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Comparison of the bio stimulating capacity of degradation of Poly(3-hydroxybutyrate) by forage plants and microorganisms in simulated soil

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Polyhydroxybutyrate [P(3HB)] is a microbial polyester and possess characteristics adequate to petrochemical plastics substitution as polypropylene. It is completely biodegradable and the speed of degradation depends on environmental characteristics as microbiota, temperature and humidity. So, we measured the degradation rate of P(3HB) synthesized by the bacterium *Ralstonia solanacearum* [P(3HB) RS] in a simulated soil model. The aim of the study was to evaluate the degradation capability effectiveness of the bacteria *Ralstonia solanacearum* and *Bacillus megaterium* CN3 and the bacterial degradation bio stimulating capability of the foraging plants *Lolium multiflorum* (Ryegrass) and *Lotus corniculatus* (Birdsfoot trefoil). With P(3HB) RS, produced by bacterium *Ralstonia solanacearum* RS and commercial P(3HB) Biocycle® [PHB Industrial S.A., Brazil] (control), films were produced by solubilizing up 1g in 40 mL of chloroform for 30 min at 58 °C and evaporation in petry plate to film formation. Samples were cut, weighed and separated into polyester bags with three samples each and buried in the soil to be removed at intervals of 20, 40, 60, 80 and 100 days. Trays for plant germination, containing individual cells full of commercial organic soil were used. The soil treatments were: (1) Natural soil grown with both plants, (2) natural soil grown with ryegrass, (3) natural soil grown with Birdsfoot trefoil, (4) natural soil without plants, (5) sterilized soil, (6) sterilized soil inoculated with R. *solanacearum*, (7) sterilized soil inoculated with B. *megaterium*, and (8) only natural soil. The plants used did not stimulate the biodegradation, but despite that, they helped in the fragmentation of the sample. For bacterial treatments, it was possible to affirm that B. *megaterium* is a more effective polymer degrader. Moreover, we can attest that polymer degradation is more effective in a microbiologically more favorable environment, since the treatment of unsterile soil without plants (trat.8) obtained the highest rate of degradation (100%).

Biography

Matheus Marques Torres is currently pursuing Bachelor's degree in Biotechnology at the Federal University of Pelotas, Brazil. He has developed his research activities in the Laboratory of Biopolymers where he works with studies related to the production, characterization and biodegradation of the bioplastic polyhydroxybutyrate (P(3HB).

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