New Plants for New Zealand's Ornamental Industries — A Researcher's Perspective©

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INTRODUCTION

New Zealand has been very successful at developing new plants for its forestry, pastoral, and horticultural industries. Examples include *Pinus radiata,* ryegrass, and *Actinidia deliciosa* (kiwifruit). Floriculture successes include crops such as *Zantedeschia, Sandersonia,* and *Nerine sarniensis.* We have also developed some of our native species for amenity and cut foliage use (e.g., *Phormium, Pittosporum, Astelia, Cordyline,* and *Leptospermum*). New Zealand's nursery and floriculture export industries are based on plants, flowers, and bulbs that can receive premium prices on international markets. These export industries require the development of new crops and novel cultivars so that our exports of floriculture products can continue to expand. Production and propagation technologies are also required for new crops.

NEW CROPS AND HYBRIDS

Interspecific hybridisation is frequently used to introduce new characteristics into crops and there are many opportunities to develop novel cultivars via interspecific hybridisation. There are often barriers to the production of interspecific hybrids that can occur before or after pollination. A range of techniques can be used to overcome these barriers for the production of wide crosses (van Tuyl, 1997).

Interspecific hybridisation has been used to introduce new characteristics into *Zantedeschia* (Cohen and Yao, 1996), *Sandersonia* (Morgan et al., 1999), and *Limonium* (Morgan et al., 1995; 1998).

Sandersonia aurantiaca is a monospecific genus with little variation observed in the species. Therefore, we considered hybridisation with related genera, such as *Littonia,* to introduce new characteristics. This wide cross required embryo rescue (Morgan et al., 1999). Plant Variety Rights have been obtained for this intergeneric hybrid, ×*Santonia* 'Golden Lights', and it is being developed as a new cut flower variety.

We successfully developed a longer stemmed *Limonium* by hybridizing *L. perigrinum* with *L.purpuratum*. Stem length of the hybrid plants varied from 40 to 70 cm (Morgan et al., 1995). One of the longer stemmed plants has been developed as the cut flower cultivar, 'Chorus Magenta' (Seelye et al., 2000). We subsequently backcrossed 'Chorus Magenta' to *L. perigrinum* to strengthen the pink flower colour and some of these backcross generation plants have very short stems (20 to 30 cm), making them potentially suitable for pot plant use.

CONFIRMATION OF HYBRIDS

Following the production of a putative hybrid, breeders usually like to confirm that the plant is a true hybrid as sometimes pollen contamination occurs. Discarding plants that are not true hybrids as early as possible avoids the costs of growing on plants that are of no interest to the breeding programme. We have successfully used flow cytometry to confirm that plants are true hybrids (Morgan et al., 1995; 1998). Flow cytometry is used to measure the DNA content of plant cells. The cells of each species have a characteristic amount of DNA, which is usually measured in picograms (10^{-12} g). The DNA content of an interspecific hybrid is intermediate between the two parents. Therefore, by measuring the DNA content of each parent and the putative hybrid it is possible to confirm that a plant is a hybrid provided that the two parents have different nuclear DNA contents. Flow cytometry only requires a small amount of tissue (about 100 mg) so the analysis can be carried out on very small plants, including in vitro plantlets.

NATIVE PLANTS

A range of New Zealand native plants are grown for export as cut foliage, including *Pittosporum* and *Phormium*. There is potential for a number of other species to be developed for cut foliage/flowering stems. These include *Hebe, Leptospermum*, and *Astelia*.

Tissue culture techniques are required for a number of native plant species that have significant commercial potential but are slow to propagate vegetatively by standard methods. These include superior selections of *Astelia* species and hybrids, and some *Phormium* selections. Many of the *Phormium* selections are chimeras with coloured, striped leaves. These can be difficult to tissue culture, as the chimeral leaf patterns can easily be lost during tissue culture. For some other species it can be difficult to develop high proliferation rates in culture (e.g., some *Astelia* species) (Seelye et al., 1998).

CONCLUSION

The expansion of New Zealand's ornamental exports requires the ongoing development of new crops, novel cultivars, and production and propagation technologies. New Zealand growers and breeders have been very successful at developing new crops. This development could be assisted with greater use of technologies such as those outlined above. Technologies developed by New Zealand research organisations are accessible to New Zealand businesses and closer working relationships between industry and researchers will lead to the identification of new opportunities for our industries.

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Something About Licorice in New Zealand©

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INTRODUCTION

European licorice (*Glycyrrhiza glabra* L. var. *typica*) is the commonly cultivated member of the genus *Glycyrrhiza*. Other common names include liquorice and sweetwood. A member of the Leguminosae family, European licorice is a perennial deciduous herb, which grows to a height of 1 to 2 m. It produces long thin roots that grow more than 1 m deep, and creeping underground rhizomes that can grow several metres long. Both roots and rhizomes are yellow and juicy inside. The tops are frost tender and die down in the winter, shooting again from the underground crown in the spring. The plant propagates by producing new plants from buds on the rhizomes.

European licorice is native from southern Europe to Pakistan and northern India, and grows in warm temperate to subtropical climates. It can grow on riverbanks and in areas with seasonal rainfall.

Commercial licorice extract is obtained by boiling or diffusing the shredded roots and rhizomes of the licorice plant in water, and then concentrating the extract in evaporators. The root extract contains about 7% of glycyrrhizin (a saponin glycoside about 50 times sweeter than cane sugar), triterpenoid acids, flavonoid glycosides, glucose, sucrose, and starch. This black extract is widely used as flavouring in medicines, confectionery, tobacco products, and in beverages (Tyler, 1993). Licorice also has medicinal properties and is used to treat respiratory tract infections and stomach complaints. These properties have been recognised for thousands of years, and the plant was used in ancient China, India, Egypt, Greece, and Rome. Other economic but less important members of the genus include *G. echinata,* which is found in the Soviet Union and Israel, and *G. uralensis,* which is native to Asia.