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Water level controls on transpiration of co-dominant species in black ash wetlands

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Canopy dominance exhibited by black ash (*Fraxinus nigra*) in regularly inundated wetland and riparian settings suggests the species has an advantageous adaptation. Our study examined the response of sap flux to water level in three common co-dominant species in depressional black ash wetlands in western Michigan. Sap flux was measured on 6 black ash, 5 red maple (*Acer rubrum*), and 6 yellow birch (*Betula alleghaniensis*). Normalized water levels were used to test for differences in sap flux among species and sap flux responses to atmospheric drivers. Red maple and yellow birch displayed a slight increase and decrease in sap flux as water levels increased, respectively. Black ash showed a strong reduction in sap flux as water levels increased. At low water levels red maple and yellow birch sap flux were not significantly different (1.8 m^3 m^{-2} d^{-1}), and black ash (3.9 m^3 m^{-2} d^{-1}) was significantly greater than both. When water levels were elevated sap flux was significantly higher in black ash (2.8 m^3 m^{-2} d^{-1}) than yellow birch (1.9 m^3 m^{-2} d^{-1}), which was significantly higher than red maple (1.7 m^3 m^{-2} d^{-1}). Differences in canopy water use and response of sap flux to water level among these species has important implications. Following the loss of black ash, a persistent reduction in canopy transpiration may exacerbate observed increases in water levels and decreases in water table drawdown throughout the growing season. Decreased transpiration and amplified hydrologic stress will likely affect future forest health and productivity.

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