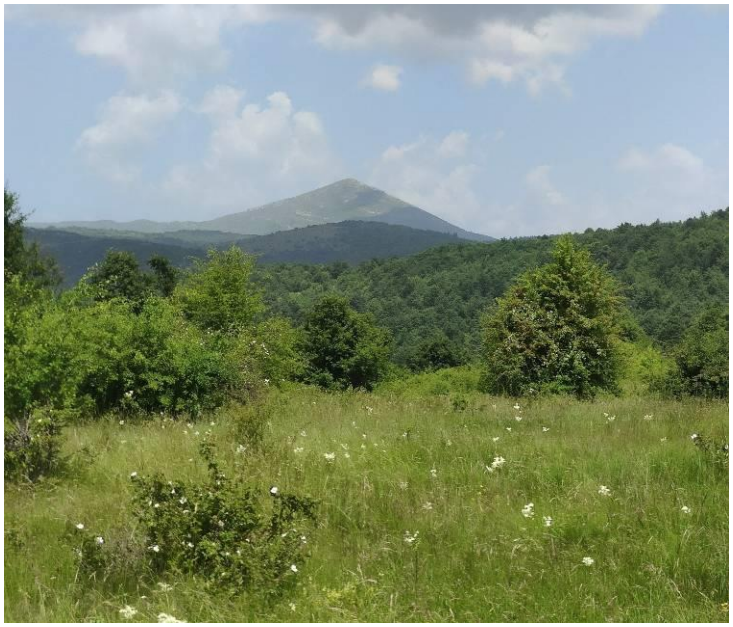
Serbian Society of Soil Science

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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EFFECTS OF APPLICATION METHOD AND TYPE OF MINERAL FERTILIZERS ON ACID SOIL FERTILITY

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Abstract

Strongly acidic soils often represent a limiting factor in the production of most cultivated plants. In such soils, calcification and humidisation measures are generally proposed. Arbitrary application of physiologically acidic fertilizers on strongly acidic soils, further deteriorates the already poor physical and chemical properties of the soil, reduces its fertility, contributes to the reduction of yield and quality of plant products. In order to determine the dynamics and the degree of acidification of the soil with acid fertilizers, the influence of increased doses of NPK and urea on changes in the chemical properties of Dystric Cambisol was studied in a field experiment. The experiment was set up with a raspberry variety Willamette, in the soil of very acid reaction and was monitored for 2 years. In addition to the control (1 t/ha NPK), the experiment contained 4 treatments: 400 kg/ha of urea + 1 t/ha NPK (input throughout the whole plantation), 400 kg/ha of urea + 1t/ha NPK (input in rows), 2t/ha NPK – double dose (input throughout the whole plantation) and 2t/ha NPK – double dose (row input). The application of physiologically acid fertilizers, NPK and urea, and especially their application in the rows, in the first two experimental years did not show the expected acidification reactions of the soil, but had a more alkaline effect. Changes in pH values after treatments were minor and variable due to terrain heterogeneity. Increased uptake of NH_4^+ ions into the soil (derived from NPK and urea) pushed alkaline ions (Ca, Mg and K) from adsorptive complex into the soil solution, which is why their increased content in the soil was measured, especially in the second year of the experiment. The content of available P and mineral N forms, was higher in all treatments compared to the control; the content of mineral N was significantly higher in treatments where fertilizer was introduced into the rows of plantations. Very high to toxic concentrations of mobile Al are significantly reduced in treatment with double dose of NPK-application in rows, as well as in treatment with urea application in rows, in the second year, due to the presence of increased concentration of alkaline ions, primarily Ca and their antagonism with Al. In relation to the control, especially on the treatments with fertilizer application in raspberry rows in the second year, increased concentrations of available microelements Fe, Mn, Zn and B were found. The results obtained in a relatively short period of two years did not show the effect of fertilizers evaluated (NPK and urea) on soil acidification. In contrast, alkaline properties of these fertilisers were detected (primarily, soil concentrations of K^+, Ca^{2+}, Mg^{2+} were increased, but also and Fe^{3+} and Al^{3+}concentrations). This is probably initial and transient effect of the fertilisers, and decrease and conversation of NH_4^+ in acidic NO_3^- is expected. In order to determine the acidic properties of these fertilizers and their long-term influence on very acid soil fertility, it is necessary to continue the research in the following period.

Keywords: Raspberry, Acid soil, Fertilization, NPK, Urea.