PRODUCTION OF MICROBIAL GELLAN USING DIFFERENT FERMENTATION METHODS

BY

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B.Sc. Agric. Sc. (Agric. Microbiology) , Ain Shams University , 2003

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إنتاج الجيلان الميكروبي باستخدام طرق تخميرية مختلفة

رسالة مقدمة من

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ABSTRACT

Shimaa Kamel Ali Mohamed: Production of Microbial Gellan Using Different Fermentation Methods. Unpublished M.Sc. Thesis, Department of Agricultural Microbiology, Faculty of Agriculture, Ain Shams University, 2009.

Gellan gum is a microbial polysaccharide commercially produced by fermentation with *Sphingomonas paucimobilis*. Due to its good rheological characteristics, gellan gum has wide application in food, pharmaceutical, industrial and bioremediation of contaminated soils and aquifers.

In the present study, a number of 80 yellow pigmented gram negative short rod isolates were collected and tested for gellan production. Only five isolates were selected as high efficient gellan producing bacteria and identified as *Sphingomonas paucimobilis*. In a series of experiments on gellan production, sucrose- nitrate medium **(Ashtaputer and Avinash, 1995)** was modified by replacing potassium nitrate with sodium nitrate as sole nitrogen source for highest gellan production after 3 days fermentation period at 28°C using shake flasks as a batch culture.

Different treatments of cane molasses and corn steep liquor gave lower viscosity than modified med.3, whereas the highest gellan yield and productivity being 12.66 % and $0.032 g l^{-1} h^{-1}$ were obtained by *S.paucimobilis* RNS4 by decreasing the crude sweet whey concentration from 87 % to 40 % as whole productive medium.

Biological activity of *S.paucimobilis* RNS4 was studied in bioreactor as a batch, fed batch and continuous culture. In batch culture, 40 % sweet whey were saturated with 60 % air and agitated at 750 rpm resulted to increase the gellan yield and productivity by *S.paucimobilis* RNS4 to 3.19 fold, respectively as compared with that obtained in shake

flasks technique. Using the continuous feeding of sugar sweet whey at 1.53gh^{-1} was favorable than pulsed feeding for gellan production in fed batch culture. In continuous culture, at 0.055 h^{-1} dilution rate, the values of gellan parameters recorded by *S. paucimobilis* RNS4 on 40 % crude sweet whey were 24.34 %, 26.54 % & 0.337 gl^{-1}h^{-1} for gellan yield , conversion coefficient and gellan productivity. This technique increased the produced gellan by 3.3 & 1.5 fold as compared to that produced by batch and fed batch culture techniques.

Key Words: Gellan gum, *Sphingomoas paucimobilis*, shake flasks, bioreactor, batch culture, fed batch culture, continuous culture, viscosity and medium composition

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