

Evaluation of factors affecting polyhydroxyalkanoates production by *Comamonas* sp. EB172 using central composite design

ABSTRACT

Aims: Statistical approach, central composite design (CCD) was used to investigate the complex interaction among temperature (25-37 °C), initial medium pH (5-9), inoculum size (4-10 % (v/v)), concentration of (NH₄)₂SO₄ (0-1 g/L) and concentration of mixed organic acids (5-10 g/L) in the production of polyhydroxyalkanoates by *Comamonas* sp. EB172.

Methodology and Results: Mixed organic acids derived from anaerobically treated palm oil mill effluent (POME) containing acetic:propionic:butyric (ratio of 3:1:1) were used as carbon source in the batch culture of *Comamonas* sp. EB172 to produce polyhydroxyalkanoates (PHAs). The analysis of variance (ANOVA) showed that all five factors were significantly important in the batch fermentation by shake flask with a P value of less than 0.001. The optimal temperature, initial medium pH, inoculum size, concentration of (NH₄)₂SO₄ and concentration of mixed organic acids were 30 °C, 7.04, 4.0 % (v/v), 0.01 g/L and 5.05 g/L respectively.

Conclusion, significance and impact of study: Optimization of the production medium containing mixed organic acids has improved the PHA production for more than 2 folds. Under optimal condition in the shake flask fermentation, the predicted growth is 2.98 g/L of dry cell weight (DCW) with 47.07 wt % of PHA content. The highest yield of PHA was 0.28 g of PHA per g mixed organic acids.

Keyword: Central composite design; *Comamonas* sp. EB172; Optimization; Polyhydroxyalkanoate; Response surface methodology