Geographical and ecological differentiation in Italian mesophilous pastures referred to the alliance Cynosurion cristati Tx. 1947


with 5 figures 3 tables and 1 electronic appendix

Abstract: The alliance Cynosurion cristati has been found by various authors across the European continent. However, the fact that its diagnosis is based on species that are found in a wide range of geographical and ecological conditions and on the absence of grazing-sensitive species has rendered the characterization of this alliance somewhat complicated.

The aims of this paper were: i) to investigate differences in the composition of some European mesophilous pastures, with particular focus on Italy; ii) to assess the main factors underlying these changes; iii) to evaluate the need for a new classification for such communities in the Italian peninsula. We used previously published data from several other European countries and both published and unpublished data from Italy. A synoptic table of data from different parts of Europe was analysed by means of hierarchical clustering. We used Multi-Response Permutational Procedure and phi coefficient to test differences between Cynosurion clusters and identify their diagnostic species. We performed Non-metric Multi-Dimensional Scaling on a table of 111 Italian relevés. Kendall’s correlation coefficient was calculated by relating the relevé scores in the ordination with the geographical, environmental variables, and with the Ellenberg indices relative to soil conditions. The first axis scores were also used as the dependent variable in a regression tree. Important compositional differences were found within the Cynosurion cluster, with significant differences emerging between the Apennine pastures in central and southern Italy and those in northern and central Italy. The first axis ordination was strongly related to the latitudinal/thermal gradient. Indeed, latitude and temperature were the most important variables in the regression tree. Our results highlight marked compositional variation in Cynosurion grasslands. This variation, which is related in the Italian peninsula to bioclimatic and biogeographical factors, led us to propose a rearrangement of the existing classification of the alliance for this part of Europe.

Keywords: Cynosurion cristati, multivariate analysis, regression tree, synecology, syntaxonomy.


Abbreviations: Non-metric Multi-Dimensional Scaling (NMDS); Multi-Response Permutation Procedure (MRPP); N-C Apennines: northern-central Apennines.

Introduction

Mesophilous grasslands are one of the most widespread vegetation types in Europe. The area covered by such grasslands is, however, shrinking (Zuidhoff et al. 1995), according to a general trend in European seminatural and natural grasslands (Pykälä 2000; Poschlod & Wallis de Vries 2002) that has also been reported in Italy (Falucci et al. 2007).

This trend is related above all to the rapid changes that have taken place over recent decades in the degree to which grasslands are exploited for grazing purposes and to the spread of intensive agricultural practices (such as re-seeding and fertilization), which strongly influence the composition and the biological diversity of these grasslands (Critchley et al. 2002; Kirkhama et al. 2008). However, semi-natural pastures are of extreme importance for the conservation of biodiversity within the context of traditional agricultural landscapes (Antrop 1997; Watkinson & Ormerod 2001; Blasi et al. 2008). Indeed, cattle grazing and mowing are known to increase vascular plant species richness (Hansson & Fogelfors 2000; Pykälä et al. 2005; Škornik et al. 2010) and functional diversity (Debuschée et al. 2001; Pykälä 2004), and traditional animal husbandry has been hypothesised to partially compensate, in terms of biodiversity, for the loss of natural processes that have been suppressed by humans (Pykälä 2000; Partēl et al. 2005). The relevance to biodiversity of traditional agricultural practices, if compared with more intensive practices, has been highlighted by several studies demonstrating that such practices increase species richness (Smith et al. 2000; Vassilev et al. 2011).

In this study we analyse mesophilous grasslands, a term here used to refer to secondary communities dominated by hemicyryptophytes that develop from the basal to the mountain zone, on mesotrophic soils...