Earthworms as ecological engineers enhancing the physico-chemical soil properties

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Riassunto

Earthworms represent the most relevant component of the soil macrofauna for their capacity to improve the soil fertility and quality, playing a crucial ecological role in maintaining its health through the bioturbation and microbial interactions processes, which increase the porosity and aeration, as well as the nutrients availability. This work aims to shed light on the epigeic earthworms (Eisenia sp.) effects on the development of two plant species (Brassica oleracea, broccoli; Vicia faba; faba bean), by changes in the soil chemico-physical properties induced by them. Using mesocosm techniques, plants were grown outdoors for four months with or without earthworms. Earthworms abundance and soil chemico-physical properties (temperature and water content throughout the experiment; macroporosity, water holding capacity, pH, organic carbon and total nitrogen at the beginning and at the end of the trial; bioturbation) were determined. Plants morphometric parameters were also measured at the end of the experiment. Earthworms' number and total weight doubled during the trial. They induced changes in the soil chemico-physical properties. Their presence increased the soil macroporosity (+16%, mean value) and water holding capacity (+9%, mean value), as well as the bioturbation level. A significant decrease of soil organic carbon in presence of earthworms on both species were detected at the end of experiment, probably related to the higher organic matter mineralization processes; whereas the significantly higher total nitrogen in the controls of both species compared to the treatments with earthworms suggested that they can promote the readily available N uptake by roots. Finally, earthworms significantly improved the shoots and roots growth of both species. These results confirm earthworms soil enhancing and plant growth supporting action, useful to make more sustainable the soil management in agroecosystems. This study was carried out within the Agritech National Research Center and received funding from the European Union Next-GenerationEU (PIANO NAZIONALE DI RIPRESA E RESILIENZA (PNRR) – MISSIONE 4 COMPONENTE 2, INVESTIMENTO 1.4 –

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