

## Adaptation Processes in Alpine Forest Trees

Report from the AForGeN2019 meeting provided by IUFRO Working Party 2.04.11 – Alpine Forest Genomics  
<https://www.iufro.org/science/divisions/division-2/20000/20400/20411/>

By Christos Th. Gallis, Deputy Coordinator of IUFRO Research Group 6.06.00 - Forest, trees and human health and wellbeing  
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Founded in 2011, AForGeN (Alpine Forest Genomics Network) constitutes the conceptual framework of IUFRO WP 2.04.11. The aim of the network is to develop an intensive cross-border research network to study adaptation processes in alpine forest trees. AForGeN traditionally organizes annual meetings in one of the high-mountain areas of the European countries. This year the meeting was held on 12-14 June in the French Alps, the region of Mont Ventoux. Scientists from nine European countries and from the United States participated and presented their latest achievements and research on genetics/genomics of alpine tree species.

The Meeting comprised one day of scientific sessions, a one-day field trip and a half-day business meeting that dealt with the future activities of the network including the Silver Fir Genome Project (SFGP), second phase. The scientific sessions started with an introductory talk by Bruno Fady (INRA), host and organizer of the meeting.

The first session on **Demography and Monitoring** started with a presentation on the evaluation of the fine scale genetic structure of silver fir populations across the species' distribution. First results of this study were presented one year earlier at the AForGeN2018, but this time the presentation focused on the analysis of cohorts and tested different spatial sampling schemes. The common work of 13 authors was presented by Enikő Major. The second talk by Marjana Westergren *et al.* referred to an empirical study on optimal sample size to be used in genetic monitoring analysis of populations. Barbara Fussi *et al.* reported about the first experiences in silver fir monitoring using SNP markers.

The second session on **Adaptations** started with the presentation of Santiago C. González-Martínez *et al.* describing a multi-scale approach in detecting selection in non-model tree species. The case study referred to *Taxus baccata* L., species with many declining mountain populations. The next presentation by Berthold Heinze *et al.* described the genomic evidence of some fatty acids present in *Abies alba* based on genomic comparison to other conifer species. Then Konstantin Krutovsky presented the results of his team on the selection of cold resistance clones in *Sequoia sempervirens* introduced to Germany.



Group photo by Santiago C. González-Martínez

Carlos Trujillo-Moya *et al.* provided the results of the study on RNA-sequencing and secondary metabolite analyses that revealed a putative defence-transcriptome in Norway spruce (*Picea abies*) against needle bladder rust infection (*Chrysomyxa rhododendrii*). The talks generated many questions from the audience and were followed by discussions.

The session continued with the topic of adaptation to drought. Christian Rellstab *et al.* reported a study on *Pinus cembra* about the species' high genomic vulnerability to climate warming. This species with long generation time provided evidence on how Alpine trees react to the climate warming. Eva M. Sehr *et al.* revealed aspects of drought stress tolerance by cross-species transcriptomics in European oaks.

The one-day scientific session ended with discussions on the silver fir genome project (SFGP) leading up to the strategic discussions planned for the third day of the meeting.

The next AForGeN meeting will be held in the Austrian Alps, in the "Zirbenland" region of Styria. Find more information on the web or directly contact network members: <http://aforngen.org/>