

# Container Hardwood Seedling Production

John McRae

John McRae is Operations Manager, International Forest Company, 1550 Simpson Road, Odenville, AL 35120; telephone: 205.629.6461; e-mail: jmcrae@interforestry.com

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**Abstract:** Container production of hardwood seedlings requires larger cavities, more space, and the ability to easily sort seedlings (as compared to conifers) very early during the germination phase of production. This presentation demonstrates the most productive system, based upon past experience, to commercially produce container hardwoods. The container system of choice is called “Old Native Tube” or “Vic Pots” and was developed and manufactured in Australia. Seedling target sizes are 18 to 24 in (45 to 60 cm) in height and 5 to 7 mm root collar diameter (RCD).

**Keywords:** Vic Pots, sorting, seed quality

## Introduction

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International Forest Company introduced commercially produced container hardwood seedlings to the Southeastern United States market in the early 1990s (McRae 1999). Details of production techniques and costs compared to bareroot seedlings have already been reported (McRae and Starkey 2002). This presentation focuses on container and media revisions since the 1990s.

## Container Production

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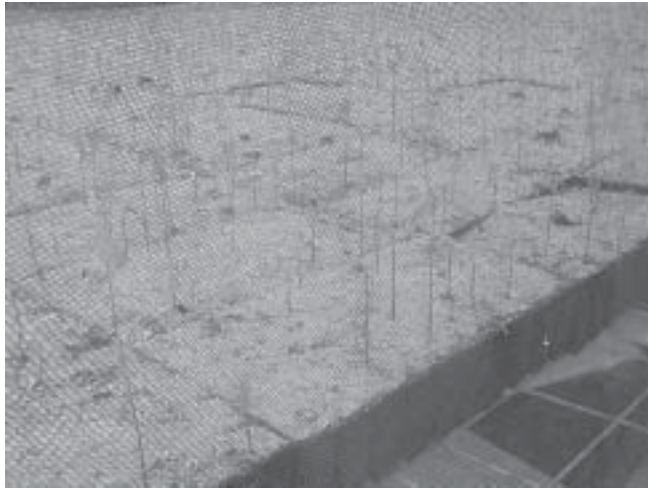
### Container Types

Early production of container hardwood seedlings occurred in Hiko V-93 containers. Although the seedlings grew very well, usually in excess of 18 in (45 cm), the root-to-shoot ratio was often out of proportion. Outplanting survival was not affected by this ratio imbalance, which was likely due to the excellent quality root establishment as a result of our growing techniques. However, height growth after outplanting was often less than desired. To create a better ratio, production was changed to the Ray Leach™ system, using 115 cc (7 in<sup>3</sup>) tubes. These were easily sorted to accommodate noticeable germination and subsequent growth rate variability that was traced to seed size. Better yield (more quality seedling production) resulted, as well as increased height growth after outplanting. However, the system was expensive to use, primarily during the media filling operation. Also, we still desired a larger cavity. A Styroblock™ product (Superblock 60/220 ml [13 in<sup>3</sup>]) was used to facilitate media filling. A better root-to-shoot ratio was obtained, but the seedlings were very difficult to extract and sort by size during the germination phase. This operation (sorting by size) is crucial to our success of increasing the yield of our shippable products.

### Seed Size and Quality

Seed size and quality, especially among oak species, have a tremendous influence on speed of germination as well as subsequent growth rates. Proper moisture content is, of course, crucial to uniform germination. Assuming filled live seeds are sown also plays a large role in container production. Inevitable significant germination and growth rate variation make it difficult to obtain uniform stands that are critical to efficient production required for container seedling success. Seed quality remains a significant issue that all growers must understand; adjustments in growing techniques are employed to maximize yields within individualized restraints. The effects of seed size are evident within 19 days of sowing, resulting in seedlings as tall as 9 in (23 cm) adjacent to many acorns from the same species and seedlot that have yet to initiate hypocotyl growth (Figure 1).

After observing successful production of rooted cuttings in “Vic Pots” by Boise Cascade personnel in Los Angeles, CA, we surmised that this system would best suit our needs as well. This container system, also referred to as “Old Native Tube,” is manufactured in Australia. The tray system is composed of 3 parts: (1) the tray, (2) tube inserts, and (3) a bottom drip



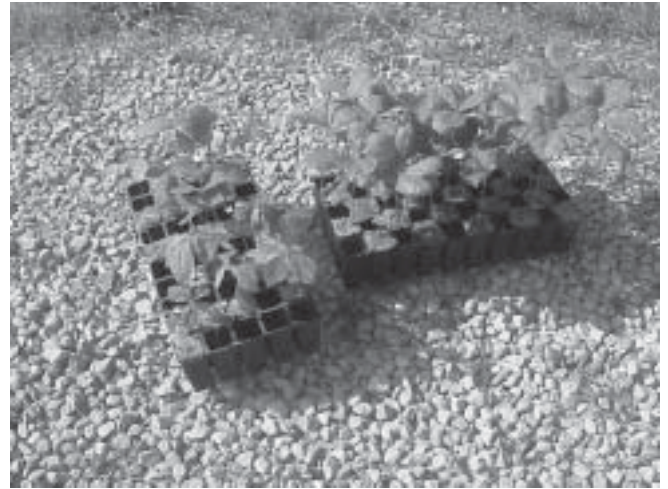
**Figure 1**—Oak seedlings showing variations in height growth initiation 19 days after sowing.

rail that snaps on the tray bottom to aid air pruning and media drainage (Figure 2). The tray holds 50 cavities that are flush mounted, which facilitates mechanized media filling very well. They are square tapered tubes containing ribs that perfectly guide root growth downward. The cavity is 15 in<sup>3</sup> (240 cc), 5 in (13 cm) deep, 2.5 in (6 cm) across the top that tapers to 2 in (5 cm) at the bottom containing a double “cross hair” to help media retention. The cavity density is 22 cavities/ft<sup>2</sup> (244 cavities/m<sup>2</sup>) (as compared to the HikoV-93 tray of 49 cavities/ft<sup>2</sup> [544 cavities/m<sup>2</sup>] and typical bareroot production of 10 to 12 seedlings/ft<sup>2</sup> [111 to 133 seedlings/m<sup>2</sup>]).

This large cavity allowed us to change our media mixture to include hammered peat moss and fine vermiculite to enhance moisture retention which, in turn, provided greater flexibility in our watering regimes. Also, as a standard practice, we add Banrot® 8G and a Polyon® 4-month controlled release fertilizer to the media.



**Figure 2**—“Vic Pot” 50 cavity tray with drip rail.



**Figure 3**—Oak seedlings grown in “Vic Pots” and sorted by size 30 days after germination.

This system allowed seedling sorting very early in the germination phase without disturbing the roots, thereby increasing our seedling yield and quality. Seedlings 8 to 12 in (20 to 30 cm) in height after 30 days were removed from the trays and transferred to alternating cavities in new trays (Figure 3). The consolidated shorter seedlings had more space to grow vigorously into shippable products. Based on results thus far, we expect a 50% greater yield of quality seedlings, resulting in vigorous growth after outplanting as compared to production in Hiko V-93 trays. Seedling target sizes remain 18 to 24 in (45 to 60 cm) in height and 5 to 7 mm root collar diameter.

## Summary

Based upon the results of 2 seasons, International Forest Company will continue to employ the “Vic Pot” growing system to produce hardwood container seedlings. Hardwood seed quality will always remain a critical issue. Hence, nearly any physical improvement that can be made that results in greater uniformity will certainly be researched and then employed where success is evident.

## References

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