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ACCEPTED MANUSCRIPT

Bioconversion of plant biomass hydrolysate into bioplastic (polyhydroxyalkanoates) using *Ralstonia eutropha* 5119

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Abstract

Pretreatment of lignocellulosic biomass results in the formation of byproducts (furfural, hydroxymethylfurfural [HMF], vanillin, acetate etc.), which affect microbial growth and productivity. Furfural (0.02%), HMF (0.04%), and acetate (0.6%) showed positive effects on *Ralstonia eutropha* 5119 growth and polyhydroxyalkanoate (PHA) production, while vanillin exhibited negative effects. Response optimization and interaction studies between the variables glucose, ammonium chloride, furfural, HMF, and acetate using the response surface methodology resulted in maximum PHA production (2.1 g/L) at optimal variable values of 15.3 g/L, 0.43 g/L, 0.04 g/L, 0.05 g/L, and 2.34 g/L, respectively. Different lignocellulosic biomass hydrolysates (LBHs), including barley biomass hydrolysate (BBH), *Miscanthus* biomass hydrolysate (MBH), and pine biomass hydrolysate (PBH), were evaluated as potential carbon sources for *R. eutropha* 5119 and resulted in 1.8, 2.0, and 1.7 g/L PHA production, respectively. MBH proved the best carbon source, resulted in higher biomass ($Y_{x/s,}$ 0.31 g/g) and PHA ($Y_{p/s,}$ 0.14 g/g) yield.

Keywords: Biomass; biopolymer; furfural; hydroxymethylfurfural; polyhydroxyalkanoate

1. Introduction

Modernization and industrialization have led to a continuous increase in the demand for plastic, resulting in environmental pollution owing to the non-biodegradable nature of plastics

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