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Dynamics of microflora in the process of composting organic waste and bioplastics

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The role and dynamics of microorganisms in the composting process of bioplastic and organic wastes is researched. For the purpose of the study, the influence of Polydegrelex material upon its introduction into the composting pile is analyzed. By chemical composition Polydegrelex refers to oxo-degradable plastic products. Polydegrelex contains an additional additive that is both photo- and thermally degradable. The rate of degradation depends on both the quality and the presence of antioxidants in the main component of this foil. According to the literature, Polydegrelex is a specific material that undergoes physical decay under the influence of temperature and sunlight. It is mainly used in the production of disposable and reusable bags. As starting materials for composting, various organic waste was used to which specific biodegradable plastic products were added. Bioplastics are products based on potato starch, corn and other substrates. The organic waste used is divided into two groups, depending on their characteristics - food waste and green waste. During the composting process, the change in the properties and characteristics of both organic waste as well as the added biodegradable products and Polydegrelex is monitored. A model experiment was performed in five variants. Each variant includes a different ratio of organic waste to which samples of different bioplastic products and Polydegrelex have been added. The experience is set as a vessel by the method of active aerobic composting by periodic aeration (mixing) and maintaining optimal humidity. For all the variants of the experiment, are analyzed (for 5 months), representative microbiological, chemical and physical parameters of the compostable materials. The microbiological analyzes of each variants were performed in the dynamics by dilution method by plating solid media, in triplicate. Traceable and analyzed are representative microbiological indicators - dynamics and change of the microbial communities during the different phases of the composting process - mesophilic, thermophilic and phase of maturation. The results of the study show a different quantitative and qualitative composition of the microflora in the individual variants. A larger microbial number was observed in the samples with food waste as compared to the green waste samples. During the composting process, nonspore-forming bacteria dominate. The composting of biodegradable plastic products does not have a negative impact on the microbial populations typical of this process. Moreover, biodegradable plastic products are an additional food base for microorganisms. By increasing the mass of biodegradable plastic waste to the total mass of waste, the microbial number increases. The results obtained show that the microbiological activity is enhanced in the presence of biodegradable plastic products and is weakened in the presence of oxo-degradable plastics products.

Recent Publications:

1. Participation in Sixth National Youth Conference "Management and Sustainable Use of Biological Resources" with Article "Are the biodegradable plastic waste compostable at home and have they an impact on the quality of the finished compost?"

Biography

Bilyana Grigorova-Pesheva has completed hers Master degree at the age of 29 years from University of Forestry and now she is PhD student - in the process of training/ qualification in the Microbiology Department, in particular "Soil Microbiology". She takes an active part in a number of ecological projects and prepares a number of reports related to the environment protection. "This document was supported by the grant No BG05M2OP001-2.009-0034-C01, funded by the Science and Education for Smart Growth Operational Program (2014-2020) and co-financed by the EU through ESIF."

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