

Tagungsnummer

P24

Thema

Kommission II: Bodenchemie

Organische Bodensubstanz: Struktur, Funktionen, Dynamik

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Titel

Short-term soil response under plastic mulching in strawberry cultivation

Abstract

Plastic mulches (PM) are known for increasing soil temperature and retaining soil moisture, suppressing weeds and avoiding ground contact of on-soil growing products. Thus, the use of PM in agriculture has been significantly increased in the last years, with important economic benefits for the farmers. Most studies dealing with PM emphasize the positive effects of this management, yet recent reports have shown that the use of PM is linked to a decrease of SOM content, soil erosion, soil contamination with plastic residues and in some cases to a high mycotoxin production by soil fungi. This questions the sustainability of the intensive use of PM in agriculture. The aim of this study was to assess the short-term modification of soil physicochemical and microbial parameters under PM, compared to no-mulch (NM). The experiment was conducted in a 2016-planted strawberry field. For each management (PM vs. NM) five plots were selected. Cultivation of strawberry in both PM and NM was done in a ridge-furrow system with subsurface irrigation. Samples were collected prior to the planting (T0) and successively at two (T1) and four months (T2) after planting. Different depths were sampled in the ridges (0-10, 10-30 and 30-60 cm) and in the furrows (0-10 and 10-40 cm). The analysis of the quantity and quality of soil organic matter is ongoing and comprised soil physicochemical analysis: pH, electrical conductivity, water content, bulk density and stability, organic C and N and density fractionation. Moreover, soil microbiology was studied via soil microbial carbon and mycotoxin occurrence as indicator of fungal stress. Additionally, temperature, humidity and pH of soil were daily recorded using an in-field installed measuring station. The continuously recorded environmental data showed differences in the temperature patterns between PM and NM, with highest average temperature under plastic. As well, pH and humidity data indicated differences between the treatments.