

XVII. Congress of the European Society for Agronomy

August 29 – September 2, 2022
Potsdam, Germany



Diversification & Digitalisation
Trends that Shape Future Agriculture

BOOK OF ABSTRACTS

Book of abstracts: XVII. Congress of the European Society for Agronomy

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Layout concept:

Leibniz Centre for Agricultural Landscape Research (ZALF)

This book of abstracts will be published only electronically: www.esa-congress-potsdam2022.de

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Organic management increases litter decomposition rates in banana fields

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In agroecosystems, the decomposition of crop residues is a fundamental process to ensure the turnover of nutrients and their assimilation by crops. This process is conditioned by various factors: climate, litter quality and the abundance and diversity of decomposer organisms. Agricultural practices play a major role in altering these factors. This is particularly the case for monoculture systems that are intensive in chemical inputs such as herbicides. In these cropping systems, the lack of plant cover and diversity can alter soil moisture and temperature, and suppress habitats for decomposer organisms. In addition, there would also be contamination of litter with pesticides which could make the litter toxic or less palatable to decomposer invertebrates.

In this study, we tested the effect of conventional versus organic farming practices on the decomposition of banana leaves, in situ in banana plantations. We selected 6 banana plots under organic management and 6 plots under conventional management. Litter mass loss was measured by the litter bag method and the effect of soil macrofauna was estimated by using different mesh sizes: 0.1mm for decomposition due to micro-organisms and 10mm for decomposition due to micro-organisms and macrofauna. The litter bags were filled with either leaves from banana plants killed by glyphosate injection or leaves from mechanically killed banana plants. Glyphosate injection is a practice commonly used in conventional management for the destruction of banana plants in case of plot renewal. A total of 264 litterbags were deposited and distributed equally between organic and conventional management plots. The temperature and relative humidity of air, plant diversity, soil vegetation cover and the abundance and diversity of decomposer invertebrates were measured to characterize organic and conventional plots.

Our results showed a significantly higher litter mass loss in the organically managed plots than in the conventionally managed ones. The higher vegetation cover in the organic plots seems to best explain this difference in decomposition rate. Indeed, the dense plant soil cover in the organically managed plots would allow a higher moisture content, accelerating microbial decomposition. In addition, the proportion of mass loss due to soil macrofauna is higher in the organic plots. This result suggests that conventional agricultural practices, especially the use of herbicides, had a cascading negative effect on litter decomposition through microclimatic conditions and a reduced macrofaunal activity. On the other hand, glyphosate contaminated banana leaves did not show a significantly different mass loss than mechanically killed banana. This result indicates that the use of glyphosate for the chemical destruction of banana plant is less damaging for the decomposers than field application of glyphosate for weed control.