

DLNR: Guideline for Out Plantings in Hawaii's Forests

Preventing the spread and minimizing the harmful impacts of invasive species is a key part of promoting healthy forests, including urban and community forests. This guide contains recommendations offered as a starting point for projects that grow, purchase, or distribute plants in Hawai'i.

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Section I. Pest Prevention in Nurseries

To ensure that pests are not transferred from one growing site to another, only pest-free plants and new materials should be purchased before relocation. It is recommended that plants and new materials be inspected for pests and rejected before purchase/relocation if pests are found.

Sucking insects (e.g. aphids, mealybugs, whitefly, thrips), mites, ants and mollusks

- Visually inspect a random selection of plants with a hand lens. Examine underside of leaves, growing tips, stems and roots (if possible).

Diseases

- Visually inspect a random selection of plants with a hand lens for fungal, bacterial or viral disease symptoms.

Little Fire Ants (LFA)

- To ensure that plants are not infested with LFA before purchase/relocation, place a thin film of creamy peanut butter on chopsticks and place in plant pots. After 1 hour, inspect with a hand lens. If LFA is found, do not purchase or relocate the infested plants. If ants are found but you are unsure of the ant species, do not purchase or relocate plants until it is verified that no LFA are present.
- If unable to test for LFA before purchase/relocation, quarantine all plants and new materials (soil, mulch, potting mix/media, shipping pallets, gravel, equipment and anything from nurseries or Big Island) on the site and test for LFA (as described above) before mixing it with the existing stock.

Coconut Rhinoceros Beetle (CRB)

- Inspect bags of garden soil/mulch for holes before purchasing.
- Quarantine newly received material in a CRB-proof container from inspected material on-site.
- If possible, use a mulch alternative, such as weed mat, gravel, or rubber chips.

Weeds and Other Pests

- Create a controlled perimeter around nurseries to reduce the influx of weeds/pests from surrounding areas by 1) extending nursery weed mats/concrete beyond the extent of nursery area 2) regularly mow/weed whack 3) purposefully plant certain grass or plants that minimize pests.

Section II. Pest Monitoring in Nurseries

Pest monitoring allows for early pest detection, thereby reducing the likelihood of unexpected pest outbreaks. Monitoring helps determine what types of treatments are needed.

Flying insects (e.g. aphids, whitefly, thrips, shore flies and fungus gnats)

- Place yellow sticky cards (e.g. Catchmaster GRO Yellow Sticky Trap) evenly spaced throughout the nursery and periodically examine cards to identify trapped insects. Replace cards weekly or as needed.

Little Fire Ants (LFA)

- To test for LFA, smear a very thin layer of creamy peanut butter on chopsticks, popsicle sticks, or coffee stirrers. Place peanut butter sticks in shady places on the ground every 10-15ft around your growing site monthly.
- Check the sticks for ants after one hour. If you see small, rust-colored ants on the stick, place them in a sealed plastic bag and freeze them overnight to kill the ants. For proper identification, Oahu Invasive Species Committee (OISC) is receiving and identifying ant samples. Samples can be mailed or dropped off (M-F, 7:30a-3pm) at 743 Ulukahiki St., Kailua, HI 96734. Include your contact info.

Coconut Rhinoceros Beetle (CRB)

- Don't stockpile compost, mulch, or wood chips for more than 4 months. If not possible, fully search material every 4 months; store material indoors.
- Inspect all host plants for damage and potential breeding materials for CRB

Section III. Pest Control in Nurseries

Maintenance pest control is the most effective way to increase the vitality, vigor, and survival rate of your nursery plants. The ongoing maintenance practices recommended below have shown to be effective against the targeted pests:

Sucking insects (e.g. aphids, mealybugs, whitefly, thrips) and mites

- Rotate between a spray application of horticultural soap and horticultural oil every other week.
- Or apply this weekly spray mix:
azadirachtin
pyrethrin
organic surfactant
horticultural soap
Place 1/2 portion of water in container. Mix azadirachtin and pyrethrin together well. Add this mix to the water. Then add the organic surfactant and horticultural soap to the water. Add the other half portion of water and mix well before spraying.
- Diatomaceous earth can be applied with a duster once a month. Be sure to apply to underside of leaves.

Ants (sweet-loving)

- Terro ant bait can be placed throughout the greenhouse on the ground and/or benches.

Note: To make sweet-loving ant bait mix 1 tsp boric acid powder with 1 Tbsp of sugar and 2 cups of water. Dissolve thoroughly.

Little Fire Ant (LFA)

- Refer to the Hawaii Ant Lab website's section on "Management of Pest Ants in Nurseries" (<https://littlefireants.com/wp-content/uploads/2020-Management-of-Pest-Ants-in-Nurseries-min.pdf>) for the latest treatment practices.

Mollusks (snails and slugs)

- Week 1 – metaldehyde
- Week 2 – iron Phosphate
- Week 3 – iron Phosphate (rain resistant formulation)
Repeat rotation after week 3. Place pellets/granules in the pots by hand. Pellets that fall to the ground will give additional control. Also, apply pellets around perimeter of greenhouse.

Diseases (fungi, bacteria and algae)

- Plant benches and nursery floors can be sprayed with hydrogen peroxide and peracetic acid once a month to prevent/control diseases and algae growth. Be sure to spray underside of benches and inside of bench legs.

Coconut Rhinoceros Beetle (CRB)

- Remove and treat any standing dead palms or logs.
- Kill CRB in soil and plant debris by: chipping, hot composting to a core temperature of 131 degrees F, completely submerging for 48 hours, steaming at 120 degrees F for at least 1 hour, or contracting a fumigator to treat with sulfuryl fluoride.
- Slow CRB population growth in soil and plant debris by: grinding, burying, tilling in, spreading to dry (less than 2" deep), tarping, covering with ½" tekken netting.
- Contract a pesticide applicator for host plant injection, soil drench, foliar spray, or granular treatment.

Section IV. Steps to Take Before Out Planting in Urban and Community Forests

It is recommended that plants being out planted to urban and community forests are free of pests. However, there is no mandate for these plants to pass a pest inspection. Therefore, the following steps are recommended but not required before out planting:

One month before (for control of root mealybug and other sucking insects):

- Dunk plant pots up to top of pot in the following solution: pyrethrin, organic surfactant and horticultural soap
- Apply imidacloprid in pots shortly after dunking pots with solution above.

Approximately ten days before:

- Conduct first pest inspection by DLNR-approved inspector or do your own inspection.
- Control plant pests indicated on inspection report.

Approximately three days before:

- Conduct second pest inspection by DLNR-approved inspector or do your own inspection. *Note: Cost of DLNR-approved inspections = @ \$115/hr + travel time @ \$95/hr + GE tax @ 4.712%. Prices subject to change.*

Section V. Steps to Take Before Out Planting in DOFAW-Administered Lands

For plants being out planted on DOFAW-managed lands (Forest Reserves, Natural Area Reserves) inspections are required and plants must be pest free. Plants are required to be inspected twice at the growing site before out planting. Before out planting follow these steps:

One month before (for control of rootmealybug and other sucking insects):

- Dunk plant pots up to top of pot in the following solution: pyrethrin, organic surfactant and horticultural soap
- Apply imidacloprid granules in pots shortly after dunking pots with solution above.

Approximately ten days before:

- Conduct first pest inspection by DLNR-approved inspector.
- Control plant pests indicated on inspection report.

Approximately three days before:

- Conduct second pest inspection by DLNR-approved inspector. Plants must be pest free at the second inspection to be cleared for out planting. *Note: Cost of DLNR-approved inspections = @ \$115/hr + travel time @ \$95/hr + GE tax @ 4.712%. Prices subject to change.*

Notes:

- 1) A pesticide is as any substance or mixture of substances intended to kill, repel, or mitigate a pest or to regulate the growth of a plant. Refer to the pesticide label for proper use of all pesticides and PPE before application.
- 2) For imidacloprid application, if plants are older (less succulent), imidacloprid may need to be applied earlier (2 weeks or so) to allow more time for systemic uptake.
- 3) Spray soaps and oils during the cooler part of the day (morning or early evening). Spot test each set (or species) of plants for sensitivity to burning before spraying all the plants.
- 4) Most of the listed chemicals can be purchased at Brewer Environmental Industries (BEI) or Simplot.

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