

Thursday June 9th • 8:30 – 9:10

Plenary Session

Keynote 4

05-2 Genetic variation in phenotypic plasticity of a *Pinus pinaster* Atlantic population in a transitional region to Mediterranean conditions

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Pinus pinaster is found in the Iberian Peninsula under a wide range of climatic conditions, from the harsh Mediterranean conditions in the Southeast to the favourable Atlantic influence in the Northwest. Mediterranean and Atlantic climates encounter each other in Galicia (NW Spain), where *P. pinaster* is a main forest species. Here, two different environmental regions can be clearly differentiated, the coastal and the interior area. Both regions differ mainly in summer drought intensity and intra-annual temperature oscillation. Trying to account for the large climatic differences between regions, two breeding and deployment areas are currently delimited. A breeding program was started in the Coastal area, where plus trees were selected and established in clonal seed orchards. The analysis of the plasticity patterns of the coastal-selected material across these two regions and the identification of the environmental variables that define these patterns is highly desirable, not only to check the suitability of the breeding areas but also to improve our knowledge about how the breeding material will respond to the predicted climate change.

Here, we analyse the genetic variation in phenotypic plasticity of the breeding coastal population of maritime pine across the transition region between the Atlantic and Mediterranean conditions in NW Spain. We characterized the Genotype by Environment interaction patterns of 116 open pollinated families of superior trees selected within the Coastal region and planted in sixteen locations covering a wide range of environments, from clearly Atlantic climates to Mediterranean-like interior areas. Total height three and seven years after plantation was used for the analyses. In particular, stability analyses were performed using mixed models, grouping of environments with similar genotypic performance was conducted with the CINTERACTION procedure, and familiar sensitivities to explicit environmental factors were characterized using factorial regression.

The results show intra-specific variation in phenotypic plasticity among the studied families. The previous delimitation of the two breeding areas appears to be pointless, since crossover interactions were detected both within and between breeding areas. It was not possible to regionalize Galicia into other geographic areas of stable genotypic performance. Additionally, no single environmental parameter alone could explain the observed interaction patterns. However, the thermal regime and, especially, the frost frequencies were found to partly underlie the array of observed phenotypic responses to changing environmental conditions. These results suggest a relevant role of climate warming on the success of the Coastal breeding material when transferred to inland areas. Selecting for genotypic stability appears as a conservative strategy to reduce the transfer risk and also to pull together all breeding activities into a single deployment area.

Keywords: Genetics and breeding, genotype x environment interaction, crossover interaction, stability, maritime pine