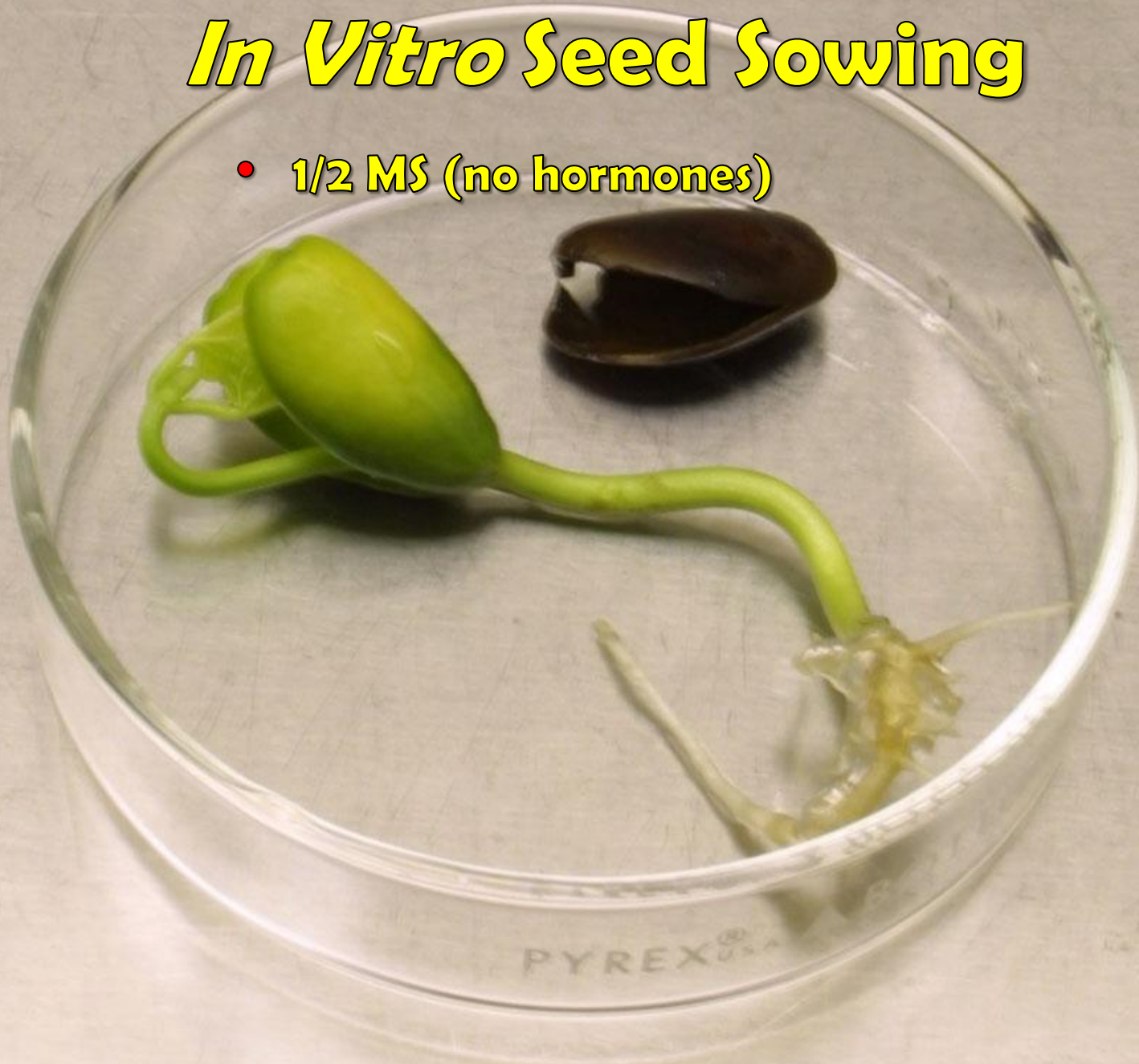
P0667-22  
*Phylla hispida*  
3/23/04 2  
6/29/04 "  
4/1/05 "

P06770009  
*Phy his*  
6/29/04 2  
12/2/04 "



# ***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







*Flueggea neowawrea*  
(mēhamehame)





*Kokia cookei*  
(koki'o)

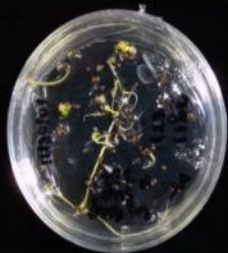
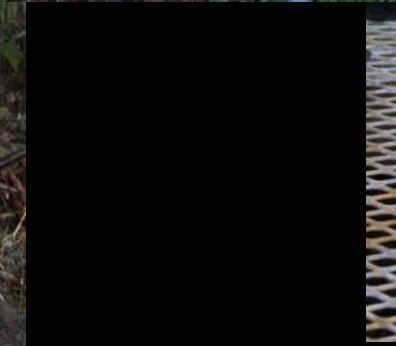




**Saved  
from**



**EXTINCTION**  
(we hope)





## **Thanks to:**

**Marie Bruegmann –USFWS**  
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