Postharvest Characteristics of Cut Flowers of Selected Members of the Family Myrtaceae

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ABSTRACT

Stages of floral development were described for *Eucalyptus ficifolia* and *Metrosideros collina* 'Tahiti' flowers (Myrtaceae) attached and detached from plants. Vase solution treatments were applied to promote bud opening of cut flowers and to prevent postharvest stamen wilting and abscission in both species. Water uptake and mass of harvested flowers in both species declined rapidly when the pedicels were placed in water (control). Some flower buds did not open after harvest. The decline in water uptake and flower mass was greatly reduced by a vase solution treatment containing 2% sucrose, and 200 ppm hydroxyquinoline citrate (HQC) adjusted to pH 4 using citrate buffer. Vase solutions containing higher sucrose concentrations (more than 6%) and of greater acidity (pH<4) were not beneficial for vase life of both species.

Cut flowers of both species held in the standard solution (2% sucrose, 200 ppm HQC adjusted to pH 4 using citrate buffer) were treated with ethephon (0-10,000 ppm) following pre-treatment with silver thiosulphate (STS) (0-2.0 mM). Ethephon treatments significantly induced stamen wilting, but had no effect on stamen or petal abscission in both species. Pre-treatment with 2 mM STS had no effect on the rate of stamen wilting, but significantly reduced stamen or petal abscission in both species.

Cut flowers of *M. collina* 'Tahiti' held in the standard solution were treated with ethylene (0-5 ppm). Exogenous ethylene significantly promoted abscission of stamens and petals in *M. collina* 'Tahiti'. Treatment with 0.5 and 5 ppm ethylene also induced flower abscission. Ethylene emanation from untreated cut flowers from plants grown in two environments (greenhouse and outside) was also measured. Untreated cut flowers harvested from plants grown outside produced more endogenous ethylene than those from plants grown in the greenhouse. The abscission of *M. collina* 'Tahiti' probably results from a relatively high sensitivity to ethylene.

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Chapter One
Introduction

Myrtaceae is a large family consisting of about 3,500 species in about 150 genera. The family is distributed throughout Central and South America, Central and South Africa, Europe, Asia, various Pacific Islands (including New Zealand) and Australia. The species are mainly shrubs or trees, rarely climbers. The family Myrtaceae includes many highly ornamental species which are popular in parks and gardens (Elliot and Jones, 1993). For example, *Eucalptus ficifolia*, a large tree native to Australia, is commonly grown in New Zealand, and is arguably the most valued of the flowering *Eucalyptus* (Palmer, 1990; Elliot and Jones, 1993).

Horticulturally, *Metrosideros collina* 'Tahiti' is one of the most useful smaller growing cultivars derived from this Pacific Island species. Brilliant orange-red blooms appear intermittently through the year, but particularly during winter months. Expanding buds through winter have a striking red colour. 'Tahiti' is quite distinct from the more familiar *Metrosideros* in both size and its well-rounded shrubby form. The plant is also becoming important as a flowering pot plant in New Zealand (Elliot and Jones, 1993).

Within the family Myrtaceae, the main postharvest and display problem is flower and floral organ abscission (Joyce, 1993). Although no information is available on the postharvest characteristics of *Eucalyptus* and *Metrosideros* flowers, several genera and species in the family Myrtaceae have been extensively studied. Preliminary investigations revealed that ethylene is an important factor in the postharvest life of a number of native Australian Myrtaceae, including *Chamaelaucium uncinatum* (Joyce, 1988). The most successful treatment for preventing postharvest floral organ abscission of *C. uncinatum* was by blocking perception of ethylene using pulses of silver thiosulphate (STS) (Joyce, 1988). Further, Joyce (1993) stated that flower abscission in *C. uncinatum* induced by water deficit could be reduced by pre-treatment with a pulse of STS. Ethylene also appeared to be involved in flower abscission of *Leptospermum scoparium* (Burge et al., 1996). Ethylene

induced flower abscission under high humidity conditions, while STS treatments prevented ethylene-induced flower abscission in this species (Zieslin and Gottesman, 1983).

The short vase life of *L. scoparium* appears to be principally the result of a rapid decline in water uptake and even more rapid water loss leading to desiccation. Improving the water relations of stems is likely to reveal other limiting factors (such as ethylene sensitivity). Pulsing flowers of *L. scoparium* with STS had little effect on flower senescence. Sucrose reduced the rate of flower senescence and when combined with hydroxyquinoline sulfate (HQS) extended the vase life from 3d to 9d in this species (Burge et al., 1996). Holding solutions containing 1% or 2% sucrose and 8-hydroxyquinoline citrate (8-HQC) at 200 $mg \cdot L^{-1}$ significantly increased the vase life of *Eucalyptus globulus* and *E. cinerea* foliage (Wirthensohn and Sedgley, 1996). Staden and Slootman (1976) observed that placing the stems of *E. fulgens* in citric acid at pH 2.8 for 1 h prevented the flow of latex and extended vase life without stem damage.

The objectives of this research were to extend the longevity of cut inflorescences of *E. ficifolia* and *M. collina* 'Tahiti' and to investigate the role of ethylene in the abscission of floral organs. The hypothesis that improved water balance would extend cut inflorescence longevity was tested by including sucrose and/or acid in the vase solution. Attempts to decrease floral organ abscission were made by attempting to block the effects of ethylene with STS.