Leptospermum — A New Image©

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INTRODUCTION

The genus *Leptospermum* contains more than 70 species that are endemic to Southeast Asia, Australia, and New Zealand. The majority of species are endemic to Australia (Thompson, 1983; 1989). New Zealand has only one species, *L. scoparium*, which is also endemic to New South Wales, Victoria, and Tasmania. Selected forms of several species are sold in the nursery trade. However, only *L. scoparium* has been extensively bred as a garden plant (Dawson, 1990). More than 100 cultivars of *L. scoparium* have been named, but less than 30 cultivars have been bred from all the other species (Harris et al., 1995). Flower colour of *L. scoparium* ranges from white to pink, to crimson, with both single- and double-flowered types, and plant forms from upright to prostrate.

The genetic base of these *L. scoparium* cultivars is quite narrow. The red petal colour of most cultivars appears to have been derived from 2 or 3 wild accessions (Harrison, 1974). Most of the original breeding of *L. scoparium* was conducted by Lammerts (1945) in California. He crossed a red-petaled cultivar, *L. scoparium* 'Nichollsii', with a pale-pink double-flowered cultivar, *L. scoparium* 'Rose Double', and subsequent populations of this breeding were generated by selfing or intercrossing their progeny. This possibly explains why there is little variation in many characteristics, such as cold tolerance, in the main cultivars despite this variation in wild ecotypes (Harris and Decourtye, 1991).

CUT FLOWER POTENTIAL

New Zealand exports small quantities of cut *L. scoparium* stems. However, the quality is poor as this species has a short vase life due to flower wilting and abscission (Zieslin and Gottesman, 1983; 1986). In Australia cut stems of *L. spectabile* and *L. rotundifolium* are sold domestically and exported, but quantities are small (Slater et al., 1999).

Earlier attempts to develop a postharvest treatment to extend the vase life of *L. scoparium* were not successful (Zieslin and Gottesman, 1983; 1986). More recently we found that hydroxyquinoline sulphate (HQS) delayed the rapid decline in water uptake and stem dessication, and when combined with sucrose, extended the vase life from 3 to 9 days (Burge et al., 1996).

Bicknell (1995) assessed the postharvest life of 15 *Leptospermum* species and found two species, *L. rotundifolium* and *L. coriaceum*, with a long vase life. He then produced a hybrid population between *L. scoparium* and *L. rotundifolium* and found the vase life of these hybrids to be intermediate (4 to 9 days) between the two parents (4 and 11 days, respectively). Selection and hybridization of the longer vase life seedlings over several generations has resulted in selections with a vase life up to

10 days. These selections are being further assessed. Plants in this breeding programme have also been identified with potential for amenity use. Last spring, three *L. scoparium* × *L. rotundifolium* cultivars, 'Galaxy Magellan', 'Galaxy Orion', and 'Galaxy Pegasus', were released. These cultivars do not have the sooty mould problem that is typically found in *L. scoparium* cultivars.

Other interspecific hybrid *Leptospermum* cultivars have also recently been released for amenity use. These are 'Karo Spectrobay', 'Karo Silver Ice', and 'Karo Pearl Star' (Harris, 1999).

Australia is making a significant investment in the development of its flora. Recently a breeding programme on *Leptospermum* has been initiated with the aim of developing cut flower types (Slater et al., 1999). Australian species have white, pale yellow and yellow-green, pale to dark pink, and red flowers. These species flower from late September until early March in Australia. Australian researchers plan to develop cut flower cultivars that can be marketed after their Geralton wax, (*Chamelaucium*) (Slater et al., 1999).

PROPAGATION

Most *L. scoparium* cultivars can be propagated from semihardwood cuttings over the summer to autumn period. Tissue culture can assist with the rapid multiplication of mother stock of new selections. A preliminary study (Braun and Leung, 1991) suggested that a tissue culture system could be developed. Recently we developed tissue-culture techniques for some of the selections from our breeding programme. These included F1 and F2 hybrid selections as well as selections from the backcrossed generation (F1 backcrossed to *L. rotundifolium*).

Actively growing young shoots from greenhouse plants provided the source material from which cultures were initiated. Following surface sterilization, shoots were excised into nodal segments.These were placed on a basal medium (BM), comprising MS salts (Murashige and Skoog, 1962), 100 mg liter^{-1} inositol, 0.4 mg liter^{-1} thiamine HCl, 30 g liter^{-1} sucrose, and 7.5 g liter^{-1} agar, which was supplemented with 0.05 mg liter^{-1} indolebutyric acid (IBA), 0.3 mg liter^{-1} benzylaminopurine (BAP), and 0.1 mg liter^{-1} gibberellic acid (GA_3).

After 2 to 4 weeks, axillary shoots produced from the nodes were subcultured by cutting into nodal segments. They were placed on similar media to bulk up sufficient tissue stock for proliferation experiments. In a preliminary experiment thidiazuron (TDZ), BAP, and kinetin were assessed at various rates to promote shoot proliferation. After 3 weeks an average of at least six shoots per nodal explant were produced on BM with 0.1 or 0.3 mg liter^{-1} BAP. Proliferation on media with either TDZ or kinetin at similar rates was less than half that of the BAP treatments. Roots developed when individual shoots produced on proliferation media were grown on either a growth regulator-free medium or media with up to 1.0 mg liter^{-1} IBA or IAA. Plantlets were potted in a bark and pumice mix (50 : 50, v/v) and placed under intermittent mist in the greenhouse. In addition, shoots could be directly removed from culture, treated with a commercial rooting compound, and placed in a high humidity mist environment. Both rooting regimes resulted in high levels of plant survival.

CONCLUSION

The current *Leptospermum* breeding work in Australia and New Zealand will result in the production of a broad range of cultivars over the next decade, and the establishment of *Leptospermum* as a cut flower crop. Selections from these breeding programmes may be suitable for amenity use because they are likely to have a wide range of flower colours, flowering times, and plant forms.

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