Study of milk-clotting proteases produced by local fungal strains: Use in cheese-making

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The coagulant traditionally used for cheese-making in most of the world is rennet extract from the fourth stomach of suckling calves. There have been temporary shortages of rennet in various countries, but a world chronic shortage occurred after. This has stimulated interest in the search for suitable substitutes for use as coagulants in cheese-making. Our work was carried out to study the production of extracellular milk-clotting enzymes by local fungal strains Aspergillus niger FFB1, Rhizopus stolonifer and Mucor sp. under SSF conditions using wheat bran as substrate, followed by the application of crude extracts in the manufacture of two kinds of cheese, compared to the commercial preparation of rennet used at “Laiterie et Fromagerie Boudouaou” (LFB). After fermentation using wheat bran (10g) at 30°C for 72h, the acid proteinases of A. niger FFB1 and R. stolonifer extracted with sterile distilled water (1:5w/v) present milk-clotting activities of 830SU/g and 504.6SU/g respectively. The maximum enzyme productivity of Mucor sp. (4800SU/g) was obtained under the optimum conditions of temperature (25°C), incubation time (96h), moisture content of solid substrate (43%) adjusted suitably with mineral solution (Czapek-Dox) of pH 3. The crude extract of A. niger FFB1 was applied in the production of the pressed and unripened cheese, where the others extracts (R. stolonifer and Mucor sp.) were used in the manufacture of cheese kind Edam using raw milk according to the conventional process of manufacture. The yields of cheese obtained by the commercial preparation and by the coagulating enzyme from A. niger FFB1 (a) differ only by 2.8%, where the organoleptic qualities of the two hard cheeses produced are very close. In the case of R. stolonifer (b) and Mucor sp. (c,c’), the yields cheese of 21.56g/l and 90.84g/l were obtained using the crude extract produced by this strain, where the commercial rennet gives a yield of 104.22g/l. The results obtained are encouraging and require more work to optimize the production procedure, but also pave the way to test the ability of the fungal crud extracts and the purified enzymes (acid proteases of A. niger, R. stolonifer and Mucor sp.: 47.7kDa, 43kDa and 36 kDa respectively) in the production of this kinds and other types of cheese.

Biography

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