liquid fertilizer regularly can help, but the sooner they are potted the better.

As we grow about 150 *Camellia japonica* cultivars we are likely to have difficulties with some.

We have found that only one or two *C. japonica* cultivars have failed to root; it will take a number of seasons to determine if this is due to the use of Rockwool or to the cutting material used. We also experimented with two cultivars previously discarded because of propagation difficulties and found them to strike very well using Rockwool as a medium.

An advantage of using Rockwool is the speed with which it can be handled. There are no pots to fill and no trays or baskets to pack and the medium requires no sterilization. The potting stage is facilitated by planting the entire material; there is no "knocking out" and no empty tubes to store. Sheets of Rockwool can be picked up wet if handled carefully; alternatively a bricklayer's trowel can be used.

Our use of Rockwool in 1983 resulted in a 25% better strike and saved considerable time and labour. Potting, however, must be carried out quickly after rooting to preserve the strike. A solution to the green algae problem must be found.

ENCLOSED MIST SYSTEM FOR PROPAGATION OF BROAD-LEAVED EVERGREENS

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The first requirement in any propagating system for leafy cuttings is to conserve water in the cutting, which no longer has access to a free water supply from a root system. While some water can be absorbed through the cut base of the cutting, this is generally insufficient to replace water loss from transpiration. This water loss occurs because the humidity of the air around the cutting is lower than the humidity of the air inside the cutting. If the temperature of the air around the cutting increases, the relative humidity decreases; if the leaf temperature rises the vapour pressure inside the cutting increases, both lead to increased water loss from the cutting. Plants will endeavour to regulate this water loss in two ways: some have evolved structural forms of stomata which restrict rate of water transfer, while all plants will tend to close the stomata as water stress occurs. The extent of stomatal closure has a profound effect on CO_2 uptake.

The second requirement is to provide an environment in which the leaves can continue to photosynthesize during the process of root formation. Few leafy cuttings, when taken, have adequate reserves of carbohydrates to provide both the energy and the raw material required for root initiation and development. These two requirements are diametrically opposed; because photosynthesis requires that the leaves be exposed to light, and light falling on the leaves will raise the leaf temperature, with consequent increase in potential for water loss.

The traditional approach to propagation by leafy cuttings was to enclose them in a relatively small structure, e.g. closed frame, or polythene tent, usually inside a greenhouse. In such a small structure it is possible to maintain a higher level of atmospheric humidity than in an open, ventilated greenhouse. While these structures were an advance in their time they had a severe weakness. Light entering the structure caused a considerable increase in air and leaf temperature and consequently the cuttings would transpire rapidly, diminishing their potential to form roots.

To overcome this problem it was normal practice to reduce the amount of light by shading; this reduced photosynthetic activity and hence also reduced the potential to form roots. The art of the propagator was to juggle these two factors, sometimes referred to as the "propagators' dilemma".

The introduction of the intermittent mist system seemed to have overcome this problem. Cuttings were planted in open benches and sprayed with water in an endeavor to maintain a film of water on the leaves. This would have two effects — evaporation of water from the leaves would reduce leaf temperature, and simultaneously would raise the humidity of the air immediately surrounding the leaves, hence reducing the potential for transpiration. Because of the leaf cooling effect the leaves could be exposed to much higher light, and thus be more effective in photosynthesis. The intermittent mist system has been widely used, and is generally accepted as superior to the polythene tent, but recent studies have shown it to be less effective than we have previously thought it to be.

The disadvantage of intermittent mist systems is that, in fact, the relative humidity of the air varies from about 100% following a burst of mist to much lower values between bursts, as less humid air in the ventilated greenhouse mixes with the air around the cuttings. Furthermore, the irregular pattern of the leaf canopy makes a uniform distribution of water to all leaf surfaces impossible. Because of these two factors, some cuttings may be subject to periods of water stress, even in a system which appears to be working satisfactorily.

The practice of combining the two systems, using mist inside a polythene tent, has been provided by Loach (1,2) at the Glasshouse Corps Research Institute in Britain. The advantage of this "enclosed mist" system is that it combines the effect of reduced leaf temperature and consequent reduction in leaf vapour pressure with increased humidity around the leaf because of the enclosed atmosphere inside the tent. Although air temperatures inside the tent rises above the ambient temperature of the greenhouse, leaf temperature does not rise to the same extent, so that transpiration is reduced. Measurements have shown that in an enclosed mist system the potential transpiration may be only about 60% of that in an open mist bed.

The New Zealand Nursery Research Centre (3) has carried out trials with enclosed mist systems, in comparison with open mist systems, over the last three years. This was done by erecting a rectangular section metal frame, 0.4m high, over half of each of two mist benches inside a greenhouse. Polythene film was draped over this frame to give an enclosure, although no attempt was made to ensure that it was 100% airtight. Some typical results are shown in Table 1.

Table 1. Percentage of cuttings rooted under two different kinds of mist systems

Species	Open mist	Enclosed mist
[*Azalea kurume* 'Kirin'][2]	98a[1]	100a
Boronia heterophylla	44b	74a
Boronia megastigma	69a	26b
Daphne odora 'Rubra'	56b	95a
Nandina domestica 'Pygmaea'	70b	100a
Rhododendron 'Ivery's Scarlet'	34b	60a

[1] Numbers followed by the same letter are not significantly different at the 5% level.
[2] *Rhododendron* (Kurume) 'Kirin'.

In general the rooting of the broadleaved cuttings in the closed mist was either improved, or equal to that of the open mist, but in one case, *Boronia megastigma*, it was significantly reduced. It is likely that the greatest benefits of enclosed mist will be found in cuttings whose resistance to transpiration is low, and the least in cuttings which are easy to root in almost any conditions. It has been found that conifer cuttings are generally inhibited from rooting in an enclosed mist system. One theory (1) is that in conifers the stomata are generally grouped in deep pits, which would easily be blocked by water, thus depriving the leaf of CO_2. Similar conditions may well occur in other fine-leaved evergreens, e.g. *Boronia megastigma.*

Successful use of the closed mist system depends upon careful attention to two factors. The first is aeration of the propagation medium and drainage, since there is a high level of water entering the system, water must be able to drain freely from the propagation medium and bench. The system in use at NZNRC uses a peat/pumice (1:2 v/v) mixture in trays on a heated, drained capillary bench to ensure that these conditions are met. The second is the need for careful weaning of cuttings from the system. This has been accomplished with most species by gradual removal of the polythene cover over about 7 days, coupled, if possible, with a gradual reduction in misting frequency toward the end of this period.

The enclosed mist system is still in relative infancy and much more remains to be found out in the light of experience. No doubt, in the process of gaining that experience we will find further modifications being developed, meanwhile it offers a new opportunity for cuttings which have problems in water economy.

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COLLECTING, SELECTING, AND PROPAGATING AUSTRALIAN PLANT INTRODUCTIONS

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The Australian flora is often referred to as being unique, but this is not an accurate description, as most of our Australian plants belong to families that are widely distributed throughout other parts of the world.

The Australian flora is closely linked with the world flora, and the endemic species have evolved since the continent was isolated. The flora can be roughly divided into three main elements: