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Production of polyhydroxybutyrate using renewable carbon sources by the extremely halotolerant bacterium *Halomonas elongata* DSM 2581^T

Andreea-Melisa Tripon[1], Adorján Cristea[1]✉,
Timea Kristea[1], Călin Gabriel Floare[2] and Horia Leonard Banciu[1]

[1] *Babeş-Bolyai University, Faculty of Biology and Geology, Department of Molecular Biology and Biotechnology, Cluj-Napoca, Romania;* [2] *National Institute for Research and Development of Isotopic and Molecular Technologies, Department of Biomolecular and Molecular Physics, Cluj-Napoca, Romania;* ✉***Corresponding author: E-mail:*** ***adorjan.cristea@ubbcluj.ro***.

Abstract

Polyhydroxybutyrate (PHB) is a natural polyester which is produced under nitrogen and/or phosphorous limitation and excess of carbon (C) source. Under these conditions, the C source is converted to PHB and stored as intracellular C and energy reserves. PHB derivatives might be used as alternatives to synthetic plastics due to their biodegradability and biocompatibility. The aim of this study was to assess the ability of the extremely halotolerant bacterium *Halomonas elongata* DSM 2581^T to synthesise PHB from two renewable C sources namely industrial (IM) and commercial molasses (CM). To induce PHB production, a liquid mineral medium with high salinity (8% w/v NaCl) was used. Three C sources where used separately in the experiments (final concentration of C-source 1% w/v) (D-glucose – as control, IM and CM) and 0.1% w/v yeast extract. Batch cultures were incubated at 37^{o}C and 180 rpm. For cell count and PHB visualisation, DAPI and Nile Red staining where employed. ^{1}H-NMR spectroscopy and crotonic acid assay were used for the chemical analysis of the PHB (Cristea *et al*., 2018). The highest PHB yield was obtained after 96 h of growth on D-glucose (2.61 g/L), followed by CM (2.63 g/L after 90 h) and IM (1.07 g/L after 48 h). The weight percentage (wt%) of PHB fraction was 85% when cultivation occurred on CM, 86% on D-glucose and 35% on IM. Our preliminary results have showed that this strain could use renewable C sources (like molasses) to produce PHB that may be further applied in sustainable circular economy strategy.

Keywords: *Halomonas elongata*, high salinity, molasses, polyhydroxybutyrate, renewable source.

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