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Impact of water stress-induced embolism on bud survival in *Populus nigra* sprouts

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Bud survival is vital to sustain tree growth across seasons. ~~It is impairment because of a~~ The lack of water supply may induce weakness that could lead to tree death. The aim of this study was to collect information on how the buds are hydraulically supplied from the bearer stem and on the impact of drought on bud survival. We hypothesized that the hydraulic connection of the bud to stem xylem structures was critical for its survival. Thus, we generated a controlled water stress of young *Populus nigra* trees for several weeks. We carried out measurements ~~a census~~ of bud metabolic activity, transcript expression of aquaporins, ~~the~~ xylem water potential of the bearer stem together with local water status within the bud and tissues in the bearer shoot node ~~of young *Populus nigra* trees~~. We found that bud respiration rate was closely correlated to its water content and decreased concomitantly in buds and their surrounding bearer tissues, ~~and a m~~ Modulation of few aquaporins pattern expressions (PIP, TIP and XIP subfamilies) seems to be linked to water movements in living cells. Both buds and trees died simultaneously beyond a threshold water content and respiration rate. Nuclear magnetic resonance (NMR) imaging provided relevant local information about the ~~various~~ water reservoirs ~~of in~~ the stem, their dynamics and their interconnections. Moreover, these images revealed that the cambium tissues remained largely hydrated at the tree death tipping point. Overall, this study provides insights into a possible water distribution between connected tissues within water stressed plants, hydraulic trade-offs between the meristematic zone integrity, and the hydration of the bud and its surrounding tissues.