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Si-MICROBIAL SYMBIOTIC EFFECT ON THE ROOT FORMATION OF THE CULTIVATED PLANTS

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Abstract

Modern agriculture requires the reduction of the traditional fertilizer application and increasing the quality of products. The production of the agricultural plants depends on the root formation. Our and literature data showed that root formation can be regulate by application of the special microorganisms (micorhiza) or by active forms of Si. Aim of this study was to determine the major factors for root formation of the cultivated plants. The investigations were conducted with sand, sandy-clay and clay soils and with using corn and barley as tested plants. The active Si (as diatomite from Central Russian region at the rate 1 t/ha) and concentrated monosilicic acid (100 mg/l of Si), mycorhiza and standard NPK fertilizers were used in the experiment. After 2 months the biomasses of the cultivated plants were measured (root, stems and leaves). The CO_2 emission from cultivated soil and content of azotobacters were tested as well. The obtained data showed that the application of the conventional fertilizers reduced the microbial activity of the soil and amount of the azotobacters, while the biomass of the stems and leaves were increased significantly. The application of the active Si (both solid and liquid forms and mycorhiza increased the soil microbial activity and azotobacted content. The biomass of the whole plant (roots, stem and leaves) were increased as well under optimization of Si plant nutrition and microbial substances application. The maximum effect was obtained for combination of the active Si and mycorhiza. The root mass was increased on 2.3 times and azotobacter amount on 3.4 times, compare with control. The obtained data confirm the theory that the conventional fertilization has negative influence on the soil-microbial system. The additional amount of the fertilizers crushed the balance between plant, soil microbes and soil biochemical equilibrium. In the opposite the application of active forms of Si and mycorhiza reinforces the soil-plant-microbial system. In the result the productivity of the cultivated plants is increased as well. These data give possibility for elaboration the new system for sustainable agriculture, which will not conflict with natural balance in the soil matrix.