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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CONTENT OF HEAVY METALS IN ARABLE PLOTS OF RASINA DISTRICT

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Abstract

Rasina district is located in the central part of Serbia, on an area of 2,667 km^2 and includes the municipalities: Aleksandrovac, Brus, Varvarin, Kruševac, Trstenik and Ćićevac. This district is recognizable as a very developed agricultural area, in which the following stand out: the valley of the West and Great Morava, the Ibar and Rasina valleys, that is, the Kruševac and Kraljevo valleys, then the famous Aleksandrovac parish or vineyards. The area of the municipality of Brus also covers the slopes of Kopaonik. In previous years, systematic fertility control including the basic agrochemical parameters of fertility was performed. The aim of the research was to improve the existing fertility control system through additional soil examinations (content of total and accessible forms of microelements and heavy metals) of certain cadastral parcels of registered agricultural holdings in Rasina district. Only on the basis of the complete examination good recommendations for the appropriate crops cultivation, as well as recommend adequate agrotechnical and ameliorative measures (calcification, application of organic fertilizers, foliar micronutrients) can be given. These measures primarily achieve the improvement of soil quality and maximum use of land potential, but also open the possibility of achieving high yields and product quality. The special significance of these results is reflected in the consideration of the possibilities of organic production on farms. One composite sample was taken from each of the 110 examined cadastral parcels from a depth of 0-30 cm. In the soil samples total and accessible forms of microelements and heavy metals were determined: arsenic (As), cadmium (Cd), chromium (Cr), cobalt (Co), copper (Cu), nickel (Ni), lead (Pb), zinc (Zn), iron (Fe), manganese (Mn), and boron (B) were determined. Regarding the microelements and heavy metals content, a significant part of the examined cadastral parcels has regular values for unpolluted agricultural lands. The potentially harmful content of total nickel and chromium (30% and 20% of samples above 100 mg/kg, respectively), which is primarily of geochemical origin, was detected. There are higher concentrations of available Ni in 9% of samples, mostly on mountainous soils. In Vertisols (under vineyards) and in Alluvial Soils (under vegetable crops), where there is intensive protection with copper preparations, increased concentrations of total and available Cu (10% of samples had values above the maximum allowed) were observed, but below the limit when harmful effects on the plant occur. The Pb content above the maximum allowed value was found in only one sample. With the increase of the total Pb, the available ones also increase (in 4% of the samples), and the exact origin of the increased concentrations should be established by the next research. The low content of individual biogenic microelements was detected, primarily Zn (30% of samples) and B (50% of samples).

Keywords: soil fertility, microelements, heavy metals, Rasina district.