

Biotic interaction of earthworm in arid pedoecosystem

(Oligochaeta)

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Abstract. Presence of a faunal group may influence the density of other fauna in pedoecosystem in arid environment. Therefore, season-dependent impacts of earthworms on populations of some important groups of soil fauna were studied. Earthworm associated alterations in populations of Collembola, mites, beetles, woodlice and pseudoscorpions showed remarkable results. Abundances of these soil faunal groups were higher at the sites with earthworms as compared to the sites without earthworms throughout the year. On the one hand, the highest abundance of Collembola and beetles were recorded in July. On the other hand, mite, woodlouse and pseudoscorpion showed their highest abundances in August at the sites with earthworms. The present findings suggest earthworms-induced enrichment of below-ground faunal biodiversity in a desert pedoecosystem.

Key words. Earthworm, Pedoecosystem, Seasonality, Biota interaction, Desert.

Introduction

Earthworms are regarded as “ecosystem engineers” (JONES et al. 1994). They create favorable conditions for other soil organisms. Different level of biodiversity enhances particular function of ecosystems (JONSSON & MALMQVIST 2000, CRAGG & BARDGETT 2001, DUFFY et al. 2001). WICKENBROCK & HEISLER (1997) showed the importance of soil porosity created by earthworms. Through porosity, they improve water availability and gas exchange (DEV-LIEGHER & VERSTRAETE 1997, SUBLER & KIRSCH 1998), improve soil system in organic (MARTIN et al. 1987) and inorganic compounds (SCHEU 1987, ROBINSON et al. 1992). Studies have revealed that density and variety of soil arthropods are higher in soils system with greater number of earthworms (BAYOUMI 1978, MARINISSEN & BOK 1988, HAMILTON & SILLMAN 1989, LORANGER et al. 1998, SALMON 2004). It has been reported that the activity of epigeic earthworms may negatively affect the population density of soil microarthropods (BROWN 1995, MCLEAN & PARKINSON 2000). Earthworm could affect the abundance and diversity of Collembola through different pathways since they modify their environment in different ways. The casts of earthworms constitute a good quality of food for Collembola and produce favorable conditions for bacterial growth (MARTIN & MARINISSEN 1993).

Like earthworms, woodlice are important soil detritivorous, ingesting, processing organic matter and influencing biomass and activity of litter colonizing microfauna in different ecosystem (ROUDE 1960, HASSALL et al. 1987, SCHEU 1993, VAN et al. 1993, ZIMMER & TOPP 1999). Woodlice generally coexist in litter layer with epigeic earthworm species. Earthworm and woodlice show different feeding strategies such as above ground fragmentation by