Optimization of Cultivation Conditions for Iturin A Production by Bacillus subtilis Using Submerged Cultural Fermentatio

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ABSTRACT

Bacillus subtilis was used as a biocontrol agent to suppress plant fungal pathogens. The secondary metabiolite, iturin A, which produced by B. subtilis consists of a peptide ring of seven amino acids. The iturin A exhibits a strong antifungal, and antibacterial activity as well as biosurfactant property. The applications of this compound have been limited due to its poor production yield. The purpose of this research was to study the optima production of iturin A of B. subtilis by using the response surface method (RSM) in submerged cultural fermentation. In the shake flask study, the glucose was found to be the best carbon source for the concentration of iturin A among several carbon sources including glucose, fructose, sucrose and maltose. On the other hand, the corn steep powder was the better nitrogen source in the selected testing nitrogen source such as soybean albumen, yeast powder, peptone special and corn steep powder. In the mutual experiment of potassium phosphate and magnesium sulfate, we found that magnesium sulfate has the apparent effect to improve the production of iturin A. the optima compositions of iturin A from the RSM was pH 4.5, 0.93% dextri-maltose, 1.11% glucose, 0.72% C.S.P, 1.5 mM MgSO4, 0.75 mM KH2PO4, rotation speed 181 rpm and area of aeration 4.35 cm2. By using the 5-L fermentor, it is help of the growth of B. subtilis and production of iturin A that improve rotational speed. In the experiment with different air flow rate, there is better production of iturin A in high aeration of 2 vvm. In the experiment with different baffles, there have the batter KLa and the best production of iturin A (about 112.12 mg/L) when adding baffle 1 in the fermentor.

Keywords : Bacillus subtilis ; submerged cultural fermentation ; iturin A ; response surface method

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