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Effects of agricultural practices of three crops on the soil communities under Mediterranean conditions: field evaluation.

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Sustainable agricultural production relies on soil communities as the main actors in key soil processes necessary to maintain sustainable soil functioning. Soil biodiversity influences soil physical and chemical characteristics and thus the sustainability of crop and agro-ecosystems functioning. Agricultural practices (e.g.: soil tillage, pesticides and fertilizer applications, irrigation) may affects negatively or positively soil biodiversity and abundances by modifying the relationships between organisms in the soil ecosystem. The present study aimed to study the influence of agricultural practices of three crops (potato, onion and maize) under Mediterranean climate conditions on soil macro- and mesofauna during their entire crop cycles.

Effects on soil communities were assessed at a higher tier of environmental risk assessment comprising field testing of indigenous edaphic communities in a selected study-site located in a major agriculture region of Central Portugal, Ribatejo e Oeste, neighbouring protected wetlands. A reference site near the agricultural field site was selected as a Control site to compare the terrestrial communities' composition and variation along the crop cycle. The field soil and Control site soil are sandy loam soils. Crops irrigation was performed by center-pivot (automated sprinkler that rotates in a half a circle area) and by sprinklers. Soil macro- and mesofauna were collected at both sites (field and Control) using two methodologies through pitfall trapping and soil sampling.

The community of soil macro- and mesofauna of the three crops field varied versus control site along the crops cycles. Main differences were due to arachnids, coleopterans, ants and adult Diptera presence and abundance. The feeding activity of soil fauna between control site and crop areas varied only for potato and onion crops vs. control site but not among crops. Concentration of pesticides residues in soil did not cause apparent negative effects on the soil communities. Significant differences of soil communities from potato and onion crops with the one from control site were observed at the beginning and during the crop cycle, but similarities were observed at the last sampling date after harvesting. The same was observed for the maize crop, indicating that soil communities recovered from the agricultural disturbances associated with crops management.

An integrated approach such as the one adopted in present study, taking into consideration soil community's abundances, feeding activity and time variations along entire crop cycles of several crops under Mediterranean conditions, as well as soil exposure to pesticides residues, may contribute to decision making towards a sustainability of crop areas, including pesticide use and management practices.