PROSPECTING THE PRODUCTION OF BIOPOLYMERS OF BACTERIAL CULTURES PRESERVED IN THE COLLECTION OF MULTIFUNCTIONAL MICROORGANISM CULTURES OF EMBRAPA TEMPERATE CLIMATE

Author(s) Ane Gerber Crochemore[2,1], Maria Laura Turino Mattos[1], Claire Tondo Vendrusculo[2], Luis Antônio Suita de Castro[1]

Institution(s) 1. CPACT, Embrapa Clima Temperado, BR 392 km 78 96001970 Pelotas, RS, Brasil 2. UFPel, Universidade Federal de Pelotas, Campus Universitário, s/nº , PO Box 354, 96010-900, Pelotas, RS, Brasil

Abstract:

Bioprospecting can be defined as a new form of exploration of the biological natural resources, having as the principal aim the search for genetic and biochemical resources for commercial use. A great deal of research involving microorganisms has been developed with the objective of bioprospecting, for example, the bioremediation of degraded areas, the production of probiotics, effluent treatment, and production of polymers. A variety of microorganism is capable of accumulating polyhydroxyalkanoates (PHAs), which are polyesters and have great biotechnological potential, possibly being utilized as a raw material for several products, such as: biodegradable plastic packaging, medical prosthesis and suture threads, inoculant substrates, and as a matrix for controlled release of drugs or pesticides. These biopolymers are attractive in that they can be totally degraded into CO2 and water, can be obtained from renewable carbon sources, and have properties similar to polypropylene. PHB (polyhydroxybutyrate) is the most studied polymer in the family of PHAs, and is the easiest to be synthesised by microorganisms. The objective of this work was to prospect the PHB production capacity of the pesticides degrading bacterial cultures preserved in the Collection of Multifunctional Microorganism Cultures of Embrapa Temperate Climate (CCMMECT). For visualisation of biopolymer in the interior of the cells, the bacteria were cultivated in nutritive agar with 5% sucrose for 48 hours in an incubation chamber at 28ºC. Fourteen species of Pseudomonas were selected for evaluation by means of the technique of coloration with Sudan Black (CSB). The positive results for CSB were analyzed by transmission electronic microscopy seeking the confirmation of the presence of granules. As a positive standard for the production of PHB the strain Bacillus megaterium from CCMMECT was utilized. The presence of dark spots in the interior of the carbofuran degrading species CMM41, CMM42, CMM43 and CMM44 was observed by means of optical microscopy, indicating the stored polymer. Micrographs confirmed the presence of granules in these species. By means of microscopy, both optical and electronic, it was possible to detect the storage of PHB by the Pseudomonas species, thus verifying the capability of these strains to produce this biopolymer in a nutritional environment with excess carbon.

Key words: Polyhydroxybutyrate, Bioprospecting, Bacterial, Degrading, Pesticide