The response of plant biomarker lipids to water stress and light variables

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Plant lipids preserved in soils and sediments are extensively used as molecular and isotopic markers of coupled climatic and vegetative changes of the geologic past. The production of free lipids, such as n-alkanes and terpenoids, could be upregulated or downregulated at the leaf-level in response to light and water stress. Leaf samples of *Quercus buckleyi* and *Juniperus ashei* collected at different canopy heights with light gradients were extracted and analysed to investigate the molecular composition and distribution of lipids in response to the heights and lights. The relative abundance of α-tocopherol showed exponential decline with increasing canopy height and light transmissivity. The concentration of the diterpenoid, dehydroabietane in *Juniperus ashei* generally increased with increasing canopy height which we posit is a response to increasing water limitation at the leaf level with increasing canopy height. Average chain length (ACL) of n-alkanes analysed from *Quercus buckleyi* increased ~1.7% with canopy height increased, while that of the *Juniperus ashei* decreased ~1.3% with increasing canopy height. However, ferruginol and cis-ferruginol concentrations of *Juniperus ashei* have shown no correlation with light transmissivity and canopy height. Therefore, we hypothesized that the responses of these lipids could be signals for indicating light and water stress, which may help to better interpret paleoclimate and paleovegetation.