TỐI ƯU THÀNH PHẦN MÔI TRƯỜNG LÊN MEN TỪ DỊCH THỦY PHÂN BÃ THẢI NHÀ MÁY BIA LÀM MÔI TRƯỜNG LÊN MEN VI KHUẨN Bacillus thuringensis SINH PROTEIN DIỆT RUỒI NHÀ

Optimization of Fermentation Medium Compositions from Brewer's Grains Waste of Beer manufactory for *Bacillus thuringiensis* MSS8-4 Crystal Protein Production

Phạm Thùy Dương[1], Ngô Đình Bính[2], Lê Đức Khánh[3] và Chu Kỳ Sơn[4]

[1]Trường Đại học Phương Đông; [2]Viện Công nghệ sinh học - Viện Hàn Lâm KH&CN Việt Nam; [4]Viện Bảo vệ thực vật 4. Trường Đại học Bách khoa Hà Nội

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Abstract

Optimization of medium compositions from brewer's grainswaste of beer manufactory for crystal protein production by *Bacillus thuringiensis* was investigated in flask fermentation. Its composition consisted of wastewater sludge hydrolysis broth with several agricultural byproducts (rice bran, soybean meal, corn flour, chicken feathers) and mineral salts ($MgSO_4.7H_2O$; K_2HPO_4; KH_2PO_4; $MnSO_4.7H_2O$; $CaCl_2$; NaCl). Soybean meal and $MgSO_4.7H_2O$, and $MnSO_4.7H_2O$ were all found to have a significant influence on crystal protein production. The optimal concentration of these three factors were then sequentially investigated using the response surface methodology with a central composite design. The resulting optimal medium components for delta endotoxin production were determined as follows: brewer's grainswaste (25 g/l, dry weight), $MnSO_4.7H_2O$ (0.05 g/l), MgSO4.7H2O (0.45 g/l), and soybean meal (3 g/l). Using this optimized fermentation media, the yield of delta endotoxin was increased by 22.7% to 529 mg/l compared with unoptimal medium. Viable cell and spore counts obtained in optimum fermented broth were 4.5×10^8 CFU/ml, 4.3×10^8 CFU/ml, respectively.

Keywords: brewer's grainswaste of beer manufactory *Bacillus thuringiensis*