ProCoGen: Promoting a functional and comparative understanding of the conifer genome- implementing applied aspects for more productive and adapted forests

Description

In the midst of a climatic change scenario, the genetics of adaptive response in conifers becomes essential to ensure a sustainable management of genetic resources and an effective breeding. Conifers are the target of major tree breeding efforts worldwide. Advances in molecular technologies, such as next-generation DNA sequencing technologies, could have an enormous impact on the rate of progress and achievements made by tree breeding programmes.

These new technologies might be used not only to improve our understanding of fundamental conifer biology, but also to address practical problems for the forest industry as well as problems related to the adaptation and management of conifer forests. In this context, ProCoGen addressed genome sequencing of two keystone European conifer species. Genome re-sequencing approaches were used to obtain two reference pine genomes.

Comparative genomics and genetic diversity were closely integrated and linked to targeted functional genomics investigations to identify genes and gene networks that efficiently help to develop or enhance applications related to forest productivity, forest stewardship in response to environmental change or conservation efforts. The development of high-throughput genotyping tools produced an array of pre-breeding tools to be implemented in forest tree breeding programmes.

ProCoGen also developed comparative studies based on orthologous sequences, genes and markers, which allowed guiding re-sequencing initiatives and exploiting the research accumulated on each of the species under consideration to accelerate the use of genomic tools in diverse species. ProCoGen integrated fragmented activities developed by European research groups involved in several ongoing international conifer genome initiatives and contributed to strengthening international collaboration with North American initiatives (US and Canada).

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