NICOLAUS COPERNICUS UNIVERSITY IN TORUŃ

RESEARCH UNIVERSITY EXCELLENCE INITIATIVE

FUNDACJA AKADEMIA BIOLOGII I OCHRONY ŚRODOWISKA

„Plant productivity and food safety: Soil science, Microbiology, Agricultural Genetics and Food quality"

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First day (15th of September 2022)

Session II: Bio-based products and nanotechnologies for food safety and sustainable agriculture

Session Chair: PhD Patrycja Golińska, Assoc. Prof. at NCU

Agricultural production provides fundamental products for nutrition, and industry (food, feed, fiber and fuels). Apart from abiotic factors, pests and pathogens highly influence yield reduction. Plant diseases caused by different microorganisms (i.e. bacteria, fungi, insects, viruses) are responsible for agricultural crop and economic losses worldwide. These pathogens attack crops in the field, and during storage, transportation and commercialization phases. Traditional plant protection strategies are often insufficient. Consequently, huge financial resources are spent annually on pesticides to control plant pests and pathogens and secure quality and yield in plant production. However, an excessive and inappropriate application of chemical-based pesticides has negative effects on animals, humans, and other non-target organisms as well as the environment. The biological control is an eco-friendly and economically viable method that involves the use of living organisms for the management of plant pathogens and pest populations, has been considered among the most promising applications for sustainable agriculture. Novel eco-friendly strategies or technologies, such as nanotechnologies, for the management of plant diseases are developed. Nanotechnology can be an alternative to the current practices and provide new tools that allow to minimize production inputs and maximize agricultural production outputs. The use of nanomaterials in agriculture assumes reduction of the amount of spread chemicals, minimizing nutrient losses in fertilization and increasing yield through pest and nutrient management. Moreover, nanoparticles possess huge potential for application in various fields of food science and food microbiology, including food processing, food packaging, functional food development, food safety, detection of foodborne pathogens, and shelf-life extension of food and/or food products. These strategies meet the increasing need for global sustainability.

Research subjects include:

- biocontrol of plant pathogens for sustainable plant production,
- microbial diversity and disease suppression,
- botanicals/ plant-based eco-friendly products as alternatives for management of plant diseases and food-borne pathogens,
- plant tissue culture as a tool for the sustainable production of disease-free plants,
- bio-based smart packaging, etc.