

Isotopic composition of organic compounds in phloem sap

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Carbon isotopic signatures are used extensively in plant sciences and are now an established tool in systems biology. Recent reviews have highlighted patterns of post-photosynthetic enrichment of plant components at a range of temporal and spatial scales. Interpreting biological processes from these patterns relies on an improved understanding of major fractionation events. Phloem is the central conduit for the long distance movement of photoassimilates in plants. Isotopic signatures of phloem carbon show close associations with environmental cues and have been recently identified as potential markers of plant and ecosystem function. Phloem carbon is often enriched compared to leaf carbon although the mechanisms responsible are not fully characterised. Here we identify a new source of variation in phloem carbon isotopic composition using compound specific analysis. Changes in the abundance of major transported solutes influences phloem carbon isotopic signature and is sensitive to environmental cues. Understanding factors contributing to these changes will aid in the development of tools for improved monitoring of ecological, physiological and biogeochemical processes.