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Abstract. Plains cottonwood trees (*Populus deltoides* subsp. *monilifera* (Aiton) Eckenw.) occur in riparian and urban areas in semi-arid regions of western United States. The amount of water necessary to maintain healthy trees while reducing water use are management objectives along the High Line Canal in Denver, Colorado, U.S. Canal-flow days, soil moisture, precipitation, cottonwood predawn leaf water potentials (ψpd) and crown dieback were measured annually from 1997–2008. Five key findings were: 1) percent soil moisture did not correlate with ψpd, 2) trees became moderately water-stressed (ψpd < -0.3 MPa) and severely water-stressed (< -0.5 MPa) 45 and 51 days after canal flow ended, respectively, 3) ψpd of water-stressed trees increased 24–48 hours after water was added, 4) only 22% of rain events of 25 mm relieved stressed conditions for seven days, and 5) yearly average autumn and growing season ψpd correlated with autumn crown dieback at low soil moisture sites (few canal-flow days), but not at moderate or high sites (more canal-flow days). Trees with ψpd > -0.30 MPa generally had low crown dieback, whereas trees with ψpd < -0.50 MPa exhibited moderate or severe crown dieback. Plains cottonwoods are relatively resilient to single-year drought, and moderately stressed trees may recover and can withstand 25%–40% crown dieback if water is available the following year for >14 days. Irrigation timing and the frequency needed to minimize cottonwood future crown dieback can be obtained from autumn and growing season predawn leaf water potentials.

Key Words. Colorado; Cottonwood; Crown Dieback; Mortality; *Populus deltoides*; Semi-Arid; Water Potential; Water Stress.

Abstract. Grafting and budding are common horticultural techniques, and similar techniques have been successfully used in the management of tree wounds by bridge and approach grafting. The success of bark grafts raises the possibility of using bark patch grafts to span trunk wounds and pruning cuts. Fifty seedling trees from each of six commonly planted Australian native and exotic species—*Acacia dealbata*, *Banksia integrifolia*, *Eucalyptus viminalis*, *Platanus* × *acerifolia*, *Quercus robur*, and *Pinus radiata*—had circular plugs of bark removed from their stem using a #3 cork borer (9 mm diameter). The plugs were lifted from the stem and then re-attached at one of four rotations (0, 90, 180, and 270 degrees) to the original cambial orientation in each of the four seasons.

While there was no successful re-attachment for *Pinus radiata*, the data for the successful re-attachment of the other five species showed that the most successful orientation for re-attachment was in the original position (0 degrees); successful attachment did occur at other orientations. The best season for re-attachment was spring, but successful attachment did occur in other seasons; success was lowest when grafting was undertaken in winter.

The use of bark patch grafts may provide arborists with an additional method for dealing with large wounds caused by vandalism and accidents, and would be particularly useful if a tree was of special, historic, or environmental significance to the landscape. Covering the wound with a bark patch graft may conceal the removal of a branch, hide obvious scarring, and at the same time reduce the risk of disease and stress to the tree by closing the wound more quickly than would normally occur due to natural callusing.

Key Words. *Acacia dealbata*; Australia; *Banksia integrifolia*; Bark Grafting; Callus; *Eucalyptus viminalis*; Native Tree Species; *Pinus radiate*; *Platanus* × *acerifolia*; *Quercus robur*; Seasonal Wound Responses; Tree Wound Closure.

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