



BSc./MSc. thesis topic

Cavitron-based plant water extractions for water stable isotope analysis

The stable isotopes of water (^2H , ^{18}O) are powerful tracers for studying water movement and storage through the soil-plant-atmosphere continuum as well as their response to climatically, environmentally and anthropogenically-induced changes.

Matching plant water isotopic composition with potential sources, enable the estimation of their relative contributions to plant water uptake. However, to obtain the water isotopic composition of plants, an extraction method is needed. Here, a recently introduced flow-rotor centrifugation approach using a “Cavitron” seems to be a promising new extraction method for plant water (see Barbeta et al., 2022).

This thesis should explore the potential application of this method to a variety of different plant (tree) species. For this, tree twig sampling will be conducted, followed by “Cavitron” plant water extraction and subsequent water isotope analysis. Additionally, the isotopic composition of precipitation at the sampling points will be monitored as a reference for a potential plant water source.

Data will be analyzed statistically and compared to literature values.

Requirements

- Interest in lab and field work
- Statistical analysis of the results

Supervision

Cover Prof. Dr. Natalie Orlowski

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Literature

Barbeta, A., Burlett, R., Martín-Gómez, P., Fréjaville, B., Devert, N., Wingate, L., Domec, J., & Ogée, J. (2022). Evidence for distinct isotopic compositions of sap and tissue water in tree stems: Consequences for plant water source identification. *New Phytologist*, 233(3), 1121–1132.

<https://doi.org/10.1111/nph.17857>

Cochard H 2002 A technique for measuring xylem hydraulic conductance under high negative pressures. *Plant Cell and Environment* 25 : 815-819.

Cochard H, Damour G, Bodet C, Tharwat I, Poirier M, Améglio T 2005 Evaluation of a new centrifuge technique for rapid generation of xylem vulnerability curves. *Physiologia Plantarum* 124:410-418



Cavitron plant water centrifuge

Photo H. Cochard

<http://herve.cochard.free.fr/Cavitron.htm>

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