


Alerce or *lawal* (*Fitzroya cupressoides*)

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César Marín feels privileged to work among giants.

Everything was new to me as a first-year PhD student from Colombia, who was discovering the temperate rainforests of southern Chile for the first time. Everything was so different. Among the many new tree species that I encountered during my sampling campaigns across the Coast and Andes mountains, the conifer *Fitzroya cupressoides* (alerce, from Spanish, or *lawal* in Mapudungun, the language of the local Indigenous Mapuche people) was breathtaking.

This is the only living species in the genus *Fitzroya*, and alerce forests immediately get your attention, as they grow tall: some primary forests average 30 m in height or more, but individuals up to 50 m in height have been reported. These forests are dense, grow in very humid and cold conditions with a monodominant structure, and are often found in harsh edaphic conditions, such as thin, weathered and nutrient-depleted soils. As a soil ecologist, I also cannot help but notice the complex and abundant organic material in these forests. Entangled roots, vines, grasses, mosses, lichens, litter and fungi – among others – form compact masses next to many alerce trunks, which sometimes grow clonally.

Several alerce individuals are over 2,000 years old: in 1993, a 3,622-year-old individual was reported, which makes it the second-oldest tree on record. However, one particularly renowned tree (called ‘the Alerce Abuelo’) may – if estimates are confirmed – be over 5,400 years old. I am fortunate to have worked at Alerce Costero National Park, where this individual is located, for 12 years now. In these forests, my colleagues and I have investigated soil chemistry, litter decomposition, plant biodiversity, alerce aboveground biomass, nutrient leaching and, most of all, soil fungal communities – especially arbuscular mycorrhizal fungi that associate with this conifer. Our research has shown that this species is highly colonized and dependent on arbuscular



Fitzroya cupressoides at Alerce Andino National Park, Chile.

mycorrhizal fungi, particularly in soils that are poorer in plant-available phosphorus. We have also shown that larger alerce trees are associated with a higher number of arbuscular mycorrhizal fungi species.

Coastal alerce forests present the slowest carbon dynamics worldwide for rainforests. These forests capture massive amounts of carbon. Thus, their conservation must be prioritized. Despite this, since the arrival of the European colonizers almost 500 years ago, more than half of the alerce’s historical distribution range has been lost (mainly owing to logging and land-use change). Logging was declared illegal in the 1970s, but continued. Furthermore, coastal alerce populations have been the most severely affected by climate change, and have experienced a decline in growth since the 1970s as demonstrated by dendrochronological research. In the past few years, public (a road that would cross Alerce Costero National Park) and private (real-estate projects) threats have continued to damage the natural populations of this species, which are currently classified as Endangered by the

IUCN (International Union for Conservation of Nature).

It has been the privilege of my life to work with this beautiful conifer to understand its relationships with arbuscular mycorrhizal fungi, with biogeochemical cycles and with other plants, and to work alongside a passionate community of scientists, park rangers, social and environmental leaders, students and neighbours, who deeply respect the alerce forests and fight for their protection.

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Competing interests

The author declares no competing interests.