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CELLULASE PRODUCTION AND PROTEIN EN RICHMENT OF CORN COB WITH TRICHODERMA ALBUM BY SOLID-STATE FERMENTATION

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INTRODUCTION Protein production from starch revealed that a conventional, solid-state fermentation (SSF) have greater than the submerged fermentation, because of its simple production methods and particularly, its reduced drying costs (1).
To be economically competitive, the boiconversion of cellulosic material into protein should be performed by a proceduce workable at the rural level, in a system combing side by side the production of the raw material, the fermentation process, and the direct utilization for animal feeding or human consumption. Solid state fermentation may reduce the cost of growing microorganisms on cellulosic wastes, increase the in vitro rumen digestibility, and increase the protein and fat content of the cellulosic wastes. From a technological point of view, a bioconversion process of solid-state fermentation should be performed with simple and appropriate equippment in a single operation. Therefore, a process of solid-state fermentation to enrich the protein content of cellulosic wastesand to investigate the activities of cellulolytic enzymes produced by Trichoderma album was studied.

MATERIALS AND METHODS Microorganisms: Trichoderma album was isolated by Professor T. Staron from T. viride that had high cellulosic activity and could degradate the cellulose (2). Medium: corncob 100g, $(NH_4)_2SO_4$ 9.4 g , urea 2.1 g ,KH_2PO_4 2.0 g, Staron solution 1.2 ml,H_2O 220ml pH 5.5-6.0 Enzyme assays: media were inoculated with 10ml spore suspensions obtained from cultures grown for 7 days in the Bharucha medium The extracellular cellulase and protein production were investigated during growth of T. album on corn cob in solid-state fermentation. Five grams of culture media was mixed with 20ml water of 0.1% Tween 80 solution. The mixture was shaken at 120 rpm in water both for 0.5 h. The supernatant of culture was obtained by centrifugated at 3000 rpm for 10 min and used for protein determination (3). Culture supernatants were clarified by centrifugation(3000rpm,10min)culture supernatants were detected CMCase, FPase, Avicelase, β -glucosidase acitivity respectively (4) and analyzed for reducing sugar with dinitrosalicylic acid (DNS) reagant (5).

RESULTS AND DISCUSSION The results of the soluble protein were increased in the eighth of culture days(10,236 mg/g of substrate). The pH values increased in the fourth of culture days. With respect to cellulase activities analysed in culture supernatants along the time of fermentation, as Table 2. shows, filter paper activity, carboxymethylcellulase and β -glucosidase avicelase were slightly increased by increasing cultural period. These result could thus be interesting from a economic point of view because with a more realistic substrate such as corn cob high enzyme activities can be obtained and can increase nutritional level in corn cob as animal feed with T. album.

Table 1. Moisture、ash contents and pH value in solid state fermentation with T. album

Cultivation period (days)	Moisture (%)	Ash(%)	pH
0	67.07	2.73	5.96
1	68.40	2.46	5.72
2	66.97	2.46	6.07
4	67.08	2.79	6.36
6	73.77	2.83	6.24

Table 2. Soluble protein(mg/ml), β -glucosidase,CMCase, FPase, Avicelase activity in solid state fermentation with T. album

Cultivation period (days)	Soluble protein	β -glucosidase	CMCase	FPasse	Avicelase
2	6.504	0.112	0.012	0.0029	0.024
4	5.624	0.050	0.006	0.0009	0.008
6	6.868	0.095	0.015	0.0013	0.011
7	8.392	0.118	0.014	0.0017	0.029
8	10.236	0.143	0.018	0.0018	0.012
10	10.736	0.140	0.020	0.0017	0.009

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