On the Gene Ecology in European Fir Species

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European forest statistics shows silver fir (*Abies alba* Mill.) as rank 11 and an area proportion of 1.5 % out of 36 European tree species which can be observed at an area proportion of more than 0.2 % (Koeble and Seufert 2001). Whilst European forestry is dominated by Scots pine (*Pinus sylvestris*: 31 %) and Norway spruce (*Picea abies*: 21 %), silver fir is found mostly mixed with beech or other broad leaved species as well as with Norway spruce in the mountains. Regionally, silver fir dominates forest stands (e.g. Val d'Aran (Spain), Beskide (Poland), Bregenz Forests (Austria)), making it a species of great economic importance for regional markets. A number of closely related species with smaller distribution areas are found in the south of Europe in the Mediterranean and in the Black Sea region (e.g. *A. cephalonica, A. cilicica, A. pinsapo* and *maroccana, A. borisii-regis, A. bornmuelleriana, A. nordmanniana*), where they occupy a variety of different habitats.

Oldest fossil records in European fir species are known from the Tertiary so that drift of the continents as well as climate oscillation (glaciation) shaped species diversity of European fir species over 65 million years. The fluctuation of the sea level in the Mediterranean Sea together with complex tectonic processes in shaping the Mediterranean basin resulted in isolation of fir populations, what may have had much more severe effects on the gene pool of European fir species than the extinction of populations by glacial ice sheets.

Recent molecular marker studies in combination with findings from fossil pollen records allow understanding the recolonization pathways of fir in Europe after last glaciation. In addition, the knowledge on fir provenances and their respective ecological amplitude was elucidated by national and international provenance test series. Hence, particular diverse *Abies alba* populations are described for refugial areas (e.g. Reggio di Calabria, Italy) and the Carpathian mountains as well as for introgression zones (e.g. Beskid mountains: Poland, Ukraine). Provenances of those regions perform best in provenance trails all over Europe and thus are recommended for afforestation in semi natural as well as in plantation forestry.