Leaf wax *n*-alkane variation in *Dodonaea viscosa* along an environmental gradient

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LEAF WAX *N*-ALKANE VARIATION IN *DODONAEA VISCOSA* ALONG AN ENVIRONMENTAL GRADIENT

N-ALKANE VARIATION WITHIN SPECIES

ABSTRACT

The variation in distribution and abundance of leaf wax *n*-alkanes has been proposed as a proxy for palaeoclimate. Understanding environmental controls on the variation in distribution and abundance of leaf wax *n*-alkanes is therefore necessary to determine if this is a robust tool for extracting climatic information from palaeo archives. Results of previous work to create a modern baseline for this proxy have, in some cases, been confounded by differences in species or plant type between sites or along gradients. This study investigates leaf wax *n*-alkane variation within a species of Australian shrub, *Dodonaea viscosa,* which inhabits a wide range of climatic conditions.

Leaf wax *n*-alkane data from 43 individuals of *D.viscosa* were analysed from a climatic gradient ranging from central Australia to Kangaroo Island, with a mean annual temperature range of 13.9—22.7 °C and precipitation range of 164—808 mm/yr. Concentration of *n*-alkanes increase with increasing temperature along the gradient. Annual mean aridity index has the strongest relationship with the average chain length (ACL) of leaf wax *n*-alkanes and suggests that water availability is a strong driver of variation in ACL. In addition to *n*-alkane data, carbon isotope ratio ($\delta^{13}C$) and specific leaf area (SLA) data were measured to determine if this species shows predictable responses to these established and climatically sensitive leaf traits. Predicted responses in $\delta^{13}C$ and SLA are observed in this species. Only weak effects of subspecies on leaf trait relationships with climate are found in this study. Scanning electron microscopy

was used to qualitatively assess differences in leaf wax microstructure with climate and produced inconclusive results.

Distributions of leaf wax *n*-alkanes have great potential as a proxy for palaeoclimate. Results presented here support the use of *n*-alkane ACL variation to detect aridity rather than temperature.

KEYWORDS

Palaeoecology, palaeoclimate proxy, *n*-alkane, leaf wax, carbon isotopes ratios, climate, specific leaf area, Australia, *Dodonaea viscosa*.

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