Seasonal and Environmental Drivers of Leaf Functional Traits in Urban and Natural Oak Forests: A Comparison between *Quercus frainetto* and *Quercus cerris*

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The Mediterranean basin is projected to become the global biodiversity hotspot with the highest proportion of urban land, highlighting the increasing importance of urban forests for biodiversity conservation. In this context, urban oak forests represent key reservoirs of ecological functionality in rapidly urbanizing landscapes.

Despite growing interest in urban green infrastructure, the physiological responses of native oak species to urban environments remain poorly understood, particularly across seasonal dynamics.

In this study, we investigated the physiological response of *Quercus frainetto* in urban and natural forest stands within a Mediterranean city, using rapid and non-invasive measurements of leaf functional traits. We analysed specific leaf area (SLA), leaf dry matter content (LDMC), leaf thickness (LTH), and chlorophyll (CHL), anthocyanin (ANTH), and flavonol (FLV) contents. Sampling was conducted across three periods (June, July, and September). Data were analyzed using linear mixed models and multivariate approaches, and results were compared with those obtained for *Quercus cerris* under the same conditions.

Our results show a clear seasonal shift, with decreasing SLA and increasing LDMC from early to late summer, indicating a transition from acquisitive to more conservative strategies. Differences between urban and natural stands were most pronounced during peak summer conditions. Compared to *Q. cerris*, *Q. frainetto* exhibited greater variability in both structural and biochemical traits, suggesting higher sensitivity to environmental stressors, while *Q. cerris* showed greater functional stability.

These findings highlight species-specific adaptive strategies and emphasize the importance of integrating structural and biochemical traits when assessing tree responses to urban environments, providing useful insights for selecting resilient native species in Mediterranean urban forestry.