

The effects of farming practices on earthworm dynamics in olive groves of central Greece

(Oligochaeta)

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Abstract. We compared species richness, species composition, density and biomass of earthworm communities in organically and conventionally managed olive groves in central Greece. Earthworm biomass and density was significantly higher ($p < 0.05$) in organic olive groves than in conventional olive groves. The highest species richness was recorded in the organic olive groves. Six species were recorded in total: *Octodrilus complanatus*, *O. croaticus*, *Dendrobaena byblica*, *D. veneta*, *Aporrectodea caliginosa*, and *Microscolex phosphoreus*. Only four of these were found in conventional olive groves, where *D. veneta* and *M. phosphoreus* were absent. The most abundant species were *O. complanatus*, *D. veneta*, and *D. byblica*.

Key words. *Olea europaea*, earthworms, organic farming, conventional farming, soil properties.

Introduction

Earthworms can be used as potential indicators of changes in terrestrial ecosystems in the context of increasing land degradation and pollution (TONDOH et al. 2007). They play an important role in soil physical, chemical, and biological characteristics (EDWARDS 2004, KALE & KARMEGAM 2010) and constitute a major part of the soil faunal biomass (LEE 1983, BHADAURIA & SAXENA 2010). Invertebrate fauna communities in soil are strongly influenced by human activities (BARTZ 2009). Earthworms provide the following major benefits: a) promote soil aeration and drainage facility during rainy seasons because of their upward and downward movement through soil. This activity also increases the percolation rate (SYERS & SPRINGETT 1984). They increase the moisture holding capacity and also the irrigation interval (MULUMBA & LAL 2008, FONTE et al. 2010). b) Earthworms add to soil fertility by absorbing soil residues (MUNNOLI et al. 2010). c) They prevent soil erosion by improving water absorption rates. Cultivation over a few (or many) years probably affects the environment for earthworms. Long-continued cultivation usually results in loss of aggregate structure and reduction of soil organic matter content, and these must result in lower populations of soil earthworms (EDWARD & BOHLEN 1996, POMMERESCHE & LOES 2009). However, adding vermi-compost helps to increase abundance of soil earthworms and thus increases benefits they provide for soil fertility, water holding capacity, and ultimately for biodiversity.

The aim of our study was to evaluate the impact of organic and conventional olive grove management on species richness, composition, density, and biomass of earthworm community and the relationship between these earthworm variables to soil properties such as pH, organic matter content, and soil moisture.