



Assessment of New Species to cope with the possible Impacts of Climate Change

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Collaborations: WSL

Thematic action concerned: WP2

Context —

In Europe, Oriental beech (*Fagus orientalis*) has been proposed for Assisted Migration, yet little is known about the growth performance and drought tolerance of Oriental beech if it was introduced. Early quantitative studies have indicated that its growth is comparable to European beech. A recent dendroecological study conducted in a provenance trial in Germany indicated that growth of Oriental beech is less sensitive to precipitation changes than in European beech. The two species are closely related – some authors treat them as two subspecies – and hybridize in their zone of contact in the southern Balkans.

As for *F. orientalis*, *Quercus cerris* and *Quercus pubescens* might be able to replace or enrich important economic oak species in Central Europe under drier and warmer conditions. It is known that *Q. cerris* is drought resistant as well as relatively frost hardy.

Objectives —

The principal objective of the NSICC project is to evaluate the relative importance of adaptive mechanisms of water transport in response to drought at different scales of space and time on 3 species *Fagus orientalis* (+ hybrids), *Quercus pubescens* and *Quercus cerris* which might be able to replace important economic species in Central Europe under drier conditions. The comparison will be done with *Fagus sylvatica* and *Quercus petraea*.

Approaches —

Monitoring drought experiment (robot)

Growth and Transpiration

Assessment of physiological performance (gas exchanges)

Assessment of leaf, root and wood morphological performance

Assessment of hydraulic properties

Key results — (presented as separated bullet points)

- *Fagus orientalis* and hybrids have better diameter growth than *Fagus sylvatica*.
- *Fagus orientalis* has the lowest net CO₂ uptake and the lowest stomatal water vapor conductance.
- *Fagus orientalis* is the species with the best water efficiency.
- No anatomical difference (leaf, wood) between species
- *F. orientalis* and hybrids close their stomata at moderate drought

Main conclusions including key points of discussion —

- The hybrids behave with respect to drought in the same way as *F. orientalis*. These react more by a phenomenon of avoidance than tolerance in a drought situation compared to *F. sylvatica*.

Perspectives —

Oaks experiment

Valorization — (scientific: publications, book chapter, presentation at conferences,...); economic: Soleau envelope, patent, license,...; distribution: press release, interview,...)

Paper in Tree Physiology in progress