



Tree recruitment of deciduous tree species at their elevational limits in Swiss Alps

Yann Vitasse, Günter Hoch, Armando Lenz, Chris Kollas, Christophe Randin, and Christian Körner
Institute of Botany, University of Basel, 4056 Basel, Switzerland (yann.vitasse@unibas.ch)

The physical and physiological mechanisms that drive treeline position are reasonably well understood, but the causes of species-specific limits at elevations for below treeline are not. Once these latter uppermost positions have been identified, the question arises whether they reflected past expansion events or active ongoing recruitment or even upslope migration.

The aim of this study was (i) to characterize population structure near the elevational cold limit of major broad-leaved tree species in Europe, (ii) based on demographic data, assess current tree recruitment at this limit, (iii) rank species by the extent their seedlings “explore” higher elevation terrain with possible links to recent climatic warming.

For each of 12 tree species, 6 size classes from seedlings to adult trees were recorded in 25 m elevation steps above and below their regional elevational limit along six elevational transects in western and eastern part of Swiss Alps. Considering the uppermost adult trees as a reference, all species were represented by young individuals in the vicinity of adults at their limit. However there was a pronounced species ranking. Tree recruitment of both seedlings and saplings was detected beyond adult limits in most of the species, up to 200 m above the current adult limit. This suggests that currently neither seed dispersal nor seedlings establishment constitute a serious limitation to extant the tree species limits. Species strongly differed in their elevational limit, and regional differences (West vs East) could be exhaustingly explained by regional differences in growing season temperature.

This study evidenced that the elevational limits of broad-leaved species in Swiss Alps were driven by temperature and that there are no recruitment limitations at the upper distributional edge of adults at current temperatures. To the extent juvenile individuals have been found at elevations higher than current adult individuals, upward migration of the adult limit seems likely, especially in species having lower elevation limits.