

## **LOW COST PROPAGATION OF EUCALYPTS**

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Over the past few years there has been an increased awareness of the need to plant trees in Australia. This has been of particular importance on agricultural land, which is being degraded at an alarming rate. Various bodies such as "Greening of Australia" and the "National Tree Program" have launched major programs of rural reforestation.

A large number of ingenious methods have been tried, both in the raising and establishment of trees with varying degrees of success to support these programs. There appear to be three major problems to be overcome for these programs to succeed.

Firstly, plants must have a very low cost so that farmers, reserve managers, and other interested groups with limited budgets can afford to plant and establish significant numbers of trees.

Secondly, these plants must be easily handled and transported in the field, be inexpensive to plant but still with sufficient growth potential to establish quickly when planted out.

Thirdly, it is essential to ensure high establishment rates with minimum cost.

In most of Australia the climate is harsh, with high summer evaporation rates, (and often the soils are poor). Under these conditions transplant shock and desiccation often cause high plant losses during establishment.

In the 1960's APM Forests in New South Wales and Victoria developed a method of growing eucalypts in small compressed peat pots (Jiffy Pots) (1). This technique met with considerable success in the establishment of forestry plantations.

The ACT Parks and Conservation Service decided to use a similar method in field trials with eucalypts for use in the production of firewood lots, and peri urban landscaping in the ACT.

Low survival rates often occur after planting out into the field, and this is costly. Transplant shock due to root damage and water stress is probably the most common problem. There is a loss of growth potential, die-back of roots and young shoots, and quite frequently, death.

If an improved or more constant supply of water to the roots could be achieved in this early stage of establishment, much of this plant damage and death could probably be reduced.

Super absorbents such as acrylamide polymers, can be used to trap gravitational water and hold it in the vicinity of the roots. A compound such as Austrasorb<sup>®</sup> is capable of holding many hundreds of times its own weight (approximately 500) of water at a

pressure of one to two atmospheres, making it readily available for plant roots. It was decided to use Austrasorb in the establishment of the trees grown in the smaller-sized Jiffy Pots to try and decrease the percentage loss due to early desiccation.

## MATERIALS AND METHODS

Because of Canberra's harsh climate it was decided to grow the plants in a glasshouse rather than in an outside nursery, with a short hardening-off period outside before planting. In the initial trial 30,000 eucalypts of some 70 different species were raised in 57mm × 57mm × 50mm Jiffy Pots; 30 pots were fitted into a standard 285mm × 340mm plastic seedling tray.

The soil mix was 75% washed river sand 25% peat moss. The seedlings were raised in punnets and pricked out one per pot at the two leaf stage. They were watered with an automatic overhead watering system in a glasshouse, and fertilised twice a week with Aquasol at full strength. The seedlings were grown in the glasshouse for about 4 months during winter then taken out for hardening off in early spring. They were planted out in spring into sites prepared by deep ripping and disc ploughing. The seedlings were between 250mm and 380mm in height at planting.

Establishment rates were high and growth was good during the first summer and autumn, and as a result a second small trial was set up to see whether the cost of production could be reduced and more flexibility could be achieved by controlling growth, and reducing the pot size without affecting the good establishment rates.

Plastic seedling trays 285mm × 340mm were filled with 72 Jiffy Pots (in cards of 12) 36mm × 36mm × 50mm. The pots were filled with a washed river sand which had no added soil or nutrients. A fine layer of ground dry peat moss was sprinkled over the top of the sand to prevent seed falling down into the voids in the sand as well as providing moisture for germinating seed.

Four species were used, *Eucalyptus globulus* subsp. *bicostata*, *E. cinerea*, *E. mannifera* subsp. *maculosa* and *E. melliodora*. Four trays of each species (308 plants) were used. Seeds were sprinkled onto the surface, making sure that each pot received 3 or 4 seeds. When the seeds germinated they were thinned to one per pot by cutting the excess off at the ground level with a small pair of scissors. This process is the most time consuming one in the operation, but with practice can be done very quickly. The seedlings were fertilised twice weekly with alternate applications of full strength Aquasol and Phostragen. When the seedlings were about 150mm high they were moved out of the glasshouse and hardened off under 50% shade.

A site was prepared for planting by ripping. Single rip lines were made about 450mm deep and about 2 metres apart. The seedlings were planted into the rip lines and no water was added at

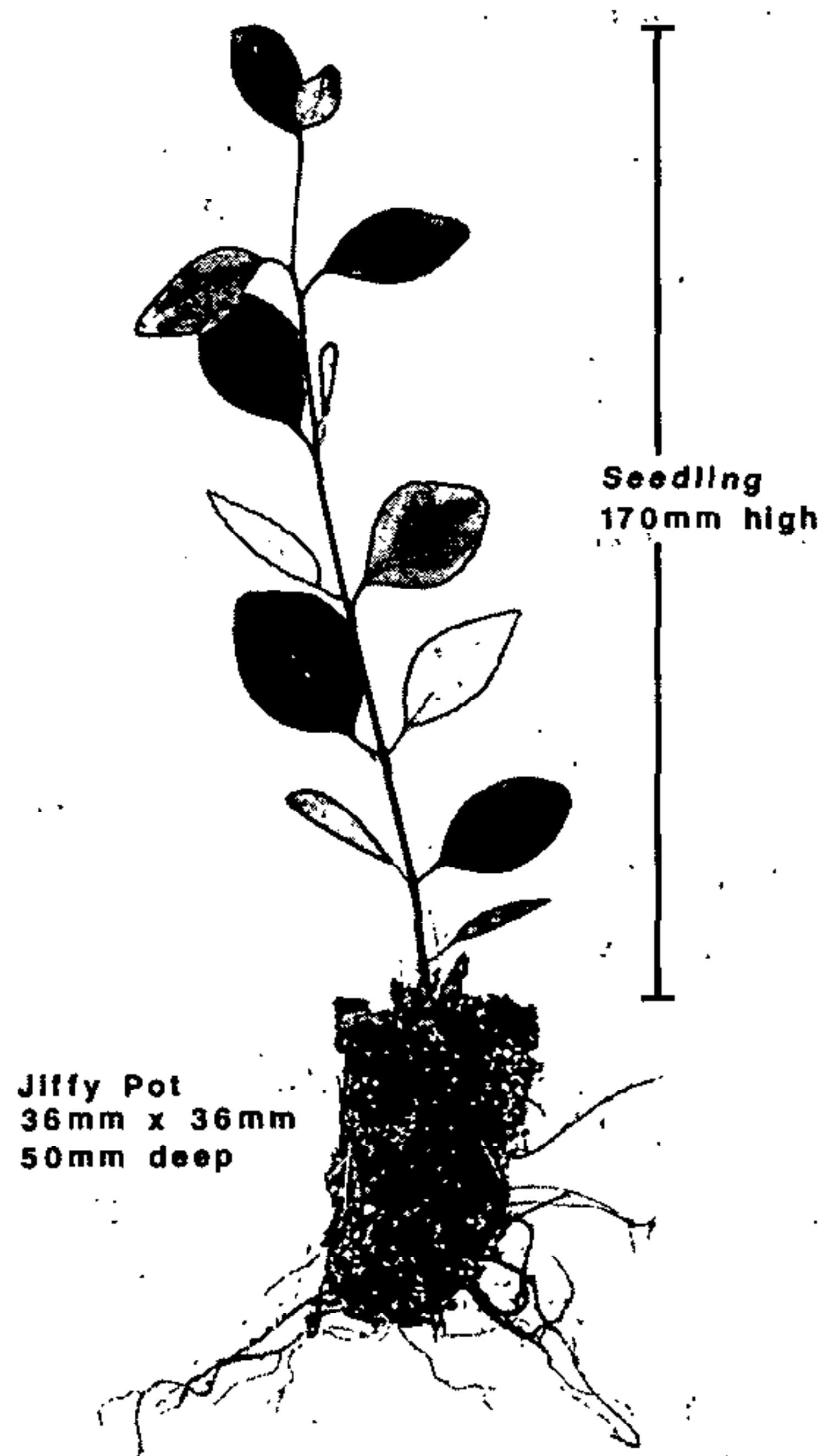
the time of planting. There had been no rain on the site for two weeks. Four rip lines were used, the plants in one line were given no treatment and all plants in the other three lines were given about 1gm of Austrasorb added as a gel made up at a rate of 1gm Austrasorb to 300cc of water. The gel was added into the planting hole, and the Jiffy Pot was placed in on top of it. About half the plants were planted out in this initial trial in late February, when conditions were quite hot and dry.

A second planting was done about three weeks later using the remainder of the plants. Three quarters of the plants were treated with Austrasorb as before and the remainder were left untreated. This time, however, all plants were watered in using about 10 litres of water per plant immediately after planting.

One tray of plants was kept for about five months. It was watered and no fertiliser was added, to observe what affect this would have on future planting stock.

## RESULTS

The seedlings raised by the above method were well suited for large scale planting. They had well-developed root systems and were easily separated from each other. There were no problems with growth and the sandy medium gave good aeration for healthy roots (Figure 1).



**Figure 1.** Eucalypt seedling grown in sand in a Jiffy Pot.

This method allowed large scale production—up to 30,000 in an 18m × 6m glasshouse using 57mm × 57mm Jiffy Pots, and 72,000 in the same area in the smaller 36mm × 36mm pots every four months. The cost of production of the seedlings in the larger Jiffy Pots was about 45¢ per plant, and about 20¢ per plant in the smaller containers.

The single tray of seedlings, which were kept in the tray for several months, ceased to grow when the fertiliser ran out, and turned a reddish colour. They remained in this state of suspended growth provided they were watered regularly.

After about 5 months they were fertilised with Aquasol several times, and quickly greened-up, commenced to grow, and were successfully planted without any apparent deleterious effects. These plants are now growing vigorously.

The large scale planting of the eucalypts in the 57mm × 57mm Jiffy Pots was very successful with above 90% establishment rate in the field. This was a spring planting and there were very few losses in the first summer.

In the first trial using the small Jiffy Pots, after 3 months there was about a 70% survival with the Austrasorb-treated plants, and only about 15% survival of the untreated ones. These plants received no water at planting and it did not rain for more than three weeks. The larger-leaved faster-growing *E. globulus* subsp. *bicostata* seedlings suffered more damage and death than the other species used.

In the second trial using the small Jiffy Pots, the survival rate after establishment and two months growth was 95% in the Austrasorb-treated plants and about 50% in the untreated plants.

## DISCUSSION

This method of raising eucalypt seedlings in Jiffy Pots in a glasshouse is very efficient and cost effective. The smaller Jiffy Pots (36mm × 36mm) are also quite suitable, provided the seedlings are planted when they are below 250mm in height. Larger plants may be harder to establish. The cost of production of this sized plant is very low, relative to other techniques, and is suited to low budget or large scale plantings.

Both sizes of Jiffy Pots produce plants which establish easily in the field, with very high success rates. Planting into rip lines is the recommended method. The use of the super-absorbent Austrasorb greatly increased the survival and early growth potential of the young plants.

This propagation method and establishment package is recommended for eucalypts, particularly for farm plantings. As with all

other planting techniques, follow-up weed control is essential to ensure that the seedlings become trees.

### LITERATURE CITED

1. McIntyre, D. K. and L. D. Pryor, 1974. Response of flooded gum in plantations to fertilisers. *Australian Forestry*. 17:15-23

## NON-ASTRINGENT PERSIMMON PROPAGATION IN SOUTHEAST QUEENSLAND

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### INTRODUCTION

The persimmon (*Diospyros kaki*) is native to China and Japan. Most of the development of the crop has been done in Japan where the persimmon has been considered as its national fruit. In 1987, domestic production of the persimmon in Japan was 309,000 tonnes; the fruit is consumed both as a fresh fruit and a processed product. Persimmon industries are now being developed in Australia, New Zealand, California, Israel, and Italy.

Evaluation of the persimmon in southeast Queensland has primarily been aimed at making better use of frost-prone, marginal, horticultural land unsuited to most other tree crops. There is the potential for exporting "out-of-season fruit" to Japan, other Asian countries, and Europe as the fruit is much sought after in these countries.

At this stage there are approximately 15,000 trees planted in southeast Queensland and market prices in Brisbane for 1987 have been firm. The use of top quality, uniform planting material is critical in the establishment of any orchard. In southeast Queensland there have been variations in the success of persimmon propagation techniques.

### PROPAGATION TECHNIQUES

**Rootstock Selection.** There are three rootstock species commonly used for persimmons in the world.

1. *Diospyros kaki*—Japanese/oriental persimmon;
2. *Diospyros lotus*—date plum (native to China);
3. *Diospyros virginiana*—American persimmon (native to midwest and southeast United States).