納豆菌發酵產物之乳化及凝乳活性之探討

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摘 要

納豆是黃豆接種納豆菌絲發酵後之日本傳統食品，納豆含有很多有價值及有營養之生理活性物質。另外，納豆亦含有很多生物性高分子，如聚麩胺酸及果聚糖，及酵素。最近意外發現納豆萃取物具有乳化效果及凝乳效果。本研究因此製備液態及固態納豆，並且探討其乳化及凝乳之性質，液態納豆及固態納豆皆具有乳化活性，但固態納豆之乳化活性較高；相對的，果聚糖及聚麩胺酸則完全無任何乳化活性，但是納豆之乳化活性則較市售乳化劑低很多。 在凝乳活性方面，液態納豆及固態納豆皆具有良好之凝乳活性，但聚麩胺酸及果聚糖皆完全為凝乳活性，在凝乳發酵土，凝乳活性受操作條件及營養因子而影響；當納豆菌在含燕糖（50g/L），氧化納（10g/L），硫酸鎂（0.5g/L），磷酸二氫鈉（3g/L），及硫酸氫鈉（3g/L）之培養基中，培養條件為370C，pH6及175rpm培養一天時，可得最高之凝乳活性685.7 SU/ml或12,000 SU/g，其中凝乳活性及蛋白質水解活性之比率在液態實驗中為2,981，在固態實驗中為52,174。 凝乳活性物質在pH 5至pH 6之間相當穩定，當加熱至70°C時凝乳活性在五分鐘內活性完全消失，但在25°C至40°C則相當穩定。雖然納豆中凝乳酵素之凝乳活性較市售之凝乳?(如小牛之凝乳酵素及黑黴素之凝乳酵素) 之活性低，但是納豆菌是益生菌，以納豆菌生產之凝乳酵素應當仍有很高之商業應用價值。

關鍵詞 : 納豆菌 ; 枯草枯菌 ; 凝乳? ; 活化活性

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