

Publication

The influence of species and growing conditions on the ^{18}O enrichment of leaf water and its impact on 'effective path length'

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)**ID** 2106221**Author(s)** Kahmen, Ansgar; Simonin, Kevin; Tu, Kevin; Goldsmith, Gregory R.; Dawson, Todd E.**Author(s) at UniBasel** [Kahmen, Ansgar](#) ;**Year** 2009**Title** The influence of species and growing conditions on the ^{18}O enrichment of leaf water and its impact on 'effective path length'**Journal** New Phytologist**Volume** 184**Number** 3**Pages / Article-Number** 619-630

The stable oxygen isotope ratio ($\delta^{18}\text{O}$) of plant material has been shown to contain essential information on water and carbon fluxes at the plant and ecosystem scales. However, the effective path length ($L(m)$), a parameter introduced to leaf-water models still requires a comprehensive biological characterization to allow interpretation of $\delta^{18}\text{O}$ values in plant material with confidence. Here, we tested the variability of $L(m)$ across and within three species that developed leaves in environments with different relative humidity. We also tested whether the $L(m)$ of fully developed leaves is affected by short-term fluctuations in relative humidity. We determined that significant differences in $L(m)$ exist among *Phaseolus vulgaris*, *Rizinus communis* and *Helianthus annuus*. Within a given species, however, $L(m)$ values did not differ significantly among individuals. These findings indicate that $L(m)$ is species specific and a relatively constant parameter and that $L(m)$ will not obscure the interpretation of $\delta^{18}\text{O}$ values in plant material of a given species. We urge caution, however, because values for $L(m)$ are derived from fitting leaf-water models to measured values of $\delta^{18}\text{O}$, so care must be taken in assigning a 'cause' to values of $L(m)$ as they likely capture a combination of different biological leaf properties.

Publisher Wiley**ISSN/ISBN** 0028-646X ; 1469-8137**edoc-URL** <http://edoc.unibas.ch/49361/>**Full Text on edoc** No;**Digital Object Identifier DOI** 10.1111/j.1469-8137.2009.03008.x**PubMed ID** <http://www.ncbi.nlm.nih.gov/pubmed/19761496>**ISI-Number** WOS:000270902200011**Document type (ISI)** Article