

Publication

Effects of plant diversity, community composition and environmental parameters on productivity in montane European grasslands

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In the past years, a number of studies have used experimental plant communities to test if biodiversity influences ecosystem functioning such as productivity. It has been argued, however, that the results achieved in experimental studies may have little predictive value for species loss in natural ecosystems. Studies in natural ecosystems have been equivocal, mainly because in natural ecosystems differences in diversity are often confounded with differences in land use history or abiotic parameters. In this study, we investigated the effect of plant diversity on ecosystem functioning in semi-natural grasslands. In an area of 10x20 km, we selected 78 sites and tested the effects of various measures of diversity and plant community composition on productivity. We separated the effects of plant diversity on ecosystem functioning from potentially confounding effects of community composition, management or environmental parameters, using multivariate statistical analyses. In the investigated grasslands, simple measures of biodiversity were insignificant predictors of productivity. However, plant community composition explained productivity very well ($R^2=0.31$) and was a better predictor than environmental variables (soil and site characteristics) or management regime. Thus, complex measures such as community composition and structure are important drivers for ecosystem functions in semi-natural grasslands. Furthermore, our data show that it is difficult to extrapolate results from experimental studies to semi-natural ecosystems, although there is a need to investigate natural ecosystems to fully understand the relationship of biodiversity and ecosystem functioning.

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