TITLE: EVALUATION OF *Yarrowia lipolytica* GROWTH IN THE PRESENCE OF POLY (ETHYLENE TEREPHTALATE) (PET) PRODUCTION CHAIN MOLECULES

AUTHORS: COSTA, A.M.; CASTRO, A.M.; COELHO, M.A.Z.

INSTITUTION: UNIVERSIDADE FEDERAL DO RIO DE JANEIRO, RIO DE JANEIRO, RJ (AVENIDA ATHOS DA SILVEIRA RAMOS,149, BLOCO E, LABORATÓRIO E-103, ILHA DO FUNDÃO, CEP 1949-900, RIO DE JANEIRO – RJ, BRASIL)

ABSTRACT: Poly(ethylene terephthalate) (PET) is one of the most consumed plastics in the world, whose production was about 56 million tonnes in 2013. Most plastic products are persistent in the environment due to the absence or low activity of enzymes that can degrade their constituents. Once microorganisms with the necessary enzymatic machinery to degrade PET were identified, they could serve as an environmental remediation strategy as well as a degradation and/or a fermentation platform for the biological recycling of PET waste. This study investigated the *Yarrowia lipolytica* growth and the consumption profile of PET production chain molecules by using polymer itself and its oligomers - terephthalic acid (TPA), bis (2-hydroxyetyl) terephthalic (BHET), monoethylene glycol (MEG) - in a media with and without glucose (YPD or YP media), aiming the development of a process for valorization of the post-consumer PET. The experiments was inoculated with 1 g/L of *Y. lipolytica* cells previously cultivated in YPD media (w/v: 2% peptone, 2% glucose and 1% yeast extract) for 72 hours. The flasks were incubated for 96 hours in an orbital shaker at 160 rpm and 28 °C. The cellular growth was monitored by *spectrophotometer* absorbance measurements at 570 nm. The results indicated that all experiments presented the same behavior until 36 hours. After this period, the experiments with glucose presented superior growth. The assays with YPD media showed exponential growth, reaching 12.30 g/L (YPD + BHET) after 96 hours of experiment. This is due to the presence of an easily assimilated substrate, such as glucose, with which the metabolism becomes more accelerated when compared to tests without this carbon source (6.73 g/L - YP + MEG). When compared to the control experiments, the assays that had particulate substrates in their composition showed inferior growth. This may be related to the ability of *Y. lipolytica* to adhere to solid substrates, thereby reducing the concentration of free cells in the suspension. The enzymatic hydrolysis of PET in the cultures was quantified by HPLC analysis and the results showed little variation in the aromatic products concetration throughout the cultures. In addition, it presented a competitive inhibition between MHET and BHET products, indicating a lower degradability of MHET. This inhibition may have occurred because of the ester bonds of MHET and BHET, which occupied the enzyme binding site.

Keywords: lipase, PET, submerged fermentation, yeast

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