Reforestation policies need to consider climate change, study finds

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Reforestation, climate change

For the past six years, researchers at the Universitat Politènica de València (Polytechnic Univeristy of Valencia, UPV) have been studying the performance of 12 Aleppo pine varieties native to different regions

of Spain in reforestation campaigns across three national forest areas. Different varieties or genotypes have different levels of resistance to cold and drought, which influence how well they perform in a given geographical region, and researchers wanted to find out which varieties worked best and where.

To do so, the different national varieties or genotypes were used to repopulate forest areas in La Hunde, Valencia (as the control region), in the drier Granja d'Escarp, Lleida, to the north and further inland in Tramacastiel, Teruel, where the climate is much cooler.

"The varieties from Inland Levante and La Mancha performed the best overall, while those from further south seem to be perfect for reforestation efforts in regions already affected by climate change", observes Antonio del Campo, researcher at the UPV's Institute of Water and Environmental Engineering (IIAMA).

Broadly speaking, varieties from central Spain work well in Valencia, on the east coat, while those from Valencia perform well up in Lleida.

Fellow researcher from the University's Institute for Plant Molecular and Cellular Biology (IBMCP), José Miguel Mulet, tells us: "What works now in the dry environments in the south-east will become, and indeed already is, ideal for the central Aleppo pine habitat area (central to eastern Spain). We are seeing a progressive colonisation from south to north".

In a context of climate change, it is perhaps not surprising that 'outsider' varieties perform better in a given region than local varieties, but this idea needs to be incorporated into national reforestation policy in order for efforts to be successful on the long-term.

New-and-improved Aleppo pine

At the IBMCP, researchers are currently working to improve the Aleppo pine at the molecular level. Varieties are grown in the lab under simulated drought and cold conditions. Their protein, amino acid and metabolite compositions are then analysed to establish whether the plant is producing the molecules that will made it cold- and drought-resistant. "The idea is to know in advance which varieties would be better adapted to any given environment."

More information: Khaled Taïbi et al. The effect of genotype by environment interaction, phenotypic plasticity and adaptation on Pinus halepensis reforestation establishment under expected climate drifts, *Ecological Engineering* (2015). DOI: 10.1016/j.ecoleng.2015.09.005

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