

Intraespecific variation in drought resistance of *Nothofagus antarctica* (G. Forst.) Oerst. (Nothofagaceae)

Variación intraespecífica en resistencia a la sequía de *Nothofagus antarctica* (G. Forst.) Oerst. (Nothofagaceae)

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RESUMEN

Futuros escenarios climáticos limitarían el establecimiento de plántulas en bosques de los Andes del sur debido al estrés hídrico. Comparamos la resistencia a la sequía de plántulas de *Nothofagus antarctica* de dos límites arbóreos: Termas de Chillán (clima mediterráneo) y Antillanca (clima superhúmedo). También comparamos la resistencia a la sequía de plántulas de dos altitudes diferentes de Antillanca. No encontramos diferencias en resistencia a la sequía entre plántulas de los dos límites arbóreos. Las plántulas del límite arbóreo de Antillanca resultaron más resistentes que las de una menor elevación.

Alpine treelines are natural ecotones mainly controlled by low temperature and hence they are considered one of the most responsive systems to global warming (Körner 1998). Seedlings establishment is seriously impeded by low temperatures at treeline ecotones (Cavieres & Piper 2004, Körner 1998), and therefore warmer conditions could promote establishment (Holtmeier & Broll 2005, Taylor 1995). In regions like the southern Andes, where water availability already limits seedlings establishment (Daniels & Veblen 2004, Heinemann & Kitzberger 2006) and precipitation is predicted to decline (CONAMA 2006), to know the capacity of seedlings to overcome concomitant drought becomes important.

Widespread species frequently have high intraspecific variation which may entail different responses to climate change and eventually affect species distribution (Benito Garzón *et al.* 2011). In treeline species, traits improving the water economy (e.g., lower specific leaf area, smaller leaf and tree sizes) are generally observed at higher elevations and drier latitudes (Premoli *et al.* 2007, Fajardo & Piper 2011), although it is not clear whether drought resistance does vary accordingly.

At alpine treelines of the southern Andes seedlings establishment is co-limited by water availability and low temperatures (Daniels & Veblen 2004). Climatic models for the region predict 2-4°C temperature increment and 40%

precipitation reduction for the growing season (CONAMA, 2006). In this study, we examined intraspecific variation in drought resistance of *Nothofagus antarctica* (G. Forst.) Oerst., related to altitude and latitude. *N. antarctica* is a deciduous broadleaf treeline species that extends across a wide latitudinal and altitudinal range in the southern Andes of Chile and Argentina (Rodríguez & Quezada 2003). We conducted a drought experiment using recently-emerged seedlings from three different provenances: Antillanca treeline (40°47'S, 72°11'W, 1350 m a.s.l., within the Puyehue National Park, hereafter Antillanca_{treeline}), Antillanca 1200 m a.s.l. (hereafter Antillanca₁₂₀₀), and Termas de Chillán treeline (36°54'S and 71°24'W, 2080 m a.s.l., hereafter Termas de Chillán_{treeline}). Although *Nothofagus pumilio* is the most extensive treeline species in the Southern Andes, both *N. antarctica* and *N. pumilio* are treeline species in the two study sites. Mean annual precipitation is about 1900 mm in Termas de Chillán and 3660 in Antillanca, with a pronounced summer drought characterizing the former (Fajardo & Piper 2011). Given the wide distribution of *N. antarctica* across contrasting climates and its high level of intraspecific variation (Steinke *et al.* 2008) local adaptation can be expected. In particular, populations from Mediterranean provenances should account for a higher drought resistance than populations from more humid sites. Likewise, treeline species show a high intraspecific variation