Título: CAMBIOS EN LA BIODIVERSIDAD BRIOFÍTICA DE LOS HAYEDOS NAVARROS A LO LARGO DEL TIEMPO Y SU RELACIÓN CON ALGUNOS PARÁMETROS AMBIENTALES

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Resumen: The bryoflora of nine Fagus sylvatica forests of Navarra (North Spain), belonging to four different phytosociological associations, was re-studied nearly 30 years after initial sampling in order to assess if there have been significant changes. To this aim, the following objectives were set: 1) Collect new bryophyte samples and compare the current (2010) species composition with that of some 1982 studies attending traditional criteria (richness, diversity, ecology, corology, life strategy...). 2) Assess changes that may have happened in these 30 years in the environment through the Ellenberg indicator values. 3) Analyze and find out which are the main factors affecting the species composition of our beech forests and best explaining the diversity of species in them. 4) Confirm or reject the characteristic species of association or alliance that were proposed in 1982. 5) Analyze the composition of nitrogen and carbon in some 1982 and 2010 bryophyte samples to confirm a possible nitrogen deposition process and its origin.

After identification of current samples and update data of 1982, we present a catalogue with 233 species: 50 liverworts and 183 mosses. More than half of species collected in 2010 present sexual structures, demonstrating the suitability of May-Jun to find these structures. We have modify the Ellenberg indicator value of some species that we considered not suitable at all, and we present an onset of adaptation for the Iberian Peninsula of the Ellenberg indicator values. The number of species found in 2010 on the set of forests is significantly lower than that found in 1982, specially due to lower collection of epilithic mosses. Specific richness values have not

changed significantly in every forest, but similarity values are low and show an species turn-over of around 30-40% in each forest, even though many of them are protected areas. Liverworts, as a group, has proved to be more stable over time than mosses. There are no significant changes between 1982 and 2010 in the spectra (proportion of species of each category) of traditional criteria, though, some trends can be observed. In fact, trends observed for ecologic spectra (light, humidity and pH) are corroborated by the analysis of Ellenberg indicator values, that show significant changes towards warmer, shadier and more nitrophilous and acidic conditions. Ordination analysis allow us to conclude that the main factors that influence the species composition of our beech forests and that best explain their diversity are Ellenberg indicator values of humidity and pH. These are the ones that best explain the gradient observed between the different phytosociological associations from acidic and very humid forests to others more basic and dry. Ellenberg indicator value of nitrogen may be the one that model and adjust differences between forests, and mean temperature, mean minimum temperature and mean temperature of the coolest month resulted also significant. We have modify the proposal of characteristic species of associations made in 1982 eliminating some of the species proposed. Finally, from the carbon and nitrogen analysis we can conclude: first, nitrogen atmospheric deposition might have reduced over these 30 years, being currently more important emissions from combustion produced in agricultural and livestock activities, and second, Rhytidiadelphus loreus and Homalothecium lutescens, may be good bioindicators and alternatives for Hypnum cupressiforme (the most widely used) in areas where it is not present.