

Effects of Biodynamic, Organic and Conventional Production Systems on Earthworm Populations

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ABSTRACT

In a long-term trial, the earthworm populations of two biological farming systems, two conventional systems and one control treatment were compared in a seven year crop rotation on a Luvisol from loess. The earthworms were investigated by handsorting at four dates during 1990–92. *Nicodrilus longus* (Ude), *N. nocturnus* (Evans), *N. caliginosus* (Savigny) and *Allolobophora rosea* (Savigny) were the dominant earthworm species in all treatments. The earthworm biomass and density, the presence of anecic species, and the number of juveniles were significantly higher in the biological than in the conventional or unfertilized plots. In addition, more earthworm species were found in the biological plots. In this trial, plant protection management seems to be the main factor responsible for the differences in earthworm populations.

INTRODUCTION

Agroecosystems are characterized by a high degree of human manipulation such as soil cultivation, fertilization and pesticide treatments. These practices are becoming more intensive and exerting ecological pressures on the environment. As consequences, soil erosion, soil compaction, nitrate contamination of ground water and a decline of floral and faunal diversity are well-known examples. Therefore, to control anthropogenic interference it is necessary to monitor changes in the soil ecosystem.

Earthworms are well suited as bioindicators for soil fertility. Due to their special biology, earthworm populations can indicate the structural, microclimatic, nutritive and toxic status of soils (Christensen, 1988). In particular, anecic species (large, vertically burrowing earthworms building up stable burrows), play an important role in conservation and improvement of soil structure (Roth & Joschko, 1991), recycling of nutrients and also in many