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Corylus avellana responsiveness to light variations: morphological, anatomical, and physiological leaf trait plasticity.

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Abstract

Morphological, anatomical, and physiological leaf traits of *Corylus avellana* plants growing in different light conditions within the natural reserve "Siro Negri" (Italy) were analyzed. The results highlighted the capability of *C. avellana* to grow both in sun and shade conditions throughout several adaptations at leaf level. In particular, the more than 100% higher specific leaf area in shade is associated to a 44% lower palisade to spongy parenchyma thickness ratio compared with that in sun. Moreover, the chlorophyll (Chl) *a* to Chl *b* ratio decreased in response to the 97% decrease in photosynthetic photon flux density. The results highlighted the decrease in the ratio of Chl to carotenoid content, the maximum PSII photochemical efficiency, and the actual PSII photochemical efficiency (Φ_{PSII}) associated with the increase in the ratio of photorespiration to net photosynthesis (P_N) in sun. Chl *a*/*b* ratio was the most significant variable explaining P_N variations in shade. In sun, P_N was most influenced by the ratio between the fraction of electron transport rate (ETR) used for CO_2 assimilation and ETR used for photorespiration, by Φ_{PSII}, nitrogen content per leaf area, and by total Chl content per leaf area. The high phenotypic plasticity of *C. avellana* (PI = 0.33) shows its responsiveness to light variations. In particular, a greater plasticity of morphological (PI_m = 0.41) than of physiological (PI_p = 0.36) and anatomical traits (PI_a = 0.24) attests to the shade tolerance of the species.