



from fossil leaves

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Leaf mass per area (LMA) is an important leaf functional trait that reflects the extent of structural investment in a leaf and is commonly used by paleobotanists to reconstruct past ecosystems. It is one of the principal traits driving the leaf economic spectrum, with plants ranging from having fast resource acquisition, high relative growth rates, low leaf life spans (e.g., deciduousness), and low leaf mass per area at one end, to having the opposite traits on the other end of the spectrum. Because leaf mass cannot be obtained from fossil leaves directly, an easy-to-measure proxy to estimate LMA from woody ‘dicot’ leaves was developed by Royer et al. (2007). This proxy takes advantage of the biomechanical relationship of petiole width relative to leaf area (here called ‘petiole stoutness’), and LMA, with a higher LMA necessitating a wider petiole to support that leaf area. An unsolved problem with the metric is that the standard error of the petiole stoutness and LMA relationship is large, which limits interpretations of community-level trends and complicates the classification of a fossil taxa's leaf habit. We address this by utilizing the community-level dataset of modern leaves from Peppe et al. (2011) to test for similarities in the community-level distributions of estimated (from petiole stoutness) and measured (from leaf mass) LMA values, and the variance of both among different climate types. We also calculate the percentage of taxa where leaf habit was correctly inferred by estimated LMA following the guidelines of Royer et al. (2007). This study provides critical information on the extent to which LMA estimates from fossil leaves can be used to reconstruct ancient plant community ecology.

An open vegetation-plot database for Southeast Asia: tool for ecology, conservation, and paleo-conservation

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