Title Copper distribution and ionic form effects for postharvest treatments of cut *Acacia holosericea* stems

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Abstract

A short postharvest life is the major constraint associated with cut *Acacia* flowers and foliage. Treatment with $CuSO_4$ (Cu^{2+}) has previously been shown to improve the longevity of cut *Acacia holosericea* stems. Towards refining the treatments, a range of Cu^{2+} and Cu^{+} salts were assessed for relative efficacy in improving vase life and water relations of *A. holosericea*. Five hour pulses with the Cu^{2+} salts $CuSO_4$, $CuCl_2$, $(CH_3COO)_2Cu$ and $Cu(NO_3)_2$ at 2.2 mM gave equally longer vase lives by ~2.5-fold over deionised water (DIW) and standard tap water (STW) controls. The same Cu^{2+} salts at 0.5 mM in the vase solution also gave significantly ($P< 0.05$) improved vase life, relative fresh weight and water uptake compared to the DIW control. For Cu^{2+} versus Cu^{+}, optimum concentrations with Cu^{2+} could not be directly compared due to the low solubility of the Cu^{+} salt CuCl. However, Cu^{+} from CuCl at 0.415 mM also had positive effects on vase life compared to the DIW control. Thus, both Cu^{2+} and Cu^{+} treatments can enhance vase life parameters for cut *A. holosericea* foliage. The benefits were irrespective of the counter ion and, thus, Cu^{2+} and Cu^{+} *per se* were responsible. The most effective Cu^{2+} pulse treatment decreased stomatal conductance of phyllodes initially, but did not cause sustained stomatal closure. Cu accumulated to greater levels in basal stem and phyllode tissues than in upper stem and phyllode tissues of cut *A. holosericea* stems. Possible mechanisms of Cu^{2+}/Cu^{+} action are discussed.