

# European scientists screen genes controlling adaptation of forests to climate change

Climate change is profoundly altering the environment and putting pressure on living organisms which can respond to these changes in three ways: adapting, migrating or going extinct. EVOLTREE is a Network of Excellence, established in April 2006 with financial support from the European Commission, looking at the response of forest ecosystems to climate change. Genetic variation in particular plays a pivotal role in adaptation since it determines the evolutionary response of organisms to environmental change. Thus, the objectives of EVOLTREE are to identify genes that influence adaptation of tree species, and to examine how these genes and their diversity are distributed in natural populations. EVOLTREE is also analyzing ancient DNA to understand how trees have responded to major climatic changes in the past and support predictions on the future development of forest ecosystems.

The task is demanding and has created a need for well-coordinated research across the Member States. Through EVOLTREE, 25 research centers and 20 associated parties in 15 European countries are strengthening their research capacity to better address the adaptation of forests at different scales, from genes to ecosystems, by linking different disciplines (ecology, evolutionary studies, genetics and genomics). EVOLTREE is also supporting integration of research facilities

by establishing common databases on genomic and genetic resources. A centralized DNA repository center has been installed at the Austrian Research Centers GmbH – ARC (in Seibersdorf, Vienna). The repository is searchable through an online portal and it contains partial DNA sequences of genes from oaks, pines, beech, Norway spruce, insects, and mycorrhizal fungi sampled throughout European forests. Variations in 65 genes that appear to control traits responsible for tree adaptation were screened in 6 tree species. Databases on genetic resources managed by the partner institutions have been standardized and linked through a centralized search engine that allows queries to be made against the whole set of data. Large-scale interdisciplinary experiments aiming at monitoring genetic and ecological processes that maintain biodiversity were installed in seven forests representing major European ecosystems.

The outputs of EVOLTREE are highly relevant for European policy-makers and forest managers and will help them to continue implementing sustainable forest management. These results provide the scientific basis for developing recommendations on silvicultural practices that account for tree adaptive responses, on the movement of forest reproductive material, on how to trace the origin of timber traded.



Fruiting body of the mycorrhizal fungus *Laccaria bicolor*, whose full genome has been sequenced very recently. Photo: F. Martin, INRA-Nancy, France



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