Nanobiotechnology is an emerging area of research, in which modern advancements in nanotechnology have been integrated into the biological sciences and also thriving as an important field of sciences due to its promising role in the agricultural like improvement crop yield and mitigation of harmful effects of pesticides to environment. Crop pathogens and nutrient deprivation reduce the yield and quality of agricultural production. They cause substantial economic losses and reduce food security at household, national and global levels. The enhancement of the productivity of global agricultural and related food systems includes the consideration of crop pests and pathogens as well as improvement of plant growth. Various methods, strategies and approaches are used in the management of plant production, which include protection from disease (fungicides, biocontrol agents, fungicides, optimization of post-harvest storage conditions) and also a variety of fertilizers (potassium nitrate, ammonium sulfate etc.). Therefore, it is suggested that nanoagrochemicals may be more beneficial to conventional products and great expectations are placed in the applications of nanotechnologies in the sector. Biologically synthesized metal nanoparticles (MNPs), have unique properties such as extremely small size, various shapes, high surface area, capping molecules, which influence their ability to combat bacteria and fungi. Moreover, green synthesized MNPs may prove to be a suitable agent to positive affect plant growth and development through facilitating important nutrients as well as micro – and macroelements. Due to its variable properties, it is difficult to predict the positive or negative effect and its mode of action in the environment and within living systems. NPs interact with plants causing many morphological and physiological changes, depending on the properties, and most importantly the dose.

The project includes biological synthesis of silver, zinc and magnesium NPs using fungal extracts e.g. from *Fusarium* sp., *Rhizoctonia* sp., *Aspergillus* sp.. The synthesized NPs will be characterized by their physical and chemical properties such as shape, size, surface charge that affect their stability and aggregation ability as well as capping molecules, which also determine their stability and biological activity. In proposed study various NPs will be applied as pretreatment agents to maize (*Zea mays*) seeds to stimulate seed germination and seedling growth. Appropriate analyses will be carried out in order to determine the influence of these NPs on processes such as germination and seedling growth, including evaluation of changes in plant growth, level of nanoparticle accumulation in plant tissues photosynthetic efficiency, as well as evaluation of the antioxidant system response, i.e. determination of the level of generated free radicals and antioxidants. The obtained results will indicate which doses and which NPs have a beneficial effect on plant growth, development and health, and will contribute to the elucidation of processes that may occur in plants after exposure to nanoparticles. The study assumed that it depends on the dose, composition, concentration, size, and physical and chemical properties of nanoparticles as well as plant species. It is intended that the use of nanoparticles will be more efficient against pathogens, less toxic or even beneficial for the plant organism and more friendly to the environment than corresponding macro-scale materials.