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Effect of soil type and management on botanical composition of the sward

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Introduction Plant communities and their botanical composition are determined by environmental factors and management. Different climate, topography and extensive system management contribute to flora and fauna diversity of Bosnia and Herzegovina grasslands. Any changes in management or soil conditions (within the same or different environments) lead to changes in botanical composition of the sward. That is why different plant communities and different botanical composition of the sward can be found in significantly small areas. Even cessation of grassland management for a few years causes increases in tall grasses, shrubs and woody plants species as well as disappearance of orchids from grasslands (Fisher and Rahmann, 1997). The aim of this study was to determine differences between botanical composition and species richness of the swards on one side and various soil types on the other.

Materials and methods We studied a grassland site in a hilly region (250m above the sea level) situated on a slope with different soil types as follows: (1) deep silt clay loam, with pH of 5.1; (2) shallow calcareous with pH of 7.0 and (3) brown soil with pH of 6.1. This grassland site had been used many years before as arable land, later as grassland and was then almost completely abandoned. The most representative plants on deep soils were *Rubus fruticosus* and *Rubus idaeus*. Shallow calcareous soils were covered by grasses, shrubs and small trees, while the grassland site on the brown soil consisted of grass cover and a lot of small orchard trees. During the summer and early autumn 1998 shrubs and small trees were cleared. After cutting, the grassland site with deep soil was sown whereby the two other parts were burned. During the following eight years (1999-2006) the whole grassland site (0.2 ha) was selectively defoliated. Botanical composition was recorded by Braun-Blanquet method.

Results Botanical composition of the grassland site indicates (with the same management) a decisive influence of soil type and soil conditions on botanical structure of the sward related to water potential and pH. Due to better water capacity and low pH, botanical composition of sward with deep silt clay loam soil contained many plant species which are characteristic of fields and meadows, like *Stellaria media*, *Glechoma hederacea*, *Taraxacum officinale*, *Heracleum sphondylium*, *Festuca pratensis*, *Dactylis glomerata*, *Lolium italicum*, *Lolium perenne*, and very acid soils i.e. *Dryopteris filix-mas* and *Pteridium aquilinum*. Botanical composition of the second part consisted of plant species that grow on very dry and poor soils, or poor calcareous soils. Within these areas, the most abundant species are *Peucedanum coriaceum*, and *Peucedanum oreoselinum*, but there are also *Sedum acre*, *Hieracium pilosella*, *Carlina vulgaris*, *Hypocheris radicata*. Especially valuable species found on this part are orchids (*Orchis pallens*, *Orchis simia*, *Orchis purpurea*, *Ophrys apifera*, *Ophrys insectifera*, *Ophrys sphecodes*, *Orobanche gracilis*, *Orobanche teucrii*) and some other rare and endangered plants *coriaceum*, *Peucedanum oreoselinum*, *Thymus serpyllum*, *Heracleum sphondylium*, *Festuca pratensis*, *Dactylis glomerata*, *Trifolium pratense* and many other plant species. The most common species for the whole grassland site was *Brachypodium sylvaticum*. Poor botanical composition at the beginning became richer during the study period due to management. The most species were found in the third year (76) and less (63) in the first part of the study. The most grass and legume species were also found growing on the brown soil with pH of 6.1.

Conclusions With the same management and environmental conditions, soil type with pH have a decisive effect on botanical composition and species richness on grasslands. In general, biodiversity and especially number of valuable species are increased on neutral and calcareous soils.

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