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Kangaroo Paws – From Wildflowers to World Market

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Summary

Kangaroo paws (*Anigozanthos* and *Macropidia* species) have been successfully domesticated over the last few decades through various genetic improvement programs and the development of propagation methods suited to mass production. This paper summarises the various strategies and techniques employed by the author and other researchers to achieve the goal of domesticating this crop for landscape and garden use as well as for cut flower production.

INTRODUCTION

Kangaroo paws (*Anigozanthos* and *Macropidia* species) are one of Australia's most distinctive native plants. Growing wild only in the southwest corner of Western Australia (**Fig. 1**), the furry flowers bear a resemblance to the paw of the iconic kangaroo, hence their common name.

The bright colours of the flowers added to the distinctive and unique shapes created instant horticultural interest when early European botanists and plant collectors sent propagation material back to Europe where it was primarily grown from seed.

Figure 1. Kangaroo paws growing wild in western Australia

It was not until the 1960's that the first report of genetic improvement of kangaroo paws emerged from Bob Dixon, a horticulturist who was growing them at Perth Zoo. This appears to be the start of the journey of kangaroo paws from a difficult to propagate 'wildflower' to a domesticated plant that has taken its place as a significant albeit minor floricultural crop in the world market (**Fig. 2)**. This paper examines some of the breeding and propagation advances that have supported this journey.

SEED GERMINATION

A breakthrough by researchers at Kings Park and Botanic Gardens in the 1990's, led by Kingsley Dixon, discovered that a chemical from smoke could enhance germination in a number of *Anigozanthos* species where germination had previously been erratic and unreliable. Smoke was found to be a trigger for breaking seed dormancy for a range of plant species from natural habitats that are prone to bushfires. It has long been observed that regeneration of kangaroo paws in these landscapes was dependent on fire.

Figure 2. Domesticated kangaroo paw found its niche market – growing in the garden adjacent to the famous Sydney Opera House and the Sydney Harbour Bridge.

The action of smoke in breaking seed dormancy has led to the development of various treatments to apply the active ingredient in smoke to seed propagation in kangaroo paws. Smoke impregnated water or vermiculite is the most common and practical way of treating seed on a commercial scale (**Fig. 3**). Other methods involve using smoke in specially created chambers to expose seed planted in containers to prolonged exposure to smoke. A tool used by beekeepers (called a 'bee smoker') to create smoke to clear bees from their hives has proven useful in generating smoke to treat seeds sown *in* situ. The materials burnt to create the smoke can come from a wide array of substances. There are also commercially available products available such as smoke impregnated water or vermiculite that can be found through internet searches.

Figure 3. Smoke impregnated water or vermiculite is the most common and practical way of treating kangaroo paw seed on a commercial scale.

Micropropagation of *Anigozanthos* and *Macropidia*

The first published report on micropropagation of *Anigozanthos* was by Roger Ellyard in 1978 at the Australian National Botanic Gardens in Canberra (Oliver, 1991). His work outlined a protocol whereby very small parts of the apical meristem were excised from vegetative shoots and grown on a sterile nutrient medium. This protocol enabled cost effective mass propagation of *Anigozanthos* cultivars for the first time and it is now a routine practice in commercial horticulture around the world (**Fig. 4**). Much of the micropropagation production of *Anigozanthos* has shifted from Australia to offshore laboratories in countries such as Sri Lanka and Indonesia. There is considerable variability in the multiplication rates of various species and cultivars within *Anigozanthos* and *Macropidia* genera and cultivars leading to some clones being not commercially viable by this propagation method.

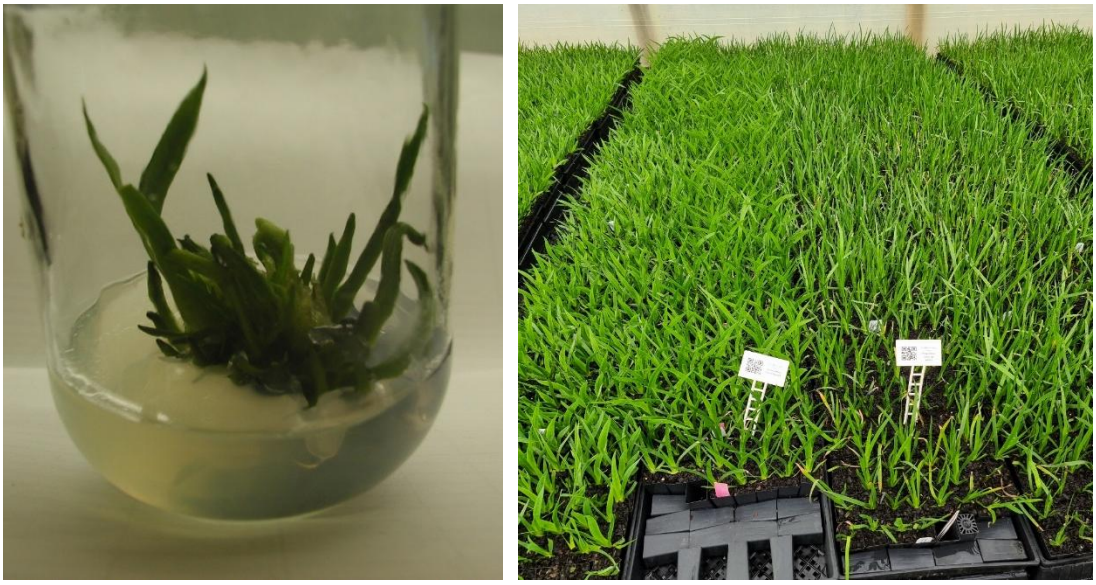

Figure 4. Cost effective mass propagation of *Anigozanthos* cultivars through tissue culture is now a routine practice in commercial horticulture around the world, particularly in offshore laboratories in countries such as Sri Lanka and Indonesia.

Division of *Anigozanthos* and *Macropidia*

Division of kangaroo paw rhizomes is an alternative method of vegetative propagation that can be used where micropropagation has proven to be not commercially viable. In the experience of the author the best time to divide is in the autumn after the plants have finished flowering. Good results have been obtained by cutting the rhizome into sections that have several healthy green shoots as part of the rhizome section. Reducing the length of foliage by about 50% by cutting it back reduces water stress on the newly divided section of rhizome, thereby reducing the stress on it while new roots are forming. Planting divided rhizome sections into pasteurised general purpose potting mix provides a suitable growing medium with optimal drainage conditions for establishment (**Fig. 5**).

Figure 5. Division of kangaroo paw rhizomes is an alternative method of vegetative propagation. Planting divided rhizome sections into pasteurised general purpose potting mix provides a suitable growing medium with optimal drainage conditions for establishment.

BREEDING ADVANCES IN KANGAROO PAWS

The species *Anigozanthos flavidus* is unlike the other 11 species of kangaroo paws in that it has proven to be a long-lived perennial plant in cultivation that has proven to be very adaptable to a wide range of soil and environmental conditions. It has been a key species in breeding programs in creating improved growing performance in intra- and interspecific hybrids. Other species of kangaroo paws such as *A. humilis* (cats paws – **Fig. 6**) and *A. bicolor* (dwarf red and green kangaroo paw) have been used to bring spectacular colours and dwarf growth habits to hybrids with *A.* flavidus. Breeding along these lines has been particularly effective in creating compact cultivars for pot plant production that also often flower continuously in frost free conditions. Whilst *A. flavidus* is useful in breeding to create adaptable relatively long-lived cultivars, its tall height (flower stems between 1.5 to 3 metres tall) is not conducive to the logistics of pot plant production and transport.

Figure 6. Cat's paws (*Anigozanthos humilis*) (above) and *A.bicolor* have been used in hybridization to bring stunning colors and dwarfism to new hybrids.

The challenge in breeding for the future is to create cultivars in a wide range of colours with more compact height that are adaptable and long flowering in cultivation for both pot and cut flower production (**Fig. 7**).

Figure 7. Hybrids of *Anigozanthos flavidus* (tall but adaptable and long-lived) with *A. humilis* can create cultivars suitable as potted plants with stunning colours. Shown above is such a cultivar 'Bush Volcano'.

Embryo culture has been a useful *in vitro* method to create new hybrid seedlings that have not been viable by conventional seed germination. The microscopic hybrid embryos are extracted under a dissecting microscope and placed onto a standard multiplication medium. As well as rescuing embryos that would not normally germinate through standard seed propagation, the hybrid embryos rapidly multiply and enable the production of clonal plants for evaluation, thus shortening the breeding cycle (Worrall, 1995).

LITERATURE CITED

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