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INNOVATIVE PREPARATIONS USED IN ORGANIC FARMING FOR SOIL AND RAW MATERIALS QUALITY IMPROVEMENT

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ABSTRACT. A growing number of studies show that organic farming leads to the higher soil quality and more biological activity in the soil than the conventional farming. This investigation was inspired by increasing global issue on how to improve soil and plant quality depending on the used alternative preparations instead of synthetic fertilizers. The aim of three years study was to investigate the influence of fermented manure product (preparation 500) and silica (preparation 501), which are typically used in biodynamic farming, on the quality on the soil as well as potatoes, great pumpkin yield and quality.

MATERIAL AND METHODS. Standard methods were applied to identify the following indexes of soil quality: amount of P_2O_5 ($mg\ kg^{-1}$), K_2O ($mg\ kg^{-1}$), pH, nitrogen (the sum of nitrate nitrogen + nitrous nitrogen) ($mg\ kg^{-1}$), ammoniacal nitrogen ($mg\ kg^{-1}$), mineral nitrogen ($mg\ kg^{-1}$), urease activity ($mg\ NH_3\ g^{-1}\ soil\ 24\ h^{-1}$), saccharase activity ($mg\ glucose\ g^{-1}\ soil\ 48\ h^{-1}$), soil CO_2 flux (F_c) ($\mu mol/m^2/s$). Chlorophyll index in pumpkin leaves and pumpkin yield depending on the preparation 500 ($t\cdot ha^{-1}$) was also calculated. The investigations were carried out over the period of 2012–2014 in Kaunas district organic farm. An experiment included two factors: I - three pumpkin cultivars 'Justynka', 'Karowita' and 'Amazonka' or three potato cultivars (two varieties of potato with blue-fleshed tuber 'Blue Congo', 'Vitelotte' and variety of potato with red-fleshed tuber 'Red Emmalie'); II – application of biodynamic preparations for field sprays (four treatments: 1. Control without BD; 2. Using of BD 500; 3. Using of BD 501; 4. Using of their combination (BD 500 + BD 501). The preparation 500 for the study was acquired from Demeter certified farm in Germany. The soil was sprayed with 1% concentration solution two weeks before planting pumpkin shoots. Soil samples were taken four times – 7 days; 14 days; 65 days and 130 days after spraying of preparation 500. Soil samples were compared with the samples without fermented manure preparation.

RESULTS. The results showed, that the significantly higher amounts of P_2O_5 (respectively 234.17 and 180.44 $mg\ kg^{-1}$), K_2O (180.00 and 127.20 $mg\ kg^{-1}$), nitrogen (5.41 and 3.21 $mg\ kg^{-1}$) and mineral nitrogen (7.97 and 5.67 $mg\ kg^{-1}$) were established in the plots where has been used the preparation

500. The higher activity of soil enzymes (urease activity was 1.93 times higher and the saccharase activity – 1.05 times higher) and the bigger amounts of ammoniacal nitrogen (9.38 and 3.45 mg kg⁻¹) was fixed also. The average soil CO₂ flux (F_c) value with the preparation 500 applied in the middle of the growing season (from 56 till 70 day) was 5.32% higher. Some significant positive correlations were identified between pumpkin yield and soil properties. The results revealed that combination of biodynamic preparation (BD 500 + BD 501) was the best among all the treatments for most of the growth, yield and quality parameters under study. It was found out that, compared with the control variant; combination of biodynamic preparations (BD 500 + BD 501) substantially increased the chlorophyll content index in leaves, the weight and number of potatoes tubers and pumpkin pulp per plants.

SUMMARY. However, more research is needed to determine whether the biodynamic preparations affect chemical properties and growth of color-fleshed potato tubers and pumpkin.