Ohia Plant Propagation At Waipa
Island School 4th Grade
September 29, 2003

ISLAND SCHOOL 4TH GRADE
OHIA PROPAGATION DAY

OBJECTIVES

- Students investigate seed germination
- Students look into air layering
- Students redefine cutting in a horticultural sense
- Students address needs of plants for survival
- Students differentiate between sexual and asexual plant propagation
- Students think critically about plant propagation
- Students uncover new information regarding Ohia
- Students use concepts of botany introduced previously to establish link with plant parts used for propagation of Ohia
- Students learn how to produce populations of genetically diverse and genetically similar plants
- Students create hypotheses regarding success of experimental treatments

SKILLS

- Sexual and asexual plant propagation
- Preparation of plant material for propagation
- Safe handling of horticultural equipment and chemicals
- How to create scientific experiment
- Cooperation

KNOWLEDGE AND VALUES DEVELOPED

- Different methods of propagating plant material exists
- Methods of plant propagation can be used to conserve native plants
- Understanding interaction of plant parts
- Insight towards plant growth and development
- Humans can assist nature in recovery
- All forms of life have value

SUPPLIES NEEDED:

Flip chart & marker	Liquid rooting hormone (mixed to different concentrations)
Laptop computer w/ powerpoint	Latex gloves (small)
Pot labels	Spray bottles
Pencils	Gloves
Basalt sand or fine coral sand	Propagation trays
Potting soil	Grafting knives
Aluminum foil	Air-layering kits
Small scrap of shadecloth or shaded area in greenhouse	Tub with water
3-4 hand pruners (capable of cutting ¼" stem)	Ohia seed and plants (3-15gal)
Powder rooting hormone	Tie on plant labels (flagging will do)

The GK-12 Fellows will be providing all necessary horticultural supplies for these activities. We will also bring a laptop computer with Powerpoint.

ACTIVITY 1

Introduction to Ohia (In-Class, pre Waipa)

In this exercise students practice observation, critical thinking and comparison skills. Students are taken to school library or computer media center and asked to find information on Ohia. A list of books available at KCC and websites that will be of interest include:

Pele Ma: Legends of Pele from Kauai, Frederick Wichman, PS571.H3 B35 no. 80

A Native Hawaiian Garden: How to Grow & Care For Island Plants, John Culliney & Bruce Koebele, SB439.24.H3.C85

Hawaiia's Floral Splendor: A Friendly Color Identification Guide to Native & Introduced Flowers of All the Hawaiian Islands, Angela Kay Kepler, QK473.H4 K465.

Paradisus: Hawaiian Plant Watercolors, Geraldine Tam, QK473.H4 T36

http://rathbun.si.edu/botany/pacificislandbiodiversity/hawaiianflora/imagegallery.htm

www.botany.hawaii.edu/faculty/carr/natives.htm#Dicots

http://pdcs.ctahr.hawaii.edu:591/hawaiianprop/default.htm

Students are asked to enter the information they find on a data sheet (attached). When they have finished entering information they are asked to sketch what they observed. Students present their work with others, discussing important characteristics and facts about Ohia. As students discuss their findings a composite list is created. Please keep this list for assessment purposes.

ACTIVITY 2

Concept Mapping Plant Propagation & Direct Teaching Techniques of Plant Propagation (At Waipa 9/29/03)

Students will be asked to assist science partner create a map based on concept of plant propagation. The science partner will introduce the term horticulture and review some of the activities that horticulturists do. This leads into the discussion and mapping of plant propagation.

After concept mapping, the science partner directly teaches skills involved in propagating plant material. We will review how to: properly sow seed, take cuttings and prepare them for rooting, and perform an air layer. Safety must be emphasized and reinforced as we will be using chemicals and cutting tools.

ACTIVITY 3

Practicing Plant Propagation (At Waipa 9/23/03)

In this set of activities students have the opportunity to practice plant propagation through seed sowing, preparation of cuttings and performing air layers of Ohia. Each activity will comprise three stations: Station 1) seed sowing/germination experiments; Station 2) Preparation and planting of cuttings for rooting; 3) Manipulation of stems for air layering. There will be a science partner at each station ready to coach students on each method. Student groups will have an opportunity to move through each station.

<u>Station 1: Seed Germination Experiments</u>

Students will be working with three propagation trays. Each tray represents one treatment and will be divided into three sections representing three replications. There are various tasks that need to be divided among the students before and during seed sowing:

1) Trays need to be filled with soil and watered thoroughly
2) Students need to properly label trays with preprinted labels
3) Students will be given Ohia fruit and asked to extract seed
4) Students must separate viable from non-viable seed (viable seed will appear plumper, non-viable seed appear flat)

5) After separating seed batches of 15-25 seed will need to be sorted (We will need a total of 9 batches. Each batch must contain the same amount of seed)
6) Students may then sow seed as demonstrated previously (guidelines provided below).
7) Aluminum foil must be placed over the clear plastic lid of the propagation tray used in the light exclusion treatment.
8) After sowing students clean up the station and move on to the next area

Station 2: Rooted Cutting Experiments

At Station 2 students will be cutting stems of Ohia for propagation with pruning shears. **ALL ATTENTION MUST BE PAID ON SAFELY TAKING CUTTINGS**!!!!! Each group should have a potted Ohia shrub from which to take cuttings. Students will again have three propagation trays to work with. Each tray represents one treatment and will be divided into three sections to represent three replications. Tasks must be divided among students in each group.

1) Trays need to be filled with soil and watered thoroughly
2) Students need to properly label trays with preprinted labels
3) Students take cuttings approximately 10-15cm (4-6") long as instructed previously (measurements can be taken from end of stem)
4) We will need 45 cuttings that are as uniform as possible
5) The cuttings will be divided into 9 batches of 5 cuttings
6) Cuttings will then be treated with the appropriate rooting hormone
7) After treatment cutting will be stuck into soil within propagation tray
8) Students clean up then move to next station

Station 3: Air Layering Experiments

In this exercise students have an opportunity to perform air layers on Ohia and Ti. Students will be using grafting knives to clear away small pieces of bark on the stem and make small incisions. **ALL ATTENTION MUST BE PAID TO SAFELY USING KNIVES**!!!!! Each group of students will have one Ohia or three Ti plants to perform air layers on.

1) Students prepare stems with grafting knives
2) After girdling the stem appropriate rooting hormones are applied
3) Students then place moist sphagnum moss over the treated area
4) The sphagnum is wrapped in plastic and the ends are closed with twist ties
5) From here students wrap the plastic with aluminum foil
6) Students clean up area and move on to next station or final activity for the day

ACTIVITY 4

Scientific Meeting: Collecting and Presenting Data
This will be completed on the return trip to Waipa

Below is a list of potential questions that may be asked during our activities on 9/29/03:
What plant part are you working with?
How do you know?
What does a seed need to germinate?
How long do you think Ohia seed can live in the wild? Why?
How long do you think it takes Ohia seed to germinate?
How do you think plants produce roots on the stem?
What do plants need to survive?
How did ancient Hawaiians propagate plants?

Additional concepts that may be introduced:
Sexual reproduction
Seed development
Requirements for germination

Ohia Data Sheet

Scientific Name _____

Common Names_____

What family does Ohia belong to? _____

How tall can an Ohia grow? _____ What is the leaf shape?_____

Do Ohia leaves have any hair on them? _____

What color flowers do Ohia have? _____

What type of habitat do Ohia grow in?_____

How have people used Ohia?

Draw your Ohia here

General Guidelines for Ohia Propagation

Seed Propagation

- Make sure to use viable seed (Viable seed appear fuller than non-viable seed. Non-viable seed are usually flat or disfigured)
- Create small pocket in soil to sow seed
- Space holes approximately 5cm apart
- Sow seeds and lightly cover with soil
- If necessary, propagation trays may be watered by capillary action until seedlings emerge

Cuttings

- Take cuttings in the morning if possible. If this is not avoidable place cuttings in plastic bag with damp paper towel or place in a cooler. Avoid exposure to heat
- Take cuttings that are about 10-15cm long about ¼" in diameter
- Try to process cuttings as quickly as possible
- Measure from the tip of the stem back
- The wood used for cuttings can be green (soft-wood) or green-brown (semi-hardwood)
- Cut just above the node
- Cut surface should be approximately 45 degrees
- Remove excessive leaves from bottom portion of stem
- There should only be 2-3 leaves remaining on the cutting
- The remaining leaves should be cut in half to avoid moisture loss by transpiration
- Dip the basal end (cut portion) of the stem in rooting hormone (If powder tap off any excess)
- When using a liquid hormone dip basal end for 3-5 seconds
- Stick cuttings in soil and high humidity immediately
- Do not allow them to dry out

Air Layering

- Select a sturdy branch or stem (¼" dia. or larger) with semi to hard wood
- Using a grafting knife girdle the entire outer surface of the stem
- Girdling means to remove the bark and expose the light colored inner portion of the stem
- Place hormone on wounded surface
- Powder hormone can be applied with a saltshaker, excess powder can be tapped off

- If using liquid hormone a light misting with a spray bottle will do. The wounded area does not need to be dripping wet
- Place moist sphagnum around wounded area and wrap with plastic
- Cover entire plastic with aluminum foil
- Check to see if sphagnum is moist from time to time
- If sphagnum begins to dry out add more water
- When roots are established cut the stem just below new roots

Mixing Liquid Hormones

These measurements apply to DipN' Grow Liquid Rooting Concentrate

To make:

100ml of a 500ppm solution mix 95ml of water with 5ml of concentrate

100ml of a 2000ppm solution mix 80ml of water with 20ml of concentrate

100ml of a 5000ppm solution mix 50ml water with 50ml of concentrate

The 100ml stock solutions should be used within 10 days of mixing and concentrate should be stored away from heat. Never place mixed solution back in concentrate bottle (you will dilute the concentrate!)