



## **Effect of Fertilization on Soil Fertility and Nutrient Use Efficiency at Potatoes**

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### **ABSTRACT**

The effect of fertilization on soil fertility, yields and nutrient use efficiency of potatoes grown under field experimental conditions was studied. The trial was conducted on shallow brown forest soil (Cambisols-coarse) during the vegetation periods of 2013 to 2015. The variants of the experiment were: control, N140; P80; K100; N140P80; N140K100; P80K100; N140P80K100; N140P80K100Mg33. The applied fertilization slightly decreased soil's pH after the harvest of potatoes compared to the soil pH their planting. Decreasing of pH was more severe at variant N (from 5,80 to 4,19 in 2014). The mineral nitrogen content in the soil after the harvest of potatoes was lower for the variants P, K and PK. The positive effect of fertilization on soil fertility after the end of the trails was more pronounced at variants NPK and NPKMg. The content of available nitrogen, phosphorus and potassium forms for these variants was the highest for each year. The highest content of mineral nitrogen was observed in 2013 (252,5 and 351,1 mg/1000g, respectively for variants NPK and NPKMg). It was due to extremely dry weather conditions during the vegetation in this year. Soil content of mineral N for the next two years was lower. The same tendency was observed for phosphorus and potassium was observed. In 2013 the P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O content in soil was the highest for the variants with full mineral fertilization - NPK (64,4 and 97,6 mg 100g<sup>-1</sup> respectively for P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O) and NPKMg (65,2 and 88,0 mg 100g<sup>-1</sup> respectively for P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O). The highest yields were recorded at variants NPK and NPKMg - 24,21 and 22,01 t ha<sup>-1</sup>, average for the studied period. The yield of variant NPK was 25 % higher than the yield from variant NP and 68 % higher than control. The partial factor productivity (PF<sub>PN</sub>, PF<sub>PP</sub> and PF<sub>PK</sub>) of the applied fertilizers was the highest at variant NPK. The PF<sub>PN</sub> (80,10 kg kg<sup>-1</sup>) for the yields of variant N was 57 % lower than the PF<sub>PN</sub> at variant NPK (180,36 kg kg<sup>-1</sup>). The PF<sub>PP</sub> and PF<sub>PK</sub> at variants P and K was approximately 57 and 47 % lower compared with variant NPK. Agronomic efficiency (AE) of applied nutrient was the highest for the combined NPK fertilization. The application only of N, P, K and PK combination without N was agronomically not effective practice. The combined NPK and NPKMg variants ensure the highest yields. The indicators of nutrient use efficiency (PF<sub>P</sub> and AE) were also the highest at these variants.

Key words: Soil fertility, nutrient use efficiency, potatoes, yields,