The characteristics of earthworm communities along vertically stratified transect of Velika Kapela Mountain grasslands (Croatia)

(Oligochaeta: Lumbricidae)

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Abstract. The spatial and temporal variability of earthworm populations is very high, both within and between differently managed types of land. Additionally, grassland ecosystem earthworm communities are reported as more heterogeneous and difficult to distinguish from one another in comparison to other types of ecosystems. The current study involves seven sites situated along the transect from the city of Ogulin on the continental slope to the Novi Vinodolski on the Mediterranean slope of the Velika Kapela Mountain. A plot of approximately 100 x 100 m in size was randomly selected for study. On each selected plot, seven random, seven transect, and 16 regular grid sampling points were chosen for earthworm sampling. A combination of hand sorting and expulsion by formalin was used for earthworm sampling. From all three sampling designs, transect had the lowest species number observed in all seven sites and regular grid sampling elicited the highest number of species in five sites. Two sites on the south-eastern slope of the Velika Kapela Mountain had the lowest species richness among all sites. The total number of species per site ranged from three to eleven. *Aporrectodea rosea* (Savigny, 1826) was the only species present at all seven sites, followed by *Dendrobaena octaedra* (Savigny, 1826) and *Octolasion lacteum* (Örley, 1881) found on five sites. The use of various species richness estimators suggested that on several sites one or two species were lacking from the sampling.

Key words. sampling design; regular grid; formalin expulsion; species richness estimators; juvenile/adult ratio

Introduction

Earthworm species characteristics and compositions have been extensively reported in grasslands from the temperate to the tropical zones (DECAËNS et al. 1997, DIDDEN 2001, JIMÉNEZ & DECAËNS 2000, ROSSI et al. 2006, IVASK et al. 2006). Generally, the spatial and temporal variability of earthworm populations is very high, both within and between differently managed types of land. Moreover, grassland ecosystem earthworm communities are reported as more heterogeneous and difficult to distinguish from one another in comparison to other types of ecosystems (POP 1997). Earthworm communities are the result of both interactions between species (CAPOWIEZ 2000) and sensitivity to ecological factors (BRIONES et al. 1995). They show clumped or aggregated distribution (DECAËNS et al. 2003, JIMÉNEZ et al. 2001, ROSSI & LAVELLE 1998). This horizontal distribution is mainly a response to a spatial heterogeneity primarily determined with physico-chemical parameters of soil and food availability. Since earthworm distribution is determined with both abiotic and biotic factors, the

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