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IMPROVEMENT OF BUTYRIC ACID PRODUCTION IN *Clostridium tyrobutyricum* BY SURFACTANT FOR DETOXIFICATION OF LIGNOCELLULOSE HYDROLYSATES

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Abstract

Phenolic compounds generated from lignocellulsic biomass during pretreatment and hydrolysis process inhibit the growth of Clostridia so that reduce the final concentration of fine metabolites produced by them. Here, we evaluated inhibition effects of *p*-coumaric acid, ferulic acid, vanillin, syringaldehyde, and soluble lignin as model phenolics on the growth and butyric acid production of *Clostridium tyrobutyricum* ATCC 25755, and developed a simple and inexpensive method by adding Tween 80 to the culture to eliminate the inhibition property of phenolics. The growth and butyric acid production were gradually decreased to the half levels compared with the negative control in proportion to the addition of ferulic acid, vanillin, and syringaldehyde up to 1.0 g/L as final concentration. It did not grow at all in the medium containing 0.5 g/L of *p*-coumaric acid even though the growth and butyric acid production showed slightly decreasing tendency in the range of 0-0.25 g/L. In case of soluble lignin, only 1.0 g/L reduced the growth and butyric acid production to the half. In the co-presence of 1.0 g/L of Tween 80 with 1.0 g/L of *p*-coumaric, ferulic acid, or souble lignin in the cultures, both the growth and butyric acid production were improved. In cases of soluble lignin, cell growth and butyric acid productions compared with control were totally recovered. However, the addition of Tween 80 did not improve the growth and butyric acid production at all in the vanillin or syringaldehyde containing medium. In case of rice straw and MWW hydrolysate, butyric acid production increased up to 17% and 8% in presence of the 1 g/L of surfactant, respectively. Hence, the surfactant could be applied for the detoxification of phenolic compounds towards biofuels production from lignocellulosic hydrolysates.