

A TREE TRIAL AT BERWICK - DEC 2002 TO JUNE 03

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Purpose of the trial.

The trial set out to develop ideas for a simple, low cost flood and drain rack - for use with a proposed new family of 3D air-pruning propagation cells. The cells and their nursery environment are being designed to work in harmony. The aim is to make it easier for skilled propagators to achieve Step 1 of the RocketPot Tree Growing System

We compared seedlings with a high output forestry tube grower late in March 03. The Berwick trial seedlings were then 15 weeks from seed and free of root distortion. They were about three times more advanced than 20 week-old seedlings in forestry tubes.

Disclaimer. The results are presented here more as an anecdote than a proper trial. We hope that experienced propagators will check our results in formal trials.

Growing medium, containers and seed

Eucalypt and Acacia seeds were sown mid December 02, directly into 8 litre air pruning pots. They were RocketPot[®] Container Model K2026 – the smallest available. They were close-stacked on 1200 x 800 mm Euro pallets in an open factory backyard. Dr David Nichols of Debco designed the growing medium especially for the trial. It was fine and water retentive with appropriate slow-release nutrients. The trial quantity was 300 pots. Seed was 3 year-old stock - germination rate unknown.

Germination

Approximately 3 seeds were sown in each pot by hand. Early sowings were often off centre. A cardboard disc 190 mm in diameter with central hole was developed to help centralise the seeds and control dibbling depth. Vermiculite cover was used initially but abandoned in favour of cover by the medium itself. Gentle sprays proved necessary to avoid washing the seed off centre.

The weather was hot and windy. Watering was by hand wand twice daily for the first 8 weeks. Most of the *E. viminalis* germinated within the first 2 weeks. The *C. citriodora* and *A. melanoxylon* were slower, frequently germinated off centre and sometimes failed to germinate at all despite three seeds per pot.

During January and February 03 we regrouped the non-germinating /off centre pots and re-sowed them with *E. viminalis* and fresh *C. citriodora* seed. The medium was not changed in any way except for a light cultivation of the surface. Germination was much improved with fresh seed, centralising ring and gentler spray watering. These re-sown trees are looking good now but growing slowly, unprotected and unheated in winter.

Seedlings at 3 June 03 - 25 weeks from seed



Flood and drain watering

Late in Feb 03 all the pots were transferred to a new location on top of a windy hill. The 135 “success at first try” trees were staked at about 300 mm tall and placed in a purpose-built flood and drain rack. The rack was 1.2 m wide and 6.5 m long. Second-hand Euro-pallets were used to support a durable and UV stable plastic fabric as a bath. Rainwater from an open dam was pumped into the rack and allowed to stand for about 2 hours. The surplus water was drained back to the dam. Watering frequency was once per 2 or 3 days in hot or windy weather and every 3 or 4 days in cooler still-air periods.

The trees were exposed to full sun and wind at all times. The weight of one sample tree and pot ranged from 5.5 kg saturated after flooding to 4.2 kg at wilt point.



E. viminalis in flood and drain rack - 3 June 03



Sample root system at 24 weeks

Results and observations

One third of the trial containers produced viable trees at first sowing. Referring to these 135 viable trees:

- At 2 weeks, a few root tips were visible beneath the container.
- At 3 weeks, root tips were visible at the air pruning cusps in the upper walls.
 - The number of root tips visible under the base increased sharply.
 - Washing root balls showed downward branching attempts by the radicle.
- After 16 weeks,
 - Air pruned root tips were visible at all 154 of the available open air pruning cusps.
 - The growing medium was packed with roots.
 - The trees were typically 1.00 metre tall with stem callipers of 10 mm+.
 - The shorter trees seemed to catch up with the taller trees (no hard data) – They all looked “saleable”.
- After 22 weeks the trees growth slowed and typically reached 13 mm/1.25 m.

Summary

At end March 2003, the trial trees are at least 3 times more advanced than those we compared that had been sown in conventional tubes at earlier dates. They looked good, with excellent stem taper. A comparison with conventional tube trees of earlier seeding date at late March showed that typical trial tree heights were 1000 mm v 300, callipers 12 mm v 4 mm. Deformed roots visible on washing out 3 root balls of each type were Nil v 3 significant pricking out defects.

Conclusions

1. The trial leads to more questions

Q1. Was the high growth rate achieved because of

- Long radicle before air pruning?
- 8 litres to grow in?
- 3D Air root pruning pot design?
- Fine - purpose designed media?
- Flood and drain watering?
- Planting seed midsummer?

Q2. Are fast-grown native trees better or worse than slow-grown trees?

Q3. Can the time to produce advanced trees be cut very substantially?

2. The trials highlighted the need for fine watering at germination, seed centralising and precise depth control.
3. Flood and drain watering worked well. Water losses were negligible - water used almost equals water actually consumed.

C. citriodora at 11 weeks from seed



Next steps

1. How do the seedlings grow on?

The select seedlings are being planted into 3D air pruning containers to grow on as advanced trees and the results will be noted. A mix of 22 week-old (original sowing) and 16 week-old (re-sowing) seedlings is under trial.

2. A workable flood and drain rack?

A new flood and drain rack is being built. Water will be retained in the rack and may be heated to assist winter propagation. TAPS will offer the new design of rack as a package for those wishing to pursue their own trials.

Test site at Berwick - Re-sown trees are on pallets at left



The RocketPot® Tree Growing System

Recommendations for consistent success with advanced trees

Part 1 - In the tree nursery

1. Direct sow seed or cuttings to air root pruning pots. Do not prick out.
2. Use a lower porosity medium.
3. Reduce pot-up steps to a minimum.
4. Use a squat-pot profile to match available soil horizons.
5. Use a cylindrical pot for root growth where it counts.
6. Provide air space under every pot in the nursery.
7. Straighten the tree trunk.
8. Grow the tree until roots “lock up”
9. Hold the tree in its RocketPot® container to extend its shelf life.
10. Ship in tree vending bags.

Part 2 - Planting and maintenance



11. Drain each planting hole to another trench or drain.
12. Plant to a hole of the same depth as the root ball and at least twice the diameter of the root ball.
13. Avoid teasing the root ball. (normally)
14. Backfill with friable soil from the original hole.
15. Amend backfill in sandy soils, using growing medium.
16. Flood in.
17. Mulch as wide as possible (but not the root ball itself).
18. Stake only when necessary. e.g. For Tall trees with high sail area and for vandalism resistance.
19. Water twice per week in the first Spring.
20. Water at least twice per week in summer and once per week in autumn until self-sufficient.