羽毛分解微生物之角蛋白?〞滲S性研究 = Study on characterization of keratinases from feather-degrading microorganisms

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摘 要

從台灣彰化養雞場的羽毛廢棄物土壤中，篩選出3株具有分泌角蛋白?能力之羽毛降解微生物。分離出來的Wu3、Wu4和Wu5菌株，經由微生物菌種鑑定後，顯示分別與Bacillus cereus strain QD232、Brevibacillus parabrevis M3和Bacillus thuringiensis strain INBI-2菌株的16S rDNA基因序列有99%相似。故將這3株分別命名為Bacillus cereus Wu3、Brevibacillus parabrevis Wu4和Bacillus thuringiensis Wu5。這3株羽毛降解微生物之菌株，是以羽毛作為碳、氮源，於37°C下培養4天，產生一胞外角蛋白?。Bacillus cereus Wu3、Brevibacillus parabrevis Wu4和Bacillus thuringiensis Wu5角蛋白?以偶氮酪蛋白為基質，分別於pH 6.5-8.0、7.0-8.5和7.5-11.0的pH範圍下具有活性；而具有活性之溫度範圍分別為40-60、50-60和70-80°C。Bacillus cereus Wu3、Brevibacillus parabrevis Wu4和Bacillus thuringiensis Wu5角蛋白?最適pH與溫度分別為pH 7、8和9與60、50和70°C。金屬螯合劑EDTA和O-phenanthroline蛋白?抑制劑會對本研究角蛋白?之酵素活性造成影響，因此這3種角蛋白?皆金屬型蛋白?。發現於Bacillus cereus Wu3、Brevibacillus parabrevis Wu4和Bacillus thuringiensis Wu5角蛋白?中添加Ca2+、K+、Mg2+和Mn2+離子可增加酵素活性。另外，角蛋白?於不同溫度和鹼性環境下，不同的輔因子會對酵素穩定性造成影響，根據研究結果顯示，添加Ca2+或Mn2+離子可增加酵素對熱的穩定性。Bacillus cereus Wu3和Brevibacillus parabrevis Wu4角蛋白?以液態形式貯存於-20°C最具有穩定性，若以粉末形式存在於不同溫度下，酵素會快速失活。此外，添加一些有機溶劑和還原劑可增加酵素穩定性。特別是Bacillus cereus Wu3和Bacillus thuringiensis Wu5角蛋白?對於不同角蛋白質基質具有寬廣水解能力，像是雞皮、鵝毛和豬毛角蛋白質基質。以偶氮酪蛋白為基質Wu3、Wu4和 Wu5角蛋白?之Km值，分別為2.31、0.98和0.95 g/L。

關鍵詞 : 角蛋白?、羽毛廢棄物、金屬蛋白?

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