Production of Curdlan by Agrobacterium sp.

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ABSTRACT

Curdlan is a water-insoluble polysaccharide composed exclusively of β-1,3-linked glucose residues、and synthesized mostly by Agrobacterium sp. and Alcaligenes faecalis under nitrogen-limiting conditions. Curdlan was produced by culture fermentation using Agrobacterium sp. in this study. Five different carbon sources (glucose、sucrose、fructose、lactose and maltose) and four different nitrogen sources (ammonium chloride、sodium nitrate、urea and yeast extract) were selected for study. Sucrose and urea were found to be the most efficient carbon and nitrogen sources、respectively. The effect of dissolved oxygen level on production of curdlan by Agrobacterium sp. was investigated. As aeration rate increased from 0.5 to 2.0 L/min、both cell concentration and curdlan production increased、indicating that higher oxygen transfer efficiency is required for a higher production of curdlan. In addition、the pH control was important for curdlan production with Agrobacterium sp. Specific cell growth rate was the highest at pH 6.6、while the specific curdlan production rate occurred at pH 5.5. Therefore、it is important to increase curdlan productivity by manipulating the environmental conditions to minimize its production cost. The purified sample was characterized by fourier transform infrared（FTIR）spectroscopy and nuclear magnetic chromatography（NMR）. The results show that the purified sample from the fermentation liquid was curdlan. It is found that sucrose、urea and pH value are the most important factors in the single factor experiments. The optimal conditions for maximization of curdlan production by Agrobacterium sp. were identified. Response surface methodology (RSM) was applied to optimize the medium composition. A study of complex interactions among sucrose concentration (56-224 g/L)、nitrogen concentration (0.05- 4.75 g/L) and pH (4-11) was carried out using central composite design (CCD). The optimal composition consisting of 143 g/L sucrose、0.47 g/L urea and phosphate buffer 7.5 predicted a curdlan production of 5.13 g/L、which was 7.3％higher than that of the control medium.

Keywords : Agrobacterium sp.、curdlan、Central composite design (CCD),Response surface methodology (RSM)

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