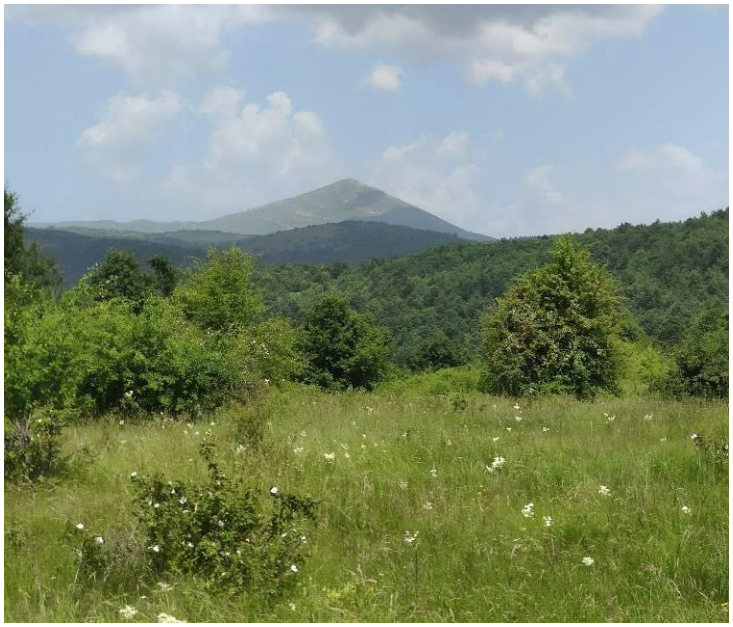
Serbian Society of Soil Science

University of Belgrade, Faculty of Agriculture

BOOK OF ABSTRACTS

3rd International and 15th National Congress

SOILS FOR FUTURE UNDER GLOBAL CHALLENGES



21–24 September 2021

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Assist. Prof. Dr Ljubomir Životić
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ORGANIC FARMING PRACTICE IMPROVES SOIL MICROBIAL PROPERTIES UNDER SOYBEAN PRODUCTION

Jelena Marinković*[a], Dragana Miljaković[a], Branislava Tintor[a], Gorica Cvijanović[b], Vuk Đorđević[a], Vojin Đukić[a], Marjana Vasiljević[a]

[a]Institute of Field and Vegetable Crops, National Institute of the Republic of Serbia, Maksima Gorkog 30, 21000 Novi Sad
[b]Megatrend University, Belgrade, Faculty of Biofarming, Bačka Topola, Serbia
*Corresponding author: jelena.marinkovic@nsseme.com

Abstract

To minimize negative impacts of intensive agricultural practice, organic farming has been proposed as a sustainable agricultural practice with the main principles of the ecological cycle and biodiversity. This concept heavily relies on an active soil microbial community to break down organic matter into plant available nutrients. The main objective of the study was to identify whether significant differences in microbial properties in soils under soybean organic and conventional farming management exist. The study included 95 samples of soil under certified organic soybean production and 48 samples in conventional production system. Soil samples were collected form soybean rizosphere, in the period of soybean full bloom. The abundance of the examined microbial communities was assessed by an indirect dilution spread-plating method on an appropriate nutritive media. Dehydrogenase and β-glucosidase activity were measured spectrophotometrically. The variables were analyzed using two-way analysis of variance (ANOVA), followed by mean separation according to Tukey's test at the $P<0.05$ level of probability. Soils under organic farming belong to the class of humic soils (3.5%), while soils samples in conventional fields were characterized by the lower humus content (2.1%). The results of the study showed significant increase in the abundance of *Azotobacter* spp., free N-fixing bacteria, actinomycetes and dehydrogenase and β-glucosidase activity in soils under organic management. The two different soil management systems did not significantly affect the total bacterial population, ammonifiers and fungal abundance. The abundance of *Azotobacter* spp., free N-fixing bacteria and actinomycetes were on average 196%, 87% and 60% higher, respectively, in organically farmed soils. Dehydrogenase activity was on average 140% greater, whereas the β-glucosidase activity was increased by 41% under organic management. As no synthetic nitrogen fertilizers are allowed in organic farming, these systems heavily depend on green manure, nitrogen fixation and organic inputs. Increased organic matter content in organic farming positively influences microbial growth, biomass and enzymatic activity. The present study underlying management practices linkage on most investigated microbial indicators and confirms the positive correlation with soil organic material turnover.

Keywords: dehydrogenase, β-glucosidase, microbial abundance, organic and conventional management, soybean

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