



Research article

## Batch and fed-batch production of polyhydroxyalkanoates from sugarcane molasses by *Bacillus flexus* Azu-A2

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### Abstract

Production of bioplastic has recently attracted great interest as an environmentally friendly alternative to petrochemical plastics. The present study aimed at production of polyhydroxyalkanoates (PHAs), a biodegradable thermoplastic, from agro-industrial wastes by potent bacterial isolates. Ninety-six isolates were obtained from different localities in Egypt and assayed for qualitative and quantitative production of PHA using sugarcane molasses. Bacterial isolate AZU-A2 showed the highest production of PHA. This strain was identified as *Bacillus flexus* strain AZU-A2 by 16S rRNA gene sequence and biochemical characterization. Physiological and nutritional factors affecting PHA production were optimized in batch fermentations. Agitation rate, supplementation of acetic acid as an auxiliary carbon source, and ammonium chloride as nitrogen source were critical factors affecting fermentation of PHA production. Maximum production of 3.97 g/L PHA with recovery yield of 88.0 (% w/w) was achieved after 24h in batch fermentation in optimized medium. A maximal PHA production of 6.13 g/L at recovery yield of 92.1 (% w/w) was obtained in fed-batch fermentation. The characteristics of extracted PHA were analyzed using <sup>1</sup>H-NMR, <sup>13</sup>C-NMR and FTIR spectroscopy techniques.