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**PROPAGATION OF EMBOTHRIMUM COCCINEUM,
CARPENTERIA CALIFORNICA, AND FREMONTODENDRON
'CALIFORNIA GLORY'**

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There are often many different ways of propagating a particular plant which will achieve the same result. What is described in this paper are the methods used at Hewton Trees and Shrubs for the propagation of *Embothrium coccineum*, *Fremontodendron* 'California Glory', and *Carpenteria californica*, all of which are often considered to be difficult subjects. All three types of plant are propagated in a similar way so the majority of the paper is devoted to the description of *Embothrium coccineum*, reference being made to any differences in the method for the other plants.

BACKGROUND AND BOTANICAL INFORMATION

Embothrium coccineum, a native of Chile and bordering parts of Argentina from about 37° south to Tierra del Fuego, was first introduced to Great Britain by William Lobb in 1846. In the wild it grows from the coast up to the tree line and as a small bush up to an 8 metre tree; in cultivation it can be even taller.

Plants growing in the United Kingdom are either evergreen or semi-deciduous. There is confusion over nomenclature, but all are synonyms of *Embothrium coccineum*, and all produce a profusion

of orange-red flowers in May and early June. There is a particularly good-flowering semi-evergreen cultivar known as 'Norquinco' after the west Argentine valley in which the seed was collected.

Carpenteria is a genus of a single species, namely *Carpenteria californica*, which was introduced to this country in about 1880. It is an evergreen shrub which is a native of California and grows to about 4 metres high. The large white flowers with conspicuous yellow anthers are produced in July. There is a vigorous free-flowering form with large flowers known as 'Ladham's Variety'.

Fremontodendron 'California Glory' is a semi-deciduous shrub which originated in California in 1952. It is a very vigorous, free-flowering hybrid raised from seed of *F. californicum* grown in the company of a plant of *F. mexicanum*. Bright yellow flowers are produced in large numbers from May to July.

Embothrium is generally hardy in the south of England, but both *Fremontodendron* 'California Glory' and *Carpenteria californica* will suffer damage in a hard winter unless planted in a protected position. All these plants tend not to be long-lived.

PROPAGATION

Embothrium coccineum is frequently propagated by seed and we use this method. Seed propagation has the advantage that it is very cheap in terms of propagation costs but it is a number of years before the plants produce flowers. Some plants in the United Kingdom will produce viable seed and this should be collected at the end of September or early October. The seed pods, which are 20 to 30 mm long and contain numerous winged seeds, are dried naturally until they open. The seed then has to be cleaned and de-winged in preparation for sowing in March in seed trays. A lime-free compost is used, made up of equal parts of sand and peat, incorporating 0.8 kg/m³ of single superphosphate and 0.4 kg/m³ of potassium nitrate. The seed normally germinates very easily and is ready for potting by the middle of May. The seedlings are best handled quite small since they do not tolerate much root disturbance.

Embothrium coccineum forms "lanceolatum" and "longifolium" are rooted from cuttings normally taken in early February. At this point it should be noted that typical *E. coccineum* tends to be more difficult to root than the forms under discussion and that any semi-deciduous cultivar such as 'Norquinco' will not root at this time of year; they are much easier from cuttings taken in July.

Cuttings are taken from the current year's growth, wounded, and stuck in 7 cm pots filled with pure lime-free sand. This sand is a waste product from the China clay industry, and is excellent for propagation. The use of pots reduces root disturbance on potting. A hormone rooting mixture is used consisting of three parts Seradix No. 2 and one part Captan. The pots are placed on a heated bench

under mist, which is manually controlled to prevent excessive wetness. Bottom heat is maintained at around 18°C. During propagation the cuttings are given a liquid feed every 2 to 3 weeks using Phostrogen at the recommended rate.

Fremontodendron 'California Glory' may be propagated from seed but the resulting plants would not be true to name. We propagate this plant and *Carpenteria californica* in exactly the same way as *Embothrium* except that cuttings are taken in October.

POTTING

As already mentioned, potting of *Embothrium* seedlings takes place as soon as they are ready in May. The compost used consists of four parts peat and one part sterilised loam, with the addition of about 10% sharp sand. *Embothrium* plants appear to be very sensitive to fertiliser levels and the only fertiliser used is Phostrogen at a low rate of 0.35 kg/m³. In addition, Aldrin at a rate of 0.7 kg/m³ is included in the compost.

After potting the plants are placed in a shaded cold frame where they are kept for the summer. If required they are fed with Phostrogen every three weeks during the growing season.

Embothrium cuttings are normally rooted by about the end of April and are then potted into 9 cm pots using a compost similar to that used for the seedlings but with twice the rate of Phostrogen in the mix. The freshly-potted plants are kept under mist to start with and given a certain amount of bottom heat to encourage root development. The plants will be weaned after 10 to 14 days and after 4 to 5 weeks will be moved to a netting shade tunnel.

Carpenteria californica and *Fremontodendron* 'California Glory' are both potted during May using a lime-free compost incorporating a slow release fertiliser. During the 1986 potting season we successfully used Ficote (14:14:14) 140-day fertiliser at a rate of 1.5 kg/m³ for *Fremontodendron* and a rate of 1.0 kg/m³ for *Carpenteria*. If space allows they will be kept under mist in the glasshouse to start with, although they could equally well go straight into a polythene tunnel, where they remain until ready for sale.

PESTS AND DISEASES

Embothrium plants suffer very little from pests and diseases. There can be a problem with tortrix moths and we have occasionally suffered an attack from scale. The main problems with *Carpenteria* and *Fremontodendron* are again tortrix, but also red spider which needs to be identified and treated at an early stage to avoid the plants becoming unsaleable.

AVAILABILITY FOR SALE

Embothrium cuttings establish quickly and become ready for sale as young plants from about the middle of June onwards; seedlings, on the other hand, need most of a growing season to develop sufficient roots. Plants of *Carpenteria* and *Fremontodendron* are also slower and start to become available from July onwards.

RESULTS FOR 1985/86 SEASON

The severe winter weather early in 1985 badly affected our *Fremontodendron* plants, with the result that only about 45% of cuttings taken were actually potted. Not only was the number of cuttings reduced but their quality was poor. Our normal success rate is about 80%.

Carpenteria californica is not an easy plant to root and 65 to 70% is our approximate overall success rate. This year we succeeded with about 55%. It is very difficult to stop the cuttings from rotting off, and therefore vitally important to remove damaged leaves as soon as they appear.

Embothrium seedlings, which were potted this year, have done well. On 15 July 1986 the approximate status of those potted was as follows:

No. seedlings over 8 cm high on 15/7/86	200	(7%)
No. healthy seedlings 3-8 cm high on 15/7/86	1800	(63%)
No. dead or unlikely to make the grade	840	(30%)
No. potted w/e 23/5/86	2840	

With *Embothrium* cuttings we would normally expect around 85% success, but this year the cutting material was excellent and we obtained our best ever results as shown below:

Embothrium coccineum, "lanceolatum" form

Total no. of cuttings taken 6/2/86	1579	
Approximate date rooting began	20/3/86	
Cuttings lost	166	(10.5%)
Potted, 1st potting 3/5/86	1359	(86.1%)
Potted, 2nd potting 18/6/86	54	(3.4%)
Total potted	1413	(89.5%)
Sold or available for sale as liners by 15/7/86	1222	(86.5%)
Not ready for sale 15/7/86	185	(13.1%)
Potted plants lost	6	(0.4%)

Embothrium coccineum, "longifolium" form

Total no. of cuttings taken	1294	
Approximate date rooting began	20/3/86	
Cuttings lost	45	(3.5%)
Potted, 1st potting	1235	(95.4%)
Potted, 2nd potting	14	(1.1%)
Total potted	1249	(96.5%)
Sold or available for sale as liners by 15/7/86	1116	(89.4%)
Not ready for sale 15/7/86	125	(10.0%)
Potted plants lost	8	(0.6%)

CONCLUSIONS

The inconsistent results obtained over a period of years are difficult to explain, but are possibly related to the effects of the previous growing season on the propagation material. What is quite certain is that high quality propagation material is particularly important if good results are to be achieved.

Micropropagation techniques have been successful with all three plants, and it may be that conventional propagation will eventually be redundant. Whether or not the plants produced by micropropagation will grow as well as those from cuttings, or will be produced more economically remains to be seen.

TASMANIA, AND THE PLANTS WE PROPAGATE THERE

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Tasmania is the smallest state in the commonwealth of Australia. Our total land area is equivalent to that of the Irish Republic. Most of the state is mountainous with numerous lakes and beautiful scenery. Being an island state and away from any cold landmasses our climate is very moderate. Temperatures in the mid-thirties are rare, while during the winter the temperature seldom drops below freezing.

This means that we can grow a very wide range of plants. Apart from a wide range of native flora, one will find all kinds of European, American, New Zealand and South African plants. All native trees and shrubs are evergreen and many of those flower during the winter months supplying food for many honey-eating birds.

A large proportion of our native plants are eucalypts, which come in all shapes and sizes. Many of them have silvery leaves like *Eucalyptus cordata*, which reduces water loss during a dry period.

In the rain forest areas tree ferns, *Dicksonia antarctica*, are abundant and some of them will grow to 50 feet in height.

Eucalyptus ficifolia (scarlet flowering gum) grows into a small tree and displays a mass of flowers, ranging in color from red to pink or white and is summer-flowering. *Eucalyptus leucoxylon* 'Rosea' is winter-flowering.

Another very large group are the acacias or wattles, as they are called. They vary from medium sized trees to dwarf shrubs and most of them are winter-flowering with a few exceptions.