

European forest trees show high levels of biodiversity within one tree species

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EU researchers have found that a single tree species may perform many different ecosystem activities, meaning that biodiversity is both between and within species.

Discovering how forest tree ecosystems function is crucial to both predicting how they might respond to climate change and to drawing up forest management plans. It is also key to the EU Forest Action Plan's objective to maintain and enhance biodiversity, carbon absorption, and the health and resilience of forest ecosystems.

One EU-funded project, DIVERFOR, has focussed on European forests which, when compared to forest regions in other areas of the world, are considered to have a relatively low range of different species.

The project found that individual [trees](#) in a single tree species can have high levels of functional biodiversity, meaning they may perform a diverse range of ecosystem activities. These activities include nutrient cycling, climate regulation, timber production, protection against erosion, and recreation.

Measuring tree characteristics

DIVERFOR assessed this diversity by measuring characteristics - or functional traits - such as leaf toughness, which is linked to its resistance to herbivores. It also assessed the branching pattern of a tree which is linked to the way it colonises space and competes with other trees. Other traits measured included the levels of nitrogen in a leaf which is linked to a forest's nutrient cycling rate and a tree's flowering time which is linked to the trees chances of reproducing.

'Our project shows that differences in certain characteristics among individual trees within a species can be as relevant as differences between different tree species in European forests. This is the case in dominant tree species in particular,' says Raquel Benavides, DIVERFOR project researcher.

'DIVERFOR also found that trees can adjust their characteristics according to the environment that surrounds them. This includes adjusting to biotic factors such as the amount of different trees species, and abiotic factors such as light, soil nutrients, water and climate,' Benavides continues.

Both findings are significant since tree communities with higher levels of biodiversity even within a species are expected to be more stable and have a higher resistance to climate change. 'This can be a good reason to preserve patches of forest with a high number of species within areas with fewer species. For example, it is important to maintain an area dominated by pine trees in Finland and pine forest in Spain, as well as areas where pine is mixed with other species,' explains Benavides.

Three different forest types

DIVERFOR carried out research in three different European forests: a boreal forest in Finland, a temperate forest in the Carpathian Mountains in Romania and a Mediterranean forest in Spain. Within these forests, researchers focussed on plots

with one dominant tree species, plots with two dominant species, and plots with three or four dominant species. In total, DIVERFOR studied 4 000 trees and collected more than 15 000 leaves. One of the biggest challenges the project faced was collecting leaves from trees up to 30 metres tall. This involved hiring climbers, hunters or using telescopic loppers.

The project officially ended in May 2016, but Benavides vows to continue the scientific research into biodiversity within a tree species with a view to increasing understanding of how [forest](#) species and ecosystems adapt to current environmental changes.

More information: For more information please see the project page on CORDIS:
cordis.europa.eu/project/rcn/104112_en.html

Provided by CORDIS

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