Phytosociological alliances in the vegetation of arable fields in the northwestern Balkan Peninsula

by Urban Šilc, Ljubljana, Sava Vrbičanin, Dragana Božić, Beograd, Andraž Čarni, Ljubljana and Zora Dajić Stevanović, Beograd

with 2 figures and 3 tables

Abstract: A stratified dataset of 2426 relevés of weed vegetation of arable fields of the Balkan Peninsula was analysed by cluster analysis. The major division in species composition was associated with the type of crop. This accords with the syntaxonomical and ecological pattern already detected for southeast Europe and is in conflict with the Central European classification that has appeared in recent years.

Clusters resulting from numerical classification reproduced the majority of traditionally recognized phytosociological alliances (Oxalidion, Panico-Setarion and Eragrostion are associated with root crops, while Scleranthion, Caucalidion and Galeopsion with cereals). Galeopsion was grouped with some Caucalidion relevés, which is not surprising since both consist of weed communities from cereals. Vernal communities form a separate cluster and indicate a special community type, which has been treated in some classification systems as a phenological aspect.

Keywords: classification, south eastern Europe, syntaxonomy, weed vegetation.

Introduction

Farming evolved in southwest Asia and the earliest farming communities are there dated to ca. 10000 cal-BC. Farming spread from southwest Asia into southeast Europe by ca. 7000 calBC and reached northwest Europe ca. 3000 years later (Colledge et al. 2005, Kreuz et al. 2005).

Packages of crops and weeds emerged in the Near East and were transferred to Central Europe during the spread of agriculture. They originally thrived in different ecological conditions. In their new home they reached the boundary of their area of distribution and respond differently in the new site conditions.

The Balkan Peninsula and its north-south orientation, with sharp climatic transitions over several phytogeographic regions, is specific and a good case study of weed species behavior (Oberdorfer 1954). Weed vegetation on arable land consisting of species originating from the Near East shows gradual impoverishment from south (and east) to north (and west). Species in Central Europe are at the northern limit of their distribution range and show different preferences (e.g. soil) than in their optimal climatic region in the south (Holzner 1978). The difference between weed vegetation in cereal and root crops is also reported to be more pronounced in warmer parts of Europe and gradually decreases towards the cooler and more humid north and northwest (Glewnitz et al. 2000, Lososová et al. 2006).

Phytosociological research of weed vegetation has a long tradition in the surveyed area (Zalokar 1939, Slavnič 1944) and a synthesis in the form of prodromus for the whole area was made by Kojić (1975). Most of the phytosociological classifications have been based on traditional expert knowledge. Some of them involved analysis and comparisons of synoptic tables from individual studies and neighbouring regions, while others lack any such analysis at all. It is therefore important to compile a large dataset and test classifications and recognized gradients by expert based classifications and also by numerical analysis.

The aim of our study was to find major types of arable fields vegetation from northwestern Balkan Peninsula by means of cluster analysis of a large data set consisting of relevés, to find relationships with the only conspectus of phytosociological units made for the whole studied area published by Kojić (1975) and various other classifications for different regions/states in NW Balkans. Results of classification were compared to Central European syntaxonomical system. Special attention was paid to vernal communities since their status in NW Balkans was unclear.

Materials and methods

A large data set of arable fields vegetation relevés (subclass Violenea arvensis sensu Hüppe & Hofmeister 1990) was compiled from the southeast margins of the Alps to the western Balkans (the territory of former Yugoslavia: Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Serbia, Slovenia), containing 4139 samples. The data set consists mainly