How is the genotype influencing photosynthetic response of *Fagus sylvatica* L. from Italy and Germany ?
Linking ecophysiology and genetics

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European beech *(Fagus sylvatica* L.) is one of the most important broad-leaves trees in Europe. The functional response to environmental changes differs among the populations. For a better understanding of the responses of beech to environmental changes the ecophysiological flexibility has to be linked to genetic differences between populations. The genetic variations of photosynthesis of beech from Italy and Germany and their response to elevated CO_2 were investigated under controlled environmental conditions.

Fagus sylvatica (provenance Montierzi (GR), Italy) and *F. sylvatica* "purpurea tree" (Germany) were grafted on *F. sylvatica* rootstocks. Photosynthetic response to high CO_2 concentration (1000 ppm CO_2) were investigated were measured by the means of chlorophyll fluorescence. Light response curves were recorded up to a light intensity of 420 µmol m^{-2} s^{-1}. Under ambient conditions photosynthesis was higher in the Italian compared to the German genotype. After 4 days under high CO_2 concentration electron transport rate increased in the Italian plants compared to the plants growing under ambient CO_2 concentration. Photosynthesis of Italian plants adapted to high CO_2 decreased immediately after been exposed 2 hours to ambient CO_2.
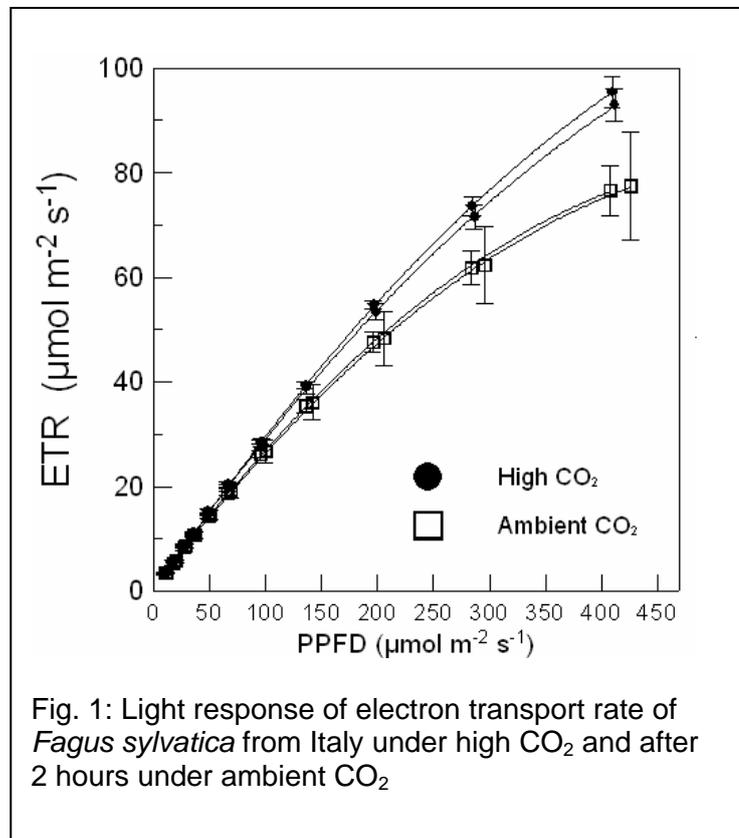

Fig. 1: Light response of electron transport rate of *Fagus sylvatica* from Italy under high CO_2 and after 2 hours under ambient CO_2

No down-regulation of photosynthesis could be observed in leaves at high CO_2 level. Activity of genes involved in the response to CO_2 will be investigated with micro-arrays and quantitative PCR and related to the ecophysiological response in the different genotypes.