

DIVERSITY AND FUNCTIONAL ROLE OF SOIL MACROFAUNA COMMUNITIES IN BRAZILIAN NO-TILLAGE AGROECOSYSTEMS

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No-tillage agroecosystems now occupy >13 million hectares in Brazil, mostly in the southern region and more recently also in the Cerrado. Compared with natural ecosystems, agroecosystems tend to have lower biomass and diversity of soil-dwelling invertebrates, that are generally dominated by a few groups that often reach very high density and frequently become pests. The use of no-tillage as opposed to conventional tillage practices, especially when combined with crop rotations and cover crops, can enhance soil macrofauna populations and their contribution to soil function, leading to a more balanced community composition. The soil macrofauna, i.e., organisms easily visible that live in the soil or on its surface for at least some part of their life cycle, includes invertebrates considered both as pests and/or as beneficial to the soil environment and plant production. Ants, termites, earthworms, pot-worms, beetles, grubs, pill-bugs, true bugs, cicadas, snails, millipedes, centipedes, crickets, wasps, pseudo-scorpions, spiders and various insect (especially moth and fly) larvae all form part of the soil macrofauna community. They include saprophagic organisms that act as decomposers and mineralizers, root and shoot-feeding organisms that directly affect plant growth, predators and necrophages that feed on other organisms, geophagous bio-turbators that burrow through the soil leaving their excrements on or under its surface, social insects that create nests and congregate in large numbers, and omnivorous organisms, that feed on many different substrates. The first results on soil macrofauna communities in Brazilian no-tillage systems are just becoming available and confirm that the diversity of macrofauna groups in no-tillage is significantly higher than in conventional systems, and that crop rotations tend to enhance the positive effects (depending on the succession). Millipedes, earthworms, arachnids, insect larvae and beetles tend to be far more abundant in no-till systems, while enchytraeids, ants and sometimes termites tend to be more abundant in conventional-till systems. The number of large (up to 3cm wide, average 1.5-2cm; up to >1m deep, average 20-30cm) scarab beetle-grub holes can be up to 10 times greater in no-till than conventional-till systems, showing the importance of these organisms for soil porosity and infiltration, especially under heavy rain-showers. These preliminary results highlight the importance of these organisms in soil function, of agroecosystem management practices on their communities and the role of adequate decision-making, in achieving a more balanced soil fauna community composition, thus enhancing its potential benefits to soil fertility, crop production and sustainability.