Abstract

Mortality patterns were analyzed in a one-year old Nothofagus dombeyi plantation at mid-elevation in the Chilean Andes. Ripley’s univariate function was used to detect spatial patterns of mortality and damage (as reflected in crown dieback) of seedlings by assigning them into four categories: no crown damage, 1/3 of the crown damaged, 2/3 of the crown damaged and dead. Through correspondence analysis, variables (plant attributes, topography, weed competition, neighboring vegetation and fertilization) that could affect mortality were tested. At the end of the first growing season 67% of the seedlings survived, and by the end of the following dormant season only 37% were alive. Mortality patterns were random for seedlings with 1/3 of the crown damaged, and clustered for all other categories. Environmental variables with the greatest influence on mortality were increasing distance to a neighboring 10m tall plantation, absence of tall vegetation cover and convex microtopography. Results suggest that large temperature oscillations with events of freezing temperatures (defined as the reported lethal temperature for 50% of its leaves) during the growing season, and severe frost during the dormant season, were the main causes of mortality and damage. The convenience of providing seedlings with some shelter when outplanted, or with an appropriate cold-acclimation treatment to resist low freezing temperatures when outplanted in open fields in harsh cold regions of the south-central Andes is discussed.

Keywords

Abiotic stress, border effects, freezing temperatures, ripley’s function, regeneration, vegetation cover.