*Understanding Soil Functions*

# WAGENINGEN SOIL CONFERENCE

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BOOK OF ABSTRACTS

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## Effects of compost application on soil macrofauna and soil functions in oil palm plantation – Biofunctool® approach

Oil palm produces about 38.7% of all vegetable oil (palm oil and palm kernel oil, 2016) and its cultivation area reach in 18.7 million ha worldwide (mature plantations) in 2017. While palm oil demand will increase in the future, leading an increase of global production, an adapted fertilization is needed to increase yield while preserving soil multifunctionality. Organic fertilization, by Empty fruit bunches (EFB) or compost is an alternative to mineral fertilization. The effect of EFB application on soil quality has been investigated, however the effect of compost application on soil functions and soil macrofauna in oil palm plantations is poorly known. To investigate the effect of compost application, we compared soil functions and soil macrofauna of two treatments of an agronomical trial (compost application / mineral fertilization), taking into account the zone around the palm tree (harvesting path, circle and windrow). Soil functions were assessed using the Biofunctool® framework, which is a novel set of in-field, low tech and time-effective indicators to assess main soil functions: soil carbon transformation, nutrient cycling and structure maintenance. Effect of the zone around the palm tree on soil functions and macrofauna, was largest than the effect of the treatment and the compost application slightly improved carbon transformation functions in the circle zone. Soil functions and macrofauna functional groups data showed similar co-structures indicating the link between soil functions and fauna. We highlighted the importance of spatial heterogeneity and discussed the effect of organic matter.

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## Analysis of the Brazilian public policies for Agroforestry management in sensitive and risk areas

In Brazil, studies indicate that the intense use of agriculture and livestock farming in sensitive regions are losing their productive capacity in a few years. With this, many farmers end up abandoning that land, due to high expenses to proceed for the recovery, so they move to new areas, bringing more impacts to the environment. These measures of exploring new areas are specified in the Brazilian environmental legislation. The abandonment land stays as fallow. Research indicates that the natural restore of an environmental area, by itself, takes more than 200 years which goes in the opposite direction with mankind needs, since there is an exponential growth of the population and consequently bigger demand for food. The application of Agroforestry Systems can be a protagonist in abandoned areas for the regenerative acceleration, given the evidence that in 40 years there is a reestablishment of unproductive areas. The study aim is the analysis of the current public policies of the environment in sensitive and risk areas, their application and effectiveness in the Brazilian territory. It also sought the application of public policies for the use of Agroforestry Systems, identified the points that are flawed in public policies and pointed out measures that can bring a transformation in the current context that is: increase production with better conservation of natural resources with more quality of life and of food to the producer and population.

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## Resilience of soil fungal communities to rainfall scenarios

Implementation of management practices that enhance ecosystem resilience to severe drought, or intense rain is a priority to sustain global food production. Soil fungi are main drivers of soil nutrient cycling and water regulation, however, the extent to which soil fungal communities are affected by weather extremes is still uncertain. We aim to study the resilience of the soil fungal communities to different rainfall scenarios. We hypothesized that the resilience of fungal communities will be higher in eco-intensive managed systems compared to conventional management.
We set up a common garden mesocosm experiment using intact soil cores from different agricultural ecosystems (eco-intensive and conventional) across Europe (Switzerland, Portugal, France). The mesocosms were subjected to different rain regimes (control, drought, excessive rain, and drought followed by excessive rain). The rainfall differentiation lasted for 263 days, followed by a recovery period of 89 days to let the mesocosms go back to normal soil moisture. After this period soil samples were collected to characterize the soil fungal community and the arbuscular mycorrhizal fungal (AMF) community using high throughput sequencing. We present preliminary results on the resilience of the soil fungal community and the AMF community to the rainfall events by comparing their community structure and diversity. We also show the prevalence of functional guilds categorized as pathogens, saprotrophs and mutualistic symbionts after the rainfall scenarios.
Our results will shed light on fungal response to climate change and will be useful for policy makers to support sustainable agricultural practices that enhance natural soil biota.

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