

**Cleft Graft.** We use this method to graft hibiscus cultivars onto vigorous rootstocks, camellia cultivars, also *Fagus* species.

In this case the rootstock is cut back to a suitable point for grafting, usually a part of the stem that is relatively free of large buds, and quite straight-grained. All shoots and buds below this point are removed with the knife. The stock is split down about 1 to 1½" (25 to 40 mm). The scion is cut in a wedge similar to the side graft and inserted into the stock with the cambium layers in contact. Again, the graft is tied and the cut surfaces waxed.

**Approach Grafting.** The distinguishing feature of this method of grafting is that two independent, growing, plants are grafted together. They can be growing in containers and brought into the glasshouse for grafting. It is a good method for grafting difficult subjects but, because of the trouble involved in bending down the scion wood and/or raising of the stock, and the gradual severing of the top of the stock and the base of the scion, it is probably not very economic. We have used this method successfully to graft *Tristania conferta* 'Variegata' onto *T. conferta* stock, after failing with other methods. The two stems to be joined should be approximately the same size. A slice of bark and wood up to 1" long (25 mm) is removed.

The cuts should be as smooth and flat as possible so that when pressed together the cambium layers will be in close contact. They are then bound together.

## NEW PLANT MATERIAL OF THE GENUS METROSIDEROS

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The University maintains two small plant propagation units, one mainly concerned with growing plants for landscaping while the second unit is available for germinating seed and rooting cuttings of plants that are to be the subject of various research and demonstration programmes of the Botany Department. Some material comes to hand from time to time collected in the field by botanists who require a closer study of genera and species and who wish to have such plants propagated and grown on before they are classified.

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For some 12 years, we have been propagating and growing on plants collected by Dr. J.W. Dawson who has published a number of important monographs on the family *Myrtaceae*. In the course of this collecting work Dr. Dawson has sent back material from travels in the Pacific region, particularly from New Caledonia. Some of the *Metrosideros* species thus collected, after growing on in the glasshouse, have been planted out into an open shrub border and have been found to grow and apparently acclimatize quite well. Because of their relationship to our N.Z. Pohutukawa and Rata, we have had a source of comparison and find that *Metrosideros demonstrans*, one of the more successful of the new introductions, with its habit of growth and brilliant yellow flowers, makes a potentially very acceptable addition to the shrub collection.

### METROSIDEROS AND THE PACIFIC REGION

We can well begin a discussion of this new plant material by commenting on the distribution of *Metrosideros* and related genera.

There are two main groups listed by Dr. Dawson:

(1) the Collina group which includes our *M. excelsa*, *M. robusta* and *M. umbellata*; some 26 species of this group are found also in the Kermadecs, New Caledonia, Fiji, Rarotonga, Tahiti, Hawaii and other smaller islands in the Pacific.

(2) the second group is made up of two sub-groups, one, related to *Mearnsia* and which includes the N.Z. *Metrosideros parkinsonii* and *M. fulgens*; and two the *Metrosideros diffusa* group which includes the N.Z. *M. colensoi* and *M. carminea*. The *Mearnsia* are found in the Philippines, New Guinea, Solomon Islands, New Caledonia.

In an examination of the distribution of the *Metrosideros* we find that in New Zealand they occur in our coastal and lowland forest while in the more tropical countries of the Pacific they often come from montane rain forests, which in part explains why we are having some success with acclimatizing some of the introduced species. Mountain regions where they are found in the Pacific Islands represent a sub-tropical or warm temperate climate not so far removed from the climate of the latitudes of northern New Zealand.

### METROSIDEROS IN NEW ZEALAND

There are 11 species of *Metrosideros* native to New Zealand and this is the only country in which climbing species occur. We are all familiar with the Pohutukawa and the Rata of our forests but it may be suggested that there could be more interest shown in them for horticultural purposes. *Metrosideros parkin-*

*sonii* is named in memory of Sidney Parkinson, the draughtsman who accompanied Banks and Solander on Captain Cook's first voyage. His were the first drawings of our native plants to reach England. It is said that it was the inclusion of the colourful Rata family in his drawings which helped give a favourable impression of the trees and wild flowers of the far away Colony.

Legend has it that Maoris too were greatly impressed by their sighting of the northern shoreline of Aotearoa covered with densely flowering Pohutukawa. As they closed in on their landing place the Ranigitira of the canoe is said to have exclaimed "The head-dresses of this land are better than those of Hawaiki. I will throw mine into the water." The Pohutukawa was further elevated by them as they became settlers, and an ancient Pohutukawa tree growing on the northern extremity of New Zealand became the last earthly hand-hold of the spirit before leaping into the underworld. The Maoris, the navigators of the Pacific, found the Pohutukawa more attractive than the flowers of the lands they had left.

The *Metrosideros* species which I am discussing, and which have come to us from islands in the Pacific, incidental to their being studied for botanical purposes, will add I am sure to our interest in this attractive group of plants. It could lead to a greater interest in selecting better forms of our own species. We have experienced the growing of Yellow Pohutukawa from cuttings taken from tip growths of adult bushes, and this has led to the discover that they can be flowered as younger plants. There is a wide range of natural variations in the colour of flower and amount of flower produced by different plants of the Pohutukawa, and better cultivars should be selected if the species is to be displayed at its best in our landscape plantings.

*Metrosideros carminea* as a climber with its bright carmine mass of flowers could be used much more than it is. Grown from cuttings prepared from adult wood this plant will come into flower quickly, and when grown from such cuttings produces a bushy shrub suitable for growing in tubs. There are a number of variegated forms of *M. excelsa* and *M. kermadecensis*; there is a yellow-flowered form of *M. fulgens* that was found at Collingwood and there is the less well known but possibly most striking of all, *M. parkinsonii*. *M. parkinsonii* which will grow to a small tree of up to 20' has bright crimson flowers. It was first discovered in the northern part of the South Island by Travers in 1882 and nearly 40 years later Dr. Oliver discovered it growing on Great Barrier Island, 400 miles away. This discontinuous distribution has been a matter of interest to botanists. Some difficulty has been experienced with propagating and growing this species for the garden, but the colour of

flower differing as it does from Pohutukawa makes it worthy of some effort in getting it established.

## METROSIDEROS FROM NEW CALEDONIA AND OTHER PACIFIC COUNTRIES

*Metrosideros demonstrans*: Of those *Metrosideros* that form the new plant material to be discussed, certainly the most interesting to date is *M. demonstrans* from New Caledonia. It has a conspicuous inflorescence formed in the axils of bud scales just below a few pairs of foliage leaves and the terminal overwintering bud. The flowers are arranged in whorls of 3 to 4 which, when fully open, have more the appearance of the "bottle brush" of *Callestemon*. It makes a well-shaped shrub with bold foliage and has reached a height of 4 feet growing in an average garden environment. It has flowered for 3 successive years from October to November.

*Metrosideros elegans*: Also coming from New Caledonia, this is a taller growing shrub with similar yellow inflorescences but the flower is somewhat obscured by luxurious foliage. Plants of these are now 7 feet high and growing very freely in a sheltered position. They make very shapely shrubs, pyramidal in growth, and have potential as a tub plant. The leaves take on a wine-red colour in the cold weather of winter and so the tree is worth growing for its foliage effect alone.

*Metrosideros collini*: One plant of this species was doing well but was unfortunately destroyed during building construction. It had not flowered but a second plant survived its first winter. This species has slightly bronze-coloured foliage which, in texture and shape of leaf, is somewhat like our N.Z. *M. parkinsonii*. Coming from higher elevations in Tahiti, we may find that it will flower in open ground in New Zealand.

*Metrosideros nitida*: From New Caledonia is a low growing and spreading shrub which has flowers similar to *M. carminea*. It is of carmine-red colour with an inflorescence at the tip of the branches while the dark green leaves provide a background for the flower heads. A plant of this species has survived one winter outdoors and flowers toward the end of October.

*Xanthostemon*: Botanically, related to the above, are three different species of *Xanthostemon*, two of which have flowered in the glasshouse. When further plants of these become available, they will be moved out into the open ground. *Xanthostemon macrophyllum* has a very attractive flower with petals of cream colour and dominant yellow stamens. Its glossy foliage is also of note. *Xanthostemon flavum* has a striking pale yellow inflorescence, making a brush of circular outline at the tip of its branches and supported by strong textured leaves. *Xanthostemon aurantiacum* plants have not yet flowered.

*Callistemon suberosum*: Finally, and also growing under glass at present, is *C. suberosum* which has silver grey foliage which, in itself, makes this yet another plant from New Caledonia that we hope to try out further for its ability to acclimatize and grow under our garden conditions.

### PROPAGATION

A number of the species described were received as plants directly from the field in New Caledonia. They were potted in a John Innes potting compost and held under quarantine in the glasshouse for their first years.

Cuttings have been taken from *M. demonstrans* and *M. elegans*; indications are that they will readily root from semi-firm tip growths planted in sand with bottom heat. Most of the work of establishing these plants has been from seed collected in the field. Seeds of *Metrosideros* and *Xanthostemon* have germinated readily when sown in the glasshouse on pure fine grained vermiculite and watered with a made up nutrient solution until sufficiently well established for potting on. By this means also they have been kept free of any damping-off fungi.

### LITERATURE CITED

1. Dawson, J.W., Pacific Capsular Myrtaceae.
2. Fisher, M.E., Gardening with New Zealand Plants, Shrubs and Trees.
3. Metcalf, L.J., The Cultivation of New Zealand Trees and Shrubs.

## **RAPID PROPAGATION OF POPLARS BY TISSUE CULTURE METHODS**

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**Abstract.** A rapid method for the propagation of poplars by tissue culture has been developed. In comparison with conventional practices very large numbers of rooted plants can be rapidly formed from small explants and the potting mix can be manipulated to give establishment advantages to the tree when planting out. The technique also gives a method for the international exchange of poplar material under sterile conditions, to eliminate the danger of disease introduction, in a form that can be quickly bulked up at any time of the year.

Because of the die-back and death of trees of many poplar cultivars in New Zealand due to the introduction of the rust