https://doi.org/10.53230/tgm.1310-912X.2024.1001.08

ELECTROSPUN POLYMER HYBRID MATERIALS AS BIO-CONTROL AGENTS WITH APPLICATION IN ECO-AGRICULTURE

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Introduction Plant diseases are a great threat to humans because they destroy plants and plant products on which humans rely for food. A wide variety of dangerous plant diseases are caused by fungi, which make up the majority of plant pathogens. Cultivated plants are generally more prone to disease than their wild counterparts. The use of synthetic pesticides in agriculture resulted in long-term harmful consequences on humans and nature. Therefore, the development of more environmentally friendly approaches is necessary. Eco-agriculture combines innovative methods and science-backed research without endangering the environment. Electrospinning is an effective and promising process to obtain materials for application in eco-agriculture.

Experimental part Biocompatible thermoplastic polyester, aminopolysaccharide and a beneficial microorganism were used as materials. Organic solvents of an analytical grade of purity were used as received, as well.

Results and Discussion Fibrous materials were prepared by electrospinning of polyester solutions in chloroform. The obtained polyester mats were coated with a film of the aminopolysaccharide (with different molecular weights) and spores of the beneficial microorganism. Contact angle measurements of the resulting materials were carried out. The fibrous mat based on neat polyester had a water contact angle of ~110°, possessing a hydrophobic surface. The coating on the polyester mat with the aminopolysaccharide film resulted in a decrease of the water contact angle to ~77°. The hybrid biomaterials, containing the beneficial microorganism, were tested for their ability to inhibit the growth of the different fungal species that are considered to be the main causative agents of widespread plant diseases. The polyester mat coated with the low molecular weight aminopolysaccharide and containing the microorganism's spores was the most effective in suppressing the pathogenic fungi. The whole Petri dish surface was covered with the beneficial microorganism, completely hampering the growth of the pathogenic fungi.

Conclusions Novel hybrid biomaterials based on biocompatible thermoplastic polyester, an aminopolysaccharide and a beneficial microorganism were successfully developed. The spores of the beneficial microorganism were successfully incorporated into electrospun fibers to obtain biohybrid materials for plant biocontrol.

Keywords: *electrospinning; eco-agriculture; polyester; aminopolysaccharide; beneficial microorganism; plant diseases;*

Acknowledgments: This research was funded under the Project BG-RRP-2.011-0005-C01 with the financial support by the European Union - NextGenerationEU, Investment C2.I2 "Increasing the innovation capacity of the Bulgarian Academy of Sciences in the field of green and digital technologies". Some of the research equipment of Distributed Research Infrastructure INFRAMAT (part of the Bulgarian National Roadmap for Research Infrastructures), supported by Bulgarian Ministry of Education and Science, was used in this study.