Selecting compact cultivars for horticulture from wild plant populations©

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INTRODUCTION

The demand for compact ornamental plant cultivars in world horticulture is being simultaneously driven by both consumers and plant producers. Increasing urbanization around the world is creating ever higher population densities in cities with the result that gardens are getting smaller and smaller and in many cases are confined to balconies, courtyards and rooftops. This is driving a demand for compact plants, preferably ones that can complete their entire life cycle in a container if there is no in ground garden area.

The demand for compact plants is also being driven by wholesale growers who will maximize profits by growing cultivars that require the most minimal of inputs. Compact cultivars that do not require pinching or pruning and can grow to a saleable size within a matter of weeks with minimal input of water and fertilizer represent the ideal nursery plant. Mechanization of production to lower costs also demands compact, preferably vegetatively propagated plants that provide the uniformity that will optimize the success of mechanical production. A height under 40 cm will also minimize freight costs to enable the maximum number of plants in a given volume of freight space.

STRATEGIES TO PRODUCE COMPACT PLANT CULTIVARS

There are several plant breeding strategies that can be used to increase the success rate when trying to produce suitable compact plant cultivars.

Traditional plant breeding

Australia is blessed with some excellent ornamental plant breeders such as Graham Brown of Nuflora in Sydney, and Digby Growns of Kings Park and Botanic Gardens in Perth. Both of these breeders have achieved global commercial success breeding compact plants for worldwide distribution. In the case of Digby Growns his breeding is based on selecting parents from the spectacular Western Australian flora and crossing them together to try and create compact plants that will service the modern market both in Australia and overseas. Graham Brown and his team at Nuflora have achieved great success with plants from outside the Australian flora such as *Argyranthemum* (Marguerite daisy) using conventional breeding techniques. Breeding work by me and other Australian entities with kangaroo paws (*Anigozanthos*) has involved collecting a range of species and forms within species and crossing them together to produce cultivars with a range of heights, colours, and flowering times that have resulted in a worldwide demand for this crop.

Selection of chance mutations

The Australian nursery industry has produced some outstanding cultivars through selection of novel genetic mutations from populations of commercial batches of plants during production cycles. Seedlings are an obvious source of genetic variation from which to select with the dwarf bottlebrush cultivar *Callistemon salignus* 'Great Balls of Fire' being an excellent example. Mutations can also occur at regular frequency in vegetatively produced crops with the almost white kangaroo paw *Anigozanthos* 'Bush Diamond' coming from a mutation of the pink cultivar 'Bush Pearl'. This represented a new colour in *Anigozanthos* at the time it was released.

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Selection of dwarf forms from coastal plant populations

The author has been involved in a breeding and selection program at The Australian Botanic Garden, Mt. Annan to utilize germplasm collected from a coastal site at Catherine Hill Bay, a small town between Sydney and Newcastle that is nestled between nature reserves on either side that features incredibly diverse and spectacular botanical biodiversity in heathland plant communities. In particular, a wide range of species have formed genetic ecotypes depending on their proximity to the coast. Populations within a species form compact, often ground covering forms on coastal headlands as compared to more upright forms further back from the coast. Examples of species that display this characteristic include *Actinotus helianthi*, *Banksia spinulosa*, *C. linearis*, *Goodenia ovata*, *Hakea sericea*, *Isopogon anemonifolius*, *Lambertia Formosa*, and *Viminaria juncea*. Cutting propagation of these compact ecotypes results in genetically stable specimens that are potential candidates as commercial ornamental plant cultivars.

A further objective of the study was to establish whether the low growing form of such ecotypes could be reproduced by seed. Thus, seed was collected from plant populations of several species displaying the low growing phenotype, namely *Acacia myrtifolia*, *C. linearis,* and *Melaleuca nodosa*. Populations of approximately 50 plants of each species were germinated using standard techniques and grown under uniform shadehouse conditions in pots. The result was that uniform populations of seedlings displaying the compact growth habit were produced without exception.

This trial demonstrates the potential of creating genetically stable seed lines of compact coastal ecotypes of a wide range of species of Australian plants.

ACKNOWLEDGEMENTS

My thanks go to Mark Viler and John Siemen of the Australian Botanic Garden Mt. Annan and that institution for help and support for this project.