Global change and urban trees: promoting sustainable landscapes through a better understanding of tree root biology.

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NEED
The effect of shifting climate scenarios underground, especially water limitation, is poorly understood despite insufficient water being a main cause of reduced growth and mortality in urban trees. Understanding what controls root dynamics can lead to more efficient and profitable landscapes. This project examines rooting characteristics of an array of native and non-native Eastern temperate tree species to help inform the tree selection decisions and aid future urban tree persistence.

APPROACH
The researchers established a long-term field experiment that mimics reduced rooting volumes through 48 in-ground, hydraulically isolated tree boxes. Boxes with ladders between each tree allowed for trees to be viewed below ground. The access areas were covered with an insulated lid when not in use to prevent temperature fluctuations. The team examined eight initial tests of drought tolerance and related standard above ground ratings to root capacitance and vulnerability. The team also established root exudate profiles to understand how tree species vary in their rhizosphere.

IMPACTS
Through a series of experiments, Bauerle and her team found the root systems of select tree species do have the ability to retain water despite drought. The team is targeting these species for future studies that investigate drought level and frequency on tree survivability. The team also found there is great variation in tree root exudate profiles and that these profiles can change with drought. The root exudates can facilitate water retention in the rhizosphere and may significantly alter the water dynamics around tree roots. The team’s established site will have continued impacts as it serves as both a research laboratory to address urban tree response to limited water availability and as an outdoor classroom for educators and plant science students.

Related information: Bauerle Lab – Plant Ecophysiology and Root Ecology