

„Biomass as a carrier of fertilizer micronutrients”

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summary of doctoral thesis

The doctoral dissertation takes the issue of the application of biomass enriched with micronutrients via biosorption as a carrier of micronutrients used in plants fertilization. Nowadays, when micronutrient deficiency in soils, plants and hence in human diet constitute global problem, there is growing interest in environmentally-friendly micronutrient fertilizers characterized by high bioavailability of micronutrients and low production costs.

Different types of biomass were enriched with micronutrient ions (zinc, manganese and copper) via biosorption in laboratory scale and in pilot-plant scale. The scheme of laboratory screening tests basing on leaching tests, extraction experiments and germination tests on *Lepidium sativum* led to appoint the most effective micronutrient fertilizer. Laboratory-scale and pilot-plant scale installations for biosorption were designed. Multielement content of preparations produced in pilot-plant with the use of ICP-OES, SEM-EDX and XRF was determined and the surface of the biomass was examined by FTIR. The utilitarian properties of new formulations were tested *in vivo*: in laboratory experiments on *Lepidium sativum* and field trials on maize. It was found that micronutrients delivered by bio-preparations were characterized by higher bioavailability to plants and biofortification of edible parts in comparison with the reference products (inorganic salts, chelates).

Production of bio-preparations in pilot-plant and conducted field trials enabled to perform preliminary economical analysis and evaluation of commercial potential of proposed technology in co-operation with Wrocław Center of Technology Transfer. Technology Readiness Level (TRL) was rated at 5 and allowed to prepare technological offer for industry.