

Publication

Losing half the conductive area hardly impacts the water status of mature trees

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The water status of transpiring tree crowns depends on a hydraulic continuum from the soil matrix around roots to the sub-stomatal cavity of leaves, with a multitude of hydraulic resistances along this path. Although the stem xylem path may not be the most critical of these resistances, it had been suggested that a >50% interruption of that path by drought-stress-induced embolization (air filling) of conduits is critical for tree survival. Here we show that cutting the sapwood of mature, 35 m tall trees in half hardly affects crown water status and transpiration. Counter expectation, this first adult tree sapwood interception experiment revealed that shoot water potential in the canopy (assessed by using a 45 m canopy crane) either remained unaffected (spruce) or became less negative (beech), associated with small reductions in leaf diffusive conductance for water vapour. We conclude that the stem xylem of these trees has a large overcapacity and the tree hydraulics debate requires a critical re-visitation.

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