

Summary

Climate change is today a reality and forests worldwide have started to register worrisome decline and mortality rates following drought and heat waves. Forests cover 30% of the terrestrial area providing local, regional, and global key ecosystem services, their health being thus of uppermost importance for nature and human society. Forests of the future need to continue to provide such services, concurrently satisfying the human society needs in a sustainable way. Thus, there is a whole debate on what should be done to promote these drought-resistant and productive desired forests. Planting non-native species (i.e., fast-growing and drought-resistant in their natural habitats), seemed to be one solution. Still, studies have shown that although introducing them might be valuable on short- to mid-term, on the long-term their ecological impact might actually be adverse, especially when it comes to mitigate climate change. Douglas fir (North American native) was introduced in Europe \approx 150 years ago and in Romania \approx 130 years ago. Since then, it has been largely studied in Europe, but in Romania, to the best of our knowledge, there are no publications combining ecological and genetic data of Douglas fir plantations. The REASONING project seeks to cover this knowledge gap by comparing growth, drought resilience, and ecosystem services provided by Douglas fir with respect to Norway spruce, and Silver fir in Romania. Specifically, the objectives are to: (1) study the historical growth rates (tree-rings) of the 3 conifer species deepening into their growth performance and responses to droughts; (2) study their provenances and genetic diversity deepening into their fate considering climate change; (3) study this plantations' understory, as their ecological impact on plant diversity has been little explored so far; (4) evaluate the ecosystem services they provide to nature and human society (i.e., C sequestration, biomass), a novel approach for such plantations.