

The role of botanic gardens in indigenous plant development and commercialisation

Mark Webb

Kings Park and Botanic Garden, Western Australia, Australia

Summary

Botanic gardens can play a key role in the selection and development of indigenous plants for display in public landscapes and private gardens. Historically, the selection, breeding and commercialisation of indigenous flora for ornamental plant production by Australian botanic gardens, government agencies, universities, private companies and individuals has generally not been strategic, adequately resourced or well managed.

Kings Park and Botanic Garden in Western Australia has a sophisticated plant development program, based on the targeted selection and breeding of Australian indigenous plants.

Background

Western Australia contains over 12,500 native plant species. The South-West province of Western Australia is one of the world's biodiversity hotspots, with a plant endemism of about 80 per cent.

Historically, the selection and development of Australian native plants for ornamental horticulture has generally been *ad hoc*, and not strategic or market focused. In addition, most of the early programs focused on local plants that were easier to grow and propagate, such as kangaroo paws. Kings Park and Botanic Garden has been selecting and breeding indigenous plants since the late 1960s, with most activity occurring in the last eight years. Releases in Australia and overseas of plants developed by Kings Park and Botanic Garden include selections and hybrids of callistemon, agonis, kangaroo paw, pimelea and lechenaultia.

The breeding systems for plant species such as roses, carnations and impatiens are generally well known and documented. For many Australian plants, there is a paucity of information on their breeding systems and for some genera, such as *Scaevola*, there are breeding barriers that must be overcome before successful controlled crossing can occur.

Most botanic gardens lack the experience or resources to commercialise plant material effectively. The commercialisation of new plant cultivars is usually most successful where it is done in partnership with an established and experienced company, or through the establishment of a separate company focused on the activity where the botanic garden is a stakeholder.

Involving industry partners such as local nurseries in plant development programs can be challenging. While the intention to assist industry partners through a plant testing and release program is commendable, any warm and fuzzy feelings associated with botanic gardens and industry working together can dissipate when faced with the commercial realities of industry's corporate and individual need to make money, usually quickly, and to beat the competition. Any significant plant development program run by a botanic garden should develop a commercial focus from the outset, with the establishment of appropriate agreements that address access and benefit sharing issues, and provide for potential release and protection mechanisms.

An unfortunate consequence of some introduction and acclimatisation programs has been the proliferation of a range of weeds. Weed history in one location is not always a good test of the propensity of a plant to become a weed in another location. Many plant species have no weed history, either because they have not

been widely grown outside their natural environment or, when first introduced into another geographical area, have failed to become established.

Current status

The Kings Park and Botanic Garden program aims to develop new perennial groundcovers, herbaceous plants, and woody shrubs suitable for containers, home gardens and public landscapes. This is mainly being done by the selection and breeding of Australian native plant species, and also by utilising grafting techniques to improve the reliability or adaptability for a range of local plants. The main genera currently being investigated by Kings Park and Botanic Garden are *Scaevola*, *Grevillea*, *Dampiera* and *Boronia*.

Species and forms are targeted that might deliver different flower colours and plant forms; improved plant vigour and extended flowering times; improved adaptability and hardiness; and improved disease or pest tolerance. A key motivation for the program is to develop new plants for the botanic garden and for private and public use, which can provide a range of benefits, including a focus on plants that can deliver more sustainable gardens in a drying climate. In the longer term, the program aims to provide a funding stream via royalties or licensing rights that will resource other plant development and conservation programs.

The Kings Park and Botanic Garden program has concentrated on the identification and collection of superior species and forms within target genera, and intra- or inter-specific or even intergeneric hybridisation using traditional plant breeding techniques. The use of DNA sequencing has resulted in significant savings in time and resources in the development of suitable crossing techniques, and in guiding the crossing program by understanding the phylogeny of target genera. The technique is also used on cotyledon material to determine the success of individual crosses; to ensure that only hybrid material is grown to flowering. In the case of *Scaevola*, which is very difficult to hybridise, DNA sequencing has assisted in allowing many hundreds of successful crosses to be done each year.

Plants developed at Kings Park and Botanic Garden also undergo a risk assessment to ensure that they are unlikely to become weeds in other localities. The use of breeding outcomes such as sterile hybrids can also aid in reducing likely weed infestations.

Kings Park and Botanic Garden has contracts with commercial partners for the testing, protection and/or release process. Preliminary testing may be done by Kings Park and Botanic Garden in Western Australia, but in the case of *Scaevola*, advanced testing is done by a partner in a range of environments to determine if any new hybrids or selections are suitable to be released worldwide or if they will have a more limited release. The testing process is rigorous; many hundreds of selections are often discarded and only a very small number make it through to advanced testing and potential release. Funds are sometimes provided by the partner to guide plant development activities, including the collection and documentation of wild species.

Collection and documentation of wild species, which forms the basis of the Kings Park and Botanic Garden program, provides important information on plant diversity. This information assists in meeting targets relating to the Global Strategy for Plant Conservation.

Conclusion

Factors that contribute to a successful plant development program in a botanic garden include having qualified staff and adequate resources; a collection of parent material that represents as much of the genetic diversity of the genus as possible; a targeted selection or crossing program with associated good record keeping; a weed risk assessment plan; and a sound commercialisation strategy.

The development of indigenous plants is a long term commitment for a botanic garden, and the outcomes are not certain. Notwithstanding, a plant development program can provide a range of new plants that can be

exhibited in the botanic garden; promote the use of local plants in a range of climates; raise the local profile of a botanic garden; potentially raise funds in the long term for botanic garden activities; and assist in meeting targets relating to the Global Strategy for Plant Conservation.