

## HORTICULTURAL DEVELOPMENT OF AUSTRALIAN PLANTS

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The Australian flora consists of some 12,000 to 15,000 species in approximately 850 genera. Of these, probably half have horticultural potential. This vast range of species from which we have opportunity to draw is the envy of horticulturalists the world over. We should pause and consider the success of our endeavors in pursuing the selection, introduction, and improvement of cultivars for ornamental planting.

Cultivars of fruit trees, roses, azaleas, camellias, and a great many other commonly grown exotic plants have been either developed by breeding or gathered as mutations over many centuries and are great improvements over their ancestors. The search for hardier, more floriferous and attractive forms and the development of techniques that allow the propagator to faithfully reproduce these, represents the history of horticulture.

In the case of Australian plants, we have had a comparatively brief time to collect, select and introduce our flora. However, native plant enthusiasts have brought approximately 3,000 species into cultivation with varying degrees of success. Although some improved forms and hybrids have been selected and introduced to gardens, the demand for native plants, both in terms of quantity and range, has increased so rapidly in recent years that the propagators' emphasis has all too frequently been on mass production rather than further selection.

The message I would like to try and convey is that individually, and as a body, we should strive to improve the quality of stock and to reproduce that stock faithfully for distribution to the home gardener and commercial landscaper. Despite inherent adaptability, many natives are unsuited to the diverse conditions across our continent and many others have a disappointingly short life. I would like to draw attention to what I believe we as propagators should be doing to select and develop more reliable and even more attractive species and cultivars.

There are some steps we can take to produce immediate benefits, and others which must only be the beginning of long term development. Among those steps which will yield immediate benefits, I feel the prime one is the substitution of propagation by vegetative means for many species which are customarily grown by seed. Commercial propagators, in particular, are aware of the variation we sometimes get within batches of some seedlings, and

between batches of seedlings where seed has been purchased at different times or from different sources. We often cannot guarantee the size or form of seedling plants, their flower colour, amount or time of flowering, or suitability for a given set of conditions. The genus *Callistemon* is one example where vegetative propagation of selected forms would be preferable.

At present, we are guilty of offering for sale seed-grown plants that are commonly believed to have a standard set of characteristics, as described on plant labels and in popular garden texts, whereas this is often not the case. *Callistemon citrinus* for example, comes in many colour forms from white to pink, red, and burgundy. The size and form of the shrub, the amount and time of flowering also varies. We can offer *Callistemon* 'Harkness,' 'Reeves Pink,' 'Mauve Mist' and other cutting-grown forms with confidence. For the same reasons, I believe that we must develop methods of producing some cultivars of eucalypts vegetatively, by cuttings or grafting, on a commercial scale.

The gardener is accustomed to buying for example a rose, azalea, or rhododendron of an exact colour specification whereas if the same customer asks for a red flowering gum, all we can honestly say is, "Here is a *Eucalyptus ficifolia*, which might produce red flowers — but on the other hand, might produce orange, pink, maroon or white flowers."

In our nursery, we are beginning to experiment with rooting eucalyptus cuttings. We removed the very young mallee growth from a 1-year-old *Eucalyptus sideroxylon* which had malleed after being damaged. Of 14 cuttings taken, 9 rooted within 3 weeks. These are now growing vigorously and will eventually be planted and their behaviour in the ground examined.

The advantage of hybridizing to combine the aesthetic qualities of one species with the hardiness of another may be of great significance if the resulting plant could then be mass produced vegetatively on a commercial basis. The further incentive for production of eucalypts by vegetative means lies in the shortage of seed of some species. It is disappointing to find that *Eucalyptus scoparia* and *Eucalyptus nicholli* seed are no longer procurable. It is also disappointing to find that some batches of seedlings are more variable than others - for example, *Eucalyptus nicholli*. Thus, the challenge to produce eucalypts vegetatively is, I believe, an urgent one. We have been relying on big stands of given eucalypts to provide sources of true seed. Because of the tendency for eucalypts to hybridize, and because of the continued destruction of natural stands of timber by man and nature, we cannot take for granted continued supply of true seed. This shortage will be compounded if demand for Australian natives continues to increase even at a lesser rate than we have experienced in recent

years. It will be further compounded by the necessary limits imposed on seed collectors by forestry authorities such as has occurred in the case of *Eucalyptus nicholli*.

The next area in which we have responsibility is in taking cuttings from the best and most vigorous plants of parent stocks that have been selected for their good qualities. When there is a shortage of good cutting material we must resist taking cuttings from poorer stock. In the long term, we must be alert to recognize good forms, hybrids and sports that have some improved features. Also, we should be looking for plants which show a higher resistance to various diseases and infestations. I hope that none of us find for example, *Phytophthora cinnamoni*, amongst our nursery stock, but should we find a plant surviving unexpectedly well in soil known to be infected, then we should endeavour to reproduce that plant vegetatively. Similarly, whenever we see plants thriving in conditions which do not usually suit them, then again we should try to reproduce those plants.

Australian native plants in horticulture, with a few exceptions, are first generation plants. By this I mean that seed or cuttings have been taken directly from bush plants and have continued to be faithfully reproduced. However the history of exotic species and cultivars is one of development over a long period of time. In citrus and soft fruit production, quality of fruit and yield have been greatly improved by selection of both rootstock and scion. The same sort of development has occurred with many deciduous ornamentals. One of our goals must be to find rootstocks for those outstanding native plants which will not themselves readily adapt to garden culture. In this group, I would particularly include some *Banksias*, *Grevilleas*, *Prostantheras* and *Boronias*. Some work has already been done in this field but further work is necessary before commercial production is possible.

In Europe, the U.S.A. and other places, the history of horticulture has been one of moving away from the propagation of the plant as it grew in the wild. Through various selection and breeding processes, in some cases coupled with budding and grafting, propagators have, over a long period of time, produced what I would call second generation plants: Second generation in that they are at least one step removed from the original native plant, although they may be many generations removed in time. With this knowledge of what has occurred over the centuries of horticulture in other parts of the world, we must be prepared to embark on similar work with our own indigenous flora.

In summary, Australian flora presents us with some 6,000 to 8,000 species worthy of developing horticulturally. This is our inheritance and is the envy of horticulturalists around the world. We are indebted to the enthusiasts who, in the past and present,

have collected and tried new species for horticulture. As propagators, we should move away from indiscriminate production to selection and breeding of improved forms which are hardy over a range of conditions and have characteristics common to each plant of a particular form.

## QUESTIONS

NOEL CHOPPING: Were the eucalyptus cuttings derived from the lignotuber? We are able to root cuttings taken from the lignotuber of *Eucalyptus tyocarpa* up to 8 years old, but not from older trees.

NATALIE PEATE: The *E. sideroxylon* cuttings were not all from the lignotuber. Normal tip cuttings and lignotuber cuttings rooted equally well.

MODERATOR CHURCHILL: You mentioned the tremendous variation in *Callistemon citrinus* grown from seed. Do you find the same variation with seed from the one ecotype?

NATALIE PEATE: As we have been propagating from commercial supplies of seed we cannot be sure that they are all from the same ecotype.

PAUL BUCHNALL: In my experience *Callistemons* grown in isolation breed very true-to-type from seed. *C. citrinus* type hybrids grown from cutting do not have the desired plant shape. It is, therefore, preferable to propagate *Callistemon* from isolated seed parents.

RICHARD MARTYR: Whose job is it to carry out selection and, even more importantly, evaluation of the range of variation in particular plants? One wants to encourage growers to do it themselves but they don't have all the yardsticks for this job. Is it a job for a research station in ornamentals which you do not have as yet, or should it be done in universities or colleges or by growers? In The Netherlands, at Boskoop, they collect all clones propagated in their country and evaluate them. The nurseryman can therefore obtain the best stock from them and propagate it. There is vast potential for this sort of thing in Australia. How is it to be done?

NATALIE PEATE: If nurserymen do it themselves, it will be less satisfactory than if done by a research organisation. I would like to see a research station established, but one where nurserymen can go and make suggestions.