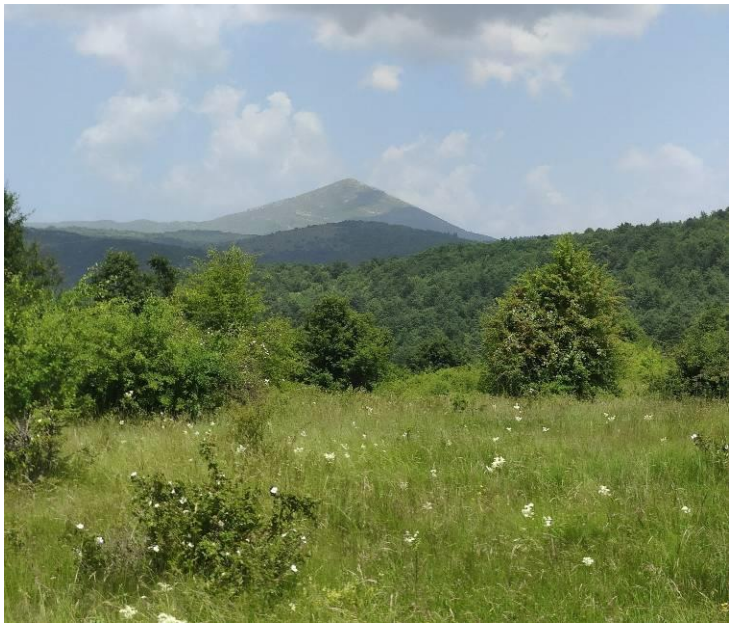
Serbian Society of Soil Science

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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Publisher

Serbian Society of Soil Science

Editors

Prof. Dr Boško Gajić
Assist. Prof. Dr Ljubomir Životić
MSc Aleksa Lipovac

Each contribution included in the Book of Abstracts was positively reviewed by referees.

Organized by;

Serbian Society of Soil Science
University of Belgrade, Faculty of Agriculture

Supported by:

Ministry of Education, Science and Technological Development of the Republic of Serbia
Maize Research Institute "Zemun polje", Belgrade, Serbia
Semenarna d.o.o., Niš, Serbia
Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia – Directorate for Agricultural Land
Terra Optima d.o.o., Topola, Serbia
Best Seed Producer d.o.o., Feketić, Mali Iđoš, Serbia

Printed by:

SistemCD, Belgrade, Serbia, 2021

Published in 130 copies

ISBN-978-86-912877-4-0

COMPARATIVE ANALYSIS OF PHYSICO-CHEMICAL AND MICROBIOLOGICAL PARAMETERS OF SOIL UNDER MISCANTHUS GIGANTEUS GROWN IN DIFFERENT AGRO-ECOLOGICAL CONDITIONS

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Abstract

The aim of this research was to evaluate the impact of soil type (physico-chemical properties), dosage and the type of applied mineral fertilizer to the bioenergetic crop *Miscanthus x giganteus* planting in different agro-ecological conditions, on the microbiological parameters of the soil. Experimental plots with miscanthus were located at three sites in the territory of the Republic of Serbia. Institute's experimental plots under miscanthus were formed on different soil types: in Varna on the Stagnosol, in Mladenovac on the Cambisol and in Belgrade on Anthropogenic Soil. The analysis of agro-ecological conditions indicated that in Belgrade vegetation season started two weeks earlier, compared to the other two localities. Furthermore, higher values of the analyzed chemical parameters of the soil (pH value, content of easily accessible phosphorus and potassium, content of carbonate, organic matter and total nitrogen) were recorded for the Belgrade location, compared to the other two localities, while in terms of physical properties, each locality was of different soil texture class. Soil samples, in which this impact was analyzed, included treatments from experimental plots under miscanthus (fertilized with 50 kg ha^{-1} NPK - granular fertilizer, with 100 kg ha^{-1} NPK - granular fertilizer, 50 kg ha^{-1} NPK - water soluble fertilizer and unfertilized variant) and uncultivated soil over a multi-year period. The total number of microorganisms was determined by the plate count method on the agarized soil extract. In the same manner, the number of microorganisms that could grow on a minimal medium enriched with miscanthus was determined. The results of this research indicated that the highest values for the total number of microorganisms were recorded for the soil from the Mladenovac location. Similar results were obtained for the Varna location, while the soil from Belgrade had the lowest number of microorganisms. The total number of microorganisms that could grow on a minimal medium enriched with miscanthus was the highest for the Belgrade location, while this number was slightly lower for the locations of Mladenovac and Varna. For the total number of microorganisms, differences in the number of microorganisms between treatments were also observed (in the range from $5x10^5$ to $3x10^9$ CFU/g). The highest number of microorganisms was observed in the treatments under miscanthus fertilized with 50 kg ha^{-1} NPK - water soluble fertilizer, while the treatments from uncultivated soil showed the lowest number of microorganisms. A similar pattern between treatments was observed in the case of microorganisms grown on minimal medium with miscanthus. These results indicated that different soil types, fertilization treatments and agro-ecological conditions had an impact on the total number of microorganisms in the soils under the perennial bioenergetic crop of miscanthus. In addition, the cultivation of miscanthus in all localities increased the total number of microorganisms, in comparison to the uncultivated soil.

Keywords: *Miscanthus x giganteus*, microorganisms, soil type, agro-ecological conditions, fertilization