



ABSTRACT

The present study deals with the fermentation strategy to enhance the production of polyhydroxybutyrate (PHB) by mutant strain of *Bacillus licheniformis* from pre-treated corn cobs using black-strap molasses as moisture content. Results of raw and pre-treated substrate were obtained and compared. Pre-treatment of corn cobs was done using HCl, NaOH and aq. ammonia. PHB production of 0.36 ± 0.018 , 0.35 ± 0.018 and 0.22 ± 0.007 g/l was obtained using 15mM aq. ammonia, 0.6 N HCl and 0.2 N NaOH. Various culture parameters were optimized in order to enhance the production of PHB. The highest PHB accumulation was achieved when 7.5 and 5 g raw and pre-treated substrate were moistened with 25 ml molasses and inoculated with 1.5 ml inoculum. Incubation was done at 37°C for 48 h. The thermophilic behaviour and effect of stabilizers (L-ascorbate and polyethylene glycol-4000) were evaluated on PHB production. The maximum PHB production of 0.34 ± 0.034 and 0.68 ± 0.034 g/l was observed at a temperature of 37°C by raw and pre-treated substrate, respectively. However, PEG-4000 was found to be an effective stabilizer of PHB and gave 0.59 ± 0.030 and 1.09 ± 0.032 g/l by raw and pre-treated substrate, respectively. Different recovery processes (NaOCl, H₂SO₄ and organic solvents) were done in order to extract PHB. PHB production of 0.69 ± 0.055 and 1.18 ± 0.059 g/l was obtained at 1.5 (% v/v) NaOCl conc. by raw and pre-treated substrate, respectively. Whereas, PHB production of 0.76 ± 0.061 and 1.15 ± 0.058 g/l was observed at 7.5 (% v/v) H₂SO₄ conc. by raw and pre-treated substrate, respectively. Chloroform gave the maximum PHB production of 0.76 ± 0.114 and 1.15 ± 0.115 g/l by raw and pre-treated substrate, respectively. After pre-treatment of corn cobs with HCl and aq. ammonia, an overall enhancement of 2.05 fold and 2.25 fold was observed which is highly significant. Thus, pre-treated corn cobs can be considered as good substrate for large scale production of low cost and eco-friendly bioplastics.