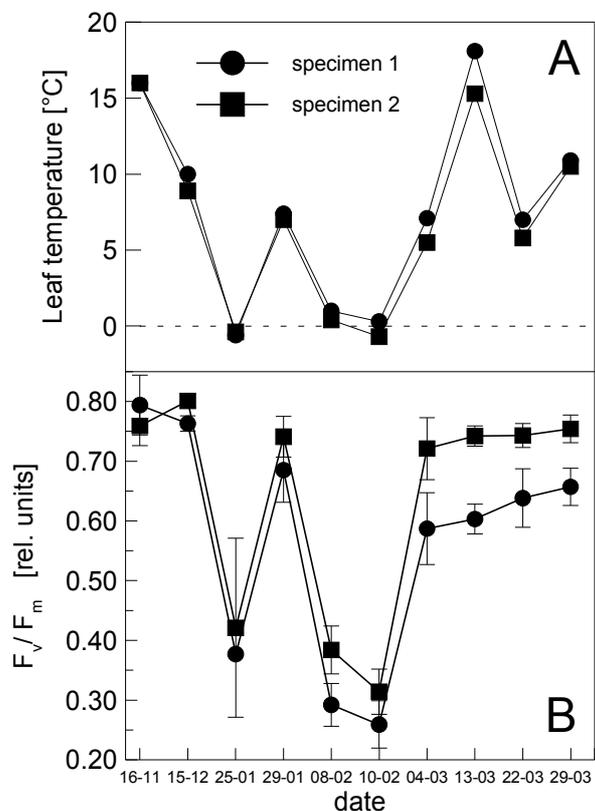


Temperature influence on photosynthetic activity of *Ilex aquifolium* L. - Photosynthetic advantage of climate change?

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The vegetation of central Europe is relatively poor in evergreen broad-leaved tree species compared to temperate regions of other continents. *Ilex aquifolium* is one of the few native evergreen broad-leaved trees in Central Europe and extends its range as far north as southern Scandinavia. Winter temperature has been pointed out as the most important factor limiting its northern range. The species' northern range limit corresponds well with the 0 °C isothermal line of January. In the last decades *Ilex aquifolium* is expanding its range towards the north and northeast in response to recent climate change. The new distribution still corresponds with the updated 0 °C isothermal line, as the latter is synchronously shifting northward, indicating rising winter temperatures (WALTHER et al. 2005). In contrast to deciduous species, evergreens may photosynthesise during mild periods in the winter season. We hypothesise that the evergreen *Ilex aquifolium* is able to profit from favourable periods in winter and early spring due to enhanced photosynthetic activity.

The sensitivity of the photosynthetic apparatus to cold stress was investigated by the means of chlorophyll fluorescence. Maximum quantum yield of photosystem II (PSII) (F_v/F_m) and light-response (data not shown) of photosynthesis were determined under field conditions. Temperatures at freezing point reduced F_v/F_m up to 45% (Fig. 1). Within the tested temperature range, the inhibition of photosynthesis that occurred at low temperatures was fully reversible within hours, when leaves were exposed to room temperature after measurements under field conditions. *Ilex aquifolium* is able to respond to favourable weather conditions almost immediately. The measured electron transport rates showed that *Ilex aquifolium* is able to perform photosynthesis on sunny, mild days also in winter and early spring. The ability to profit from photosynthesis in periods when deciduous trees are leafless may favour *Ilex aquifolium* in areas with milder winter conditions due to contemporary climate change.



References

WALTHER, G.-R., BERGER, S. & M.T. SYKES (2005): An ecological 'footprint' of climate change. Proc. R. Soc. B 272: 1427–1432