

## Survival on the Exposed Limestone Pavement in the Burren: Photosynthesis and Water Relations of Three Co-Occurring Plant Species

Osborne B., Black K., Lanigan G., Perks M., Clabby G.

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### Abstract

Examination of the abundance of plant species occurring in limestone terrain at Mullagh More, in the Burren, Co. Clare, indicates that 'shade' plants are not restricted to microenvironmental conditions with reduced light levels (grikes), but are also common in exposed situations. Investigations of three species found in exposed locations (*Teucrium scorodonia* L., *Mycelis muralis* L. Dumort. and *Corrylus avellana* L.) indicate that they all have a limited capacity to acclimate their maximum photosynthetic rate ( $P_m$ ) to the prevailing light climate and that as much as 70% of the incident irradiance is not utilised in photosynthesis. Diurnal reductions in stomatal conductance ( $G_s$ ) and maximum photosynthetic rate ( $P_m$ ), were observed with all three species. These changes in  $P_m$  and  $G_s$  were associated with concomitant decreases in shoot water potential  $\psi_s$  and increases in leaf-air vapour pressure deficit (VPD), suggesting that water availability could be an important factor even under the prevailing mild climatic conditions. This was supported by parallel species-specific declines in the ratio of variable ( $F_y$ ) to maximum ( $F_m$ ) fluorescence ( $F_y/F_m$ ) for a larger number of species found in these limestone habitats. Shoot-water status was also closely coupled to short-term wetting and drying episodes caused by periodic rainfall events. On the basis of this evidence, water limitation is likely to be a common and overriding ecological determinant in this limestone environment, despite the mild climatic conditions. Also, under these environmental conditions a limited acclimatory capacity does not preclude an ability to persist in exposed situations.