double dibble

—COMPANION PLANTING TECHNIQUES FOR ESTABLISHING RARE PLANTS

William Garnett |

Figure 1. An *Acacia koa* seedling receiving deep-pipe irrigation.

Photo by William Garnett

ABSTRACT

On O'ahu, growing some plants together in the same container in the nursery or planting them in the same hole on the restoration site increases survival and growth. I present a few examples of species combinations where companion planting provides better results than planting either species separately. I also describe a simple deep-pipe irrigation system used on outplanting sites.

KEY WORDS
co-planting, container plants, threatened and endangered, Hawai'i, irrigation

NOMENCLATURE
(plant names) ITIS (2002); (Hawaiian names) UHB (2002)

The technique of companion planting or co-planting involves planting 2 species together either in the same container during nursery production or in the same planting hole on a restoration site. This idea has been around a long time, and essentially involves grouping plants in order to provide microclimatic conditions that duplicate natural succession.

Companion or co-planting has proved to be an excellent restoration technique to promote survival of slow growing common and endangered woody species in dry and degraded reintroduction sites on O'ahu in Hawai'i. It has been especially successful for plants grown in 2.8- and 6.2-l (1- and 2-gal) Treepots ™ (10 to 15 cm [4 to 6 in] square top, 36 to 41 cm [14 to 16 in] deep; Stuewe & Sons Inc, 2290 SE Kiger Island Drive, Corvallis, Oregon 97333-9425; URL: http://www.stuewe.com) and planted into 76-cm-deep (30-in) holes into which 113 g (4 oz) of both green sand and rock phosphate was added. Plants are irrigated with a simple deep-pipe system, comprised of a 1.3-cm-diameter (0.5 in) PVC pipe with the open base set 40 to 55 cm (15 to 22 in) below the soil surface and an equal amount extending above ground. Two nylon zip-ties attach an inverted 1.5-liter (50 fl oz) 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 ground level. The slowly thawing water drips directly to the root zone, avoiding soil surface moisture and thereby reducing weed competition (Figure 1).

Originally, a native koʻokoʻolau (*Bidens torta* Sherff [Asteraceae]) was co-planted into the large tree pots with the native ʻiliahi (sandalwood, *Santalum ellipticum* Gaud [Santalaceae]) and uhiuhi (*Caesalpinia kavaiensis* Mann [Fabaceae]). The *Bidens* provided a host for the hemiparasitic sandalwood while binding the container substrate around the uhiuhi roots. I believe that both ʻiliahi and uhiuhi survive transport and planting better when grown in contact with koʻokoʻolau roots.

I have seen that planting the slow growing ʻōhiʻa lehua (*Metrosideros polymorpha* Gaud [Myrtaceae]) in the microclimate created beneath the bushy *Bidens* allowed us to outplant younger nursery stock of ʻōhiʻa while dramatically improving ʻōhiʻa survival and vigor during the first 2 y.

Finally, I have good success reintroducing *Acacia koa* Gray [Fabaceae] on to sites using companion planting. I sow koa seeds 10 cm (4 in) deep into a "dibble tube" (SC-10 Super Cell; 3.8 cm [1.5 in] diameter, 21 cm [8 in] deep, 164 ml [10 in^3]; Stuewe & Sons Inc). I then either transplant a *Bidens torta* or pili (*Heteropogon contortus* (L.) Beauv. ex Roemer & J.A. Schultes [Poaceae]) plant or direct sow their seeds on the substrate surface. As the herb or grass grows, it binds the container substrate and after outplanting, the koa seeds sprout and establish during the coming years. Further, the fast growing *Bidens* or *Heteropogon* provide a seed source on site within a year, which can be allowed to fall and sprout in place, be harvested and scattered on another site, or harvested and returned to the nursery to propagate more plants.

Double planting in deep pots or dibble tubes or planting companion species on outplanting sites has improved survival of endangered plants on reintroduction sites, enhancing the restoration process. This technique may have utility for other slow-growing or rare species and I encourage other nursery managers and restorationists to experiment with other species.

REFERENCES

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AUTHOR INFORMATION

William Garnett
Botanical Horticulturalist
59-753 Alapio Road
Haleiwa, HI 96712
wili@hawaii.rr.com