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"Gheorghe Asachi" Technical University of Iasi, Romania

ABOVE AND BELOW GROUND FUNCTIONAL BIOLOGY AND MANAGEMENT OF BEECH FORESTS: INSIGHTS FROM A STUDY IN SPAIN

Iván Closa, Nieves Goicoechea *

Departamento de Biología Vegetal, sección Biología Vegetal (Unidad Asociada al CSIC, EEAD, Zaragoza e ICVV, Logroño), Facultades de Ciencias y Farmacia, Universidad de Navarra. c/Irunlarrea 1, 31008-Pamplona (Spain)

Abstract

Many beech forests in Navarra, North of Spain, were deeply disturbed as a consequence of clear-cutting practices that involved the complete removal of a stand in a single harvest by heavy machinery. The regeneration of most clear-cut areas was left to occur naturally from the seed bank and from seeds provided by the surrounding beech trees. This review is integrating the results obtained from the study of tree physiology, soil biology and mycorrhizal communities in three nearby beech stands: one clear-cut in 2001; another clear-cut in 1996 and an unmanaged forest for at least the last century. The main objectives were (i) to study the microclimatic conditions inside the beech stands subjected to clear-cutting, then naturally regenerating from disturbance, and exhibiting very different tree size and density; (ii) to deepen the knowledge of some anatomical, physiological and biochemical parameters of beech trees that had successfully established within clear-cut areas with strong differences in microclimatic conditions and (iii) to know the biological properties of soils belonging to beech stands naturally regenerating from clear-cutting. We hypothesized that the soil biology in regenerating clear-cut beech stands of different ages could be markedly influenced by the microclimatic conditions determined by both tree size and density within each site, with the latter factor uncertain when stands are naturally regenerating from disturbance.

Key words: clear-cutting, *Fagus sylvatica*, mycorrhizal communities, natural regeneration, soil biology

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* Author to whom all correspondence should be addressed: e-mail: niegoi@unav.es; Phone: +34 948 425600; Fax: + 34 948 425619