In an agricultural landscape fragments of the natural loess forest-steppe vegetation – mainly grasslands – survive on steep erosional slopes, where species composition and sward physiognomy changes with slope aspect. Among others (e.g. land use history) plant tolerance of the abiotic environment must be important since slope microclimate varies considerably with exposition. The once oak steppe woodland understorey grass, Brachypodium pinnatum, may persist for centuries after forest felling and often dominates slopes facing north or east. Here it successfully occupies both sun and shade microhabitats thanks to a remarkable plasticity of leaf photochemistry (PSII quantum yield and its components) and morphology (thickness and bulk tissue density). In a field transplant experiment between sun, half-shade and shade microhabitats B. pinnatum acclimated rapidly to the new light environment, although this was not complete by the second growing season for plants transferred between full sun and shade. However, slopes exposed to south or west are too warm and dry for the broadleaf B. pinnatum, where it reaches reduced physiological performance and growth, and is generally replaced by narrowleaf steppe grasses (e.g. Festuca). Some of these xeric grasses are C4 species, which typically avoid slopes facing north. Support from OTKA F022728, T030459 and FKFP 353/2001 is acknowledged.