# 7.0 POST PLANTING TREATMENT

*Cyanea grimesiana subsp. obatae*, a critically endangered lobelia.

Some of the following guidelines are primarily geared toward ensuring the survival of rare plants given the expense of collecting, growing and planting them in the wild. However, the techniques can also be readily applied to common natives planted in the wild. As mentioned in Ch. 2, monitoring is a critical component of measuring outplanting success.

## 7.1 MULCHING

Mulching involves spreading loose, readily permeable material, such as wet straw, bark, rocks or sawdust, around newly planted trees and shrubs to protect the roots, trap moisture, and prevent weed growth.

The advantages of mulching are:

- Controls weed growth
- Considerably reduces loss of moisture from the soil surface, helping to keep planted trees and shrubs alive during a dry summer or drought
- Provides insulation and thus stabilizes soil temperature
- If organic, may add nutrients to the soil and make the soil more friable

- Prevents excessive soil and water runoff which would otherwise expose and damage surface roots.
- Helps to identify plant locations and prevent trampling

There can be disadvantages to mulching as it:

- May be a source of plant diseases or a home for insect pests (e.g may cause stem rot if mulch placed directly against stems and trunks)
- May prevent water from reaching plant roots if mulch is too impermeable
- Takes time and money
- Can increase frost damage
- Decaying leaves (e.g. guava) may suppress growth because of tannins or other plant chemicals
- May prevent desirable seeds from making good seed to soil contact and germinating

Well drained mulches (e.g. wood chips) are best as they allow rain to filter down and do not rapidly break down. Rock mulches were traditionally used by Hawaiians in agricultural plots in dryland areas. Rotten kukui logs make great mulch as they hold considerable amounts of water creating a favorable microclimate as the water slowly evaporates or is released to the ground.

Commercially available jute netting may also serve as a mulch in addition to anchoring the soil along steeper slopes.

Mulching should ideally be done when the soil is moist in order to trap in available surface moisture, therefore thoroughly water the ground around the plant before applying the mulch. The immediate area should also be relatively free of weeds. After planting, apply a ring of mulch of around the plant, being careful not to bury the stem. About three inches deep is plenty. The width will vary with the size of the plant; generally the mulch ring should be as wide as the width of the crown or width of the plant (although this is often impractical for large trees).

## 7.2 WATERING

Most forest revegetation sites are unlikely to have a readily available water supply, making the task of watering very difficult. At the initial planting, water that is hand-carried or brought to the site in a tank can be helpful in stimulating plant growth and ensuring plant survival. In the long-term however, watering is usually impractical and shallow watering can be undesirable, because it encourages only surface root growth, when deeper root systems are needed for trees to survive through drought periods. The combination of using well-conditioned and appropriate nursery stock, skillful planting technique, and mulch usually makes follow-up and long-term watering unnecessary. The best solution is often to plant the correct species for the site at the right time of year, and the need to water can often be avoided.


If the ground is not saturated by rain at planting time, watering is needed to alleviate planting shock. Generally, plants can become stressed and wilted when outplanted because the fine root hairs which do most of the water and nutrient uptake become physically damaged or even dry out during planting. See also the planting chapter for techniques to avoid transplanting shock. To ensure that the root hairs remain functional, water and careful handling is needed when planting stock in the earth. At the time of planting, about two liters is plenty for a gallon sized plant. Be careful to slowly pour the water out to allow the soil to become saturated while minimizing wasted runoff. Water above plants if on a slope and water more slowly if soils are hydrophobic (repells water). Thereafter, each plant will have different watering needs and should be watered accordingly. Generally, deep infrequent soakings are better than frequent shallow waterings, as this encourages deeper root growth. Plantings should be regularly monitored for the first four to six weeks to ensure that sufficient water (about the equivalent of a minimum of 1 inches of rain per week) is provided.

### 7.2.1 CATCHMENT SYSTEMS

Catchment systems can be a relatively inexpensive means of obtaining water in remote field sites. Systems can be as simple as a tarp over a 55 gallon plastic barrel or as complex as a large tank gravity feeding several smaller holding tanks all connected by an extensive irrigation line network.

A large 1500 gallon tank feeds a smaller 250 gallon tank which is also rigged for catchment.

Whatever the chosen catchment system, the initial effort in setting up the system can offer the rewards of having water always available for planting in the dry season as well as for herbicide use.

As with any outdoor water storage tank, consideration must be given also to preventing problems associated with disease carrying mosquitoes, algae clogging lines, and rodents using the tank or becoming trapped inside. Regular maintenance using larvicides, algaecides, gutter covers, and wire meshing at intake areas should resolve most of the above problems.

### 7.2.2 SLOW-DRIP IRRIGATION

In remote, drier areas slow-drip irrigation systems may be a favorable option. Trickle or dripper irrigation systems are two such examples. A trickle system is comprised of a low pressure water supply which feeds a main line. The main line delivers water to lateral lines, which feed the microtubes, which water the plants. Dripper heads or soaker lines have the advantage that they do not block up as often as microtubes. Numerous other delivery systems are possible. The reference section at the end of this chapter provides a useful website describing some of the more elaborate systems employed at desert sites in the U.S. southwest.

The Pahole Natural Area Reserve Program successfully implemented the use of individual ice-drip watering systems to promote the survival of slow-growing woody natives in dry and degraded reintroduction sites on Oahu. This simple deep-pipe system is comprised of a 1/2 inch PVC pipe with the open base set 15 to 22 in. below the soil surface and an equal amount extending above ground. Two nylon zip-ties attach an inverted 2 liter bottle of frozen water or nutrient solution to the pipe. A short section of drip irrigation hose is attached to the bottle by a threaded junction in the bottle cap, and fed into the pipe through a drilled hole just above the ground. The slowly thawing water drips directly to the root zone, avoiding soil surface moisture and thereby reducing weed competition. Six gallon water jugs can also be converted to a drip system by running feeder lines from the base of the jug.

A simple ‘double hole’ technique is used when planting in the dry season by The Nature Conservancy-Oahu Program. Two planting holes are dug next to one another (about 2 feet apart for gallon sized pots) on a slope with a power auger. The outplant is placed in the lower hole. In the upper hole a one gallon plastic jug is essentially buried below ground but with a pinhole pierced on the downhill side. The spout of the jug is left open at the surface to receive water which then drips out slowly at the root zone of the plant below. Two-liter frozen water bottles can also be inverted and stuck into the spout of the jug for even slower drip watering. The plastic jug should be removed from the ground following plant establishment.

Systemic insecticides approved for use in conservation areas can also be applied to the root zone using this method for particularly valuable plantings susceptible to twig borer or other pest insect damage. An additional benefit of watering ‘below’ ground is that game birds like Erckel’s Francolin are less likely to damage seedlings and plantings as they seek out and peck around moist surface areas which also attract invertebrates. Numerous sandalwood seedlings were systematically uprooted by Francolin birds at one trial planting site in Honouliuli Preserve after followup surface waterings were done.

## 7.3 FOLLOW-UP WEED CONTROL

As noted above, mulching can be an effective way of ensuring the outplants are not lost to weed re-growth. Hand-weeding in a 3 foot diameter around the base of outplants will do much to prevent strangling and surface water competition. Also, herbicides that are grass specific such as Fusilade® or more non-selective such as Roundup® can be carefully sprayed around the base of outplantings. A low volume spray with a funnel over the nozzle to minimize herbicide drift is a quick and effective means of ensuring target plant establishment. Ideally however, most of the troublesome weeds should have been removed prior to planting. Herbicide users should be careful not to overapply herbicides as some herbicides may also kill valuable soil microflora which assist plants through soil creation and nutrient uptake.

## 7.4 REFERENCES

Bainbridge, D. Irrigation at Remote Sites. Soil Ecology and Restoration Group. www.serg.sdsu.edu/SERG/techniques/Irrigation.pdf