



## **Hydrogen isotopes in plant organic compounds reflect the carbohydrate metabolism of plants**

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In contrast to the stable C, N and O isotope composition of plant materials, the hydrogen isotope composition of plant organic compounds has not yet been established as a tool in ecological or biogeochemical research. With the development of new analytical instruments that allow the hydrogen isotope analysis of selected plant compounds there is, however, growing interest to explore the power of hydrogen isotopes as tools for ecological and biogeochemical research. In my talk I will summarize recent work from my lab where we show that the hydrogen isotope composition of lipids and carbohydrates reflect the carbon and energy metabolism in plants: Our experiments revealed that that autotrophic and carbon-autonomous plant tissue is  $2\text{H}$  depleted while heterotrophic or non-carbon-autonomous tissue is  $2\text{H}$  enriched. We were able to identify various biochemical processes during the biosynthesis of plant tissue that contribute to these patterns and can show that these patterns apply for various levels of organization: across plant species (e.g. heterotrophic parasitic plants and their autotrophic hosts), across different organs within an individual plant (e.g. autotrophic leaves vs. heterotrophic roots), and even within a plant organ (e.g. following the transition of a leaf from a carbohydrate sink to a carbohydrate source during ontogeny). As such, the hydrogen isotope composition of plant tissue seems to be a robust proxy for the carbohydrate metabolism in plants and could serve thus as an important new tool in plant ecology, plant breeding, biogeochemistry, and paleo applications.