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Beech (*Fagus sylvatica* L.) forests cover about 12 million hectares in Europe. Beech wood is much appreciated worldwide and many beech forests are regularly harvested for timber. Apart of its economic importance, European beech also has a major role in soil preservation and water cycles, which makes this species a target of ecologically oriented conservation. Climate change will force beech populations to adapt *in situ*, to migrate to higher latitudes or altitudes, or to rely on plasticity. This study is part of a project investigating variation in candidate genes related to cold and drought tolerance in *Fagus sylvatica* along an altitudinal gradient on Mont Ventoux, southern France. About 40 000 ESTs, sequenced within the European Network of Excellence EVOLTREE, have been processed to select candidate genes. About 200 primer pairs were designed and tested for amplification and polymorphism. Polymorphisms at the selected genes have been genotyped to estimate level and distribution of diversity within a population sampled along an altitudinal gradient and to dissect the role of selective pressures and demographic dynamics in European beech.

Keywords: beech, candidate genes, signature of selection, SNPs