

# Polystyrene Bullets Not Satisfactory For Reforestation in Hawaii

Gerald A. Walters

Pacific Southwest Forest and Range  
Experiment Station USDA Forest Service  
Berkeley, Calif.

Forest planting practices in Hawaii rely on bare-root or bagged seedlings. Both methods increase labor, relying on the use of dibble or mattock to prepare the planting hole. In Hawaii, the opportunity for mechanization is limited because of the rugged topography and rocky soils. To reduce reforestation costs and allow more time for other forest management practices, a more efficient reforestation method must be found.

The Canadians have developed a technique which expedites planting (1, 2). It involves polystyrene "bullets" and a hand-operated mechanical action "gun." Tree seedlings are grown in bullets and, when ready, both seedlings and bullets are injected into the ground. With this gun, planting becomes a one step operation.

Could such a technique be used in Hawaii? To find out, I obtained bullets from Canada. The 444-inch long bullets were loaded with planting medium and

sown with *Eucalyptus saligna* and *Acacia koa* seeds. Seedlings of both species developed vigorously in the bullets.

After 14 weeks the seedlings of both species, which averaged 10 inches tall and 0.1 inch in diameter, were outplanted. Removing the bullets from the holder was difficult because roots of many seedlings were growing into adjacent bullets (fig. 1). This problem could be eliminated by removing the medium from between the bullets after loading, but this would be tedious.<sup>2</sup>

Planting bullet seedlings with the planting "gun" proved difficult on soils typical of much of Hawaii's forest lands. Such soils have medium to high clay content and high rock content, both of which resist the penetration of the bullet. I intended to plant 100 seedlings on a clay soil so that the planting would become a demonstration area. But after only getting 10 seedlings successfully planted out of 50 attempts, I gave up. Often up to four "shots" were necessary to get the bullet completely into the soil. In the process, either the seedling's stem was broken or the roots were damaged when the bullet broke (fig. 2).

All 10 of the seedlings that were planted eventually died. Mortality was apparently due to lack of moisture even though intermittent showers occurred during the weeks after planting. Because the bullet encases all but a small portion of the roots, direct contact between the surrounding soil and the roots or planting medium is minimal. Apparently, moisture lost from the planting medium by the transpiring seedling cannot be replaced fast enough from the soil to keep the seedling alive.

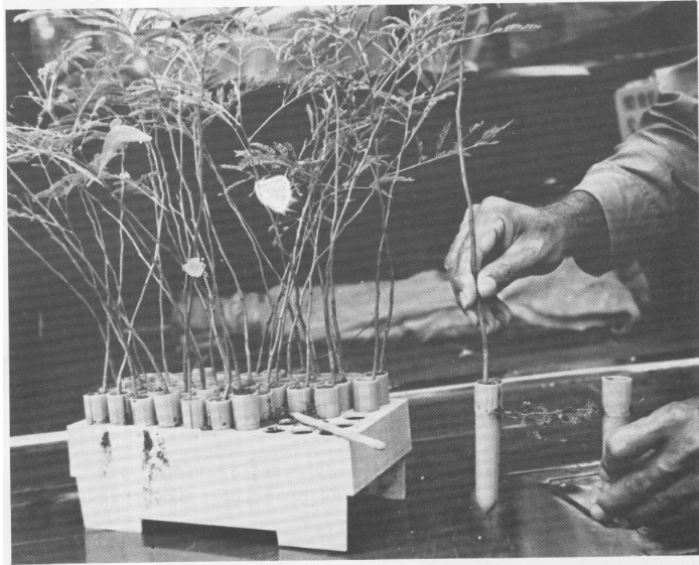
My attempt to plant bullet seedlings in a rocky soil failed completely. None of the 20 seedlings tried was successfully planted. Even when I picked what was apparently a good planting spot, the bullet shattered when it hit a rock or log hidden under the soil surface. And when the bullet shattered, the seedling was destroyed.

Because of these problems, it does not appear that the bullet planting technique is feasible for reforestation in Hawaii. Meanwhile other more promising methods are being studied for their applicability.

1- Author is stationed in Honolulu, Hawaii

2- My method of loading bullet was the same as used in Canada.

Figure 1. The planting between the polystyrene bullets allowed Acacia koa seedling roots to grow outside the bullet, making it difficult to extract the bullets from the holder.



### Literature Cited

1. Arnold, J.T. 1971. Field performance of Douglas-fir and Western Hemlock container seedlings. Pacific Forest Research Centre, Canadian Information Report BC-X-63.
2. Vyse, A.H. 1971. Planting Rates increased in British Columbia with new planting gun and bullets. *Tree Planters' Notes* 22(1):1.

23

Figure 2- Planting bullet seedlings with the planting gun was difficult because the clay soil resisted. This bullet was not completely in the soil even after three "shots", and the seedling was broken in the process.

