Title Inhibitors of oxidative enzymes affect water uptake and vase life of cut *Acacia holosericea* and *Chamelaucium uncinatum* stems

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Abstract

Cut *Acacia holosericea* (Velvet Leaf Wattle) foliage has a short vase life, possibly because of blockage in xylem vessels. We indirectly investigated a hypothesised role for peroxidase and phenoloxidase enzyme activities in xylem occlusion of Acacia stems by using their inhibitors. We also tested these inhibitors with cut *Chamelaucium uncinatum* (Geraldton waxflower), another woody stemmed cut flower.

The peroxidase inhibitors used were 3-amino-1,2,4-triazole (AT), catechol (CH), hydroquinone (HQ), p-phenylene diamine (PD) and copper sulphate (CS, Chamelaucium only). The catechol oxidase inhibitors were tropolone (TP), 4-hexylresorcinol (HR) and 2,3-dihydroxynaphthalene (DN). A laccase inhibitor, cetyltrimethylammonium bromide (CM), was also used. Other phenoloxidase inhibitors tested were p-chlorophenol (CP), p-nitrocathechol (NC), p-nitrophenol (NP) and sodium metabisulphite (SM). 2-Mercaptoethanol (ME), phenyl hydrazine (PH) and salicylhydroxamic acid (SH) were used as inhibitors of both peroxidase and phenoloxidase.

Twelve inhibitors (CH, HQ, DN, HR, TP, CM, CP, NC, NP, SM, PH and SH) significantly improved water uptake, maintained relative fresh weight and increased vase life of Acacia at least once in two experiments. In Chamelaucium, six inhibitors had significant positive effects on water relations (CH, PD, CS, CM, CP and PH) and vase life (AT, CH, PD, CS, ME and PH), while four of them (DN, TP, NC and NP) were phytotoxic at applied concentrations. Only one of the 46 inhibitor treatments inhibited transpiration and increased fresh weight, suggesting that the inhibitors mainly acted by increasing water uptake. Overall, results indicate that oxidative enzyme activities, potentially through phenolic deposition, contribute to xylem occlusion in woody cut stems of Acacia and Chamelaucium.