

Project report: Diagnostic genetic markers to ascertain the origin of forest reproductive material in *Pinus pinaster*

Sanna Olsson, Institute of Forest Sciences (INIA-CSIC, Madrid, Spain)

Genetic markers play a crucial role in identifying the origin of biological stocks, including forest trees, but their application in tree species has been limited. Our project aimed to address this gap by testing genetic assignment methods in *Pinus pinaster*, an economically and ecologically significant species with a clear population genetic structure. The study used a comprehensive genomic dataset generated by previous projects using the 4TREE TF SNP-array, supplemented with new samples from under-represented regions, together with introgressed samples from known origin to test assignment bias. The tested samples included individuals from the Intensive Study Sites (ISS) in Landes and Calderona-Espadán, among many other sites.

Our results demonstrated that genetic assignment is effective at the gene pool and region of provenance level, ensuring that reproductive material can be correctly sourced, provided that the 10K SNP markers and a comprehensive genetic baseline are used.

However, the accuracy decreases at the population level, highlighting the challenge of fine-scale genetic discrimination. Additionally, we found that incomplete reference datasets could lead to incorrect assignments, regardless of the sampling intensity.

The tested genetic assignment methods, together with the baseline, have a wide range of applications as a diagnostic tool for FRM identification. For example, they will next be used to test the origin of additional independent samples from the Spanish National Forest Inventory to identify autochthonous versus allochthonous samples. The commercial array will allow the baseline to be extended with new samples of maritime pine, increasing the accuracy of future assignment exercises by forest researchers and managers.

As a result of the project, we have created and made publicly available a genetic baseline for *P. pinaster*, available at Zenodo with the DOI: 10.5281/zenodo.14950394. Methodological testing will be presented in a forthcoming publication.

The project was carried out in collaboration with the EVOLTREE partners Institute of Forest Sciences (ICIFOR-INIA, CSIC), Slovenian Forestry Institute and INRAE Bordeaux. The project received samples from other research partners in Algeria, Tunisia and Portugal.

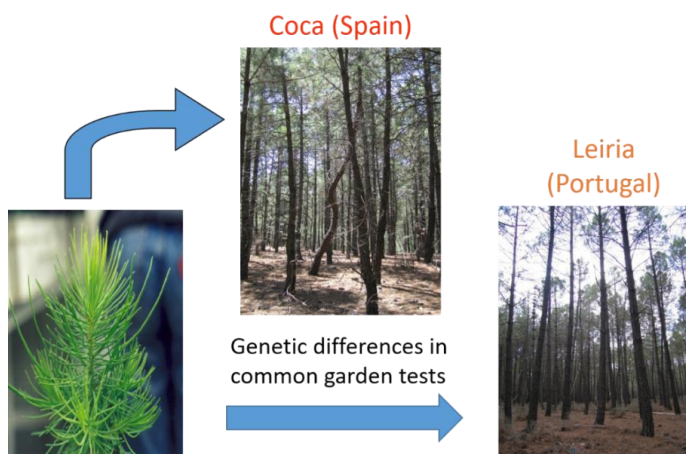


Figure 1. Behaviour of *Pinus pinaster* reproductive material in two different common gardens.