Chanaporn Trakunjae 2014: Induction of Xylanase in *Bacillus pumilus* DMKUB39 and *Microbispora siamensis* DMKUA 245^{T} and Production of Xylan-Degrading Enzymes by *Bacillus pumilus* DMKUB39 and *Bacillus amyloliquefaciens* DMKUB24 using Rice Straw as Raw Material. Master of Science (Microbiology), Major Field: Microbiology, Department of Microbiology. Thesis Advisor: Associate Professor Vichien Kitpreechavanich, Dr.Eng. 132 pages.

From 180 Gram's positive spore forming bacteria, *B. pumilus* DMKUB39 and *B. amyloliquefaciens* DMKUB24 were selected as its highest producers of ß-xylanase (10.7 U/ml) and ß-xylosidase (7.9 U/ml), respectively idn the liquid medium containing alkaline treated rice straw. The effect of diffent carbon source on the ß-xylanase induction was investigated by the selected isolate of *B. pumilus* DMKUB39 and *M. siamensis* DMKUA245^{T} which a novel specie of produced ß-xylanase. Xylan was found to be the best inducer on the ß-xylanase production yielded 17.7 and 9.4 U/ml, respectively. The addition of glucose to the xylan medium affected the increase of ß-xylanase production with 1.1 fold increased by *B. pumilus* DMKUB39. While the addition of manitol to the xylan medium affected an increase of ß-xylanase production with 1.8 fold increased by *M. siamensis* DMKUA245^{T}. In contrast, the addition of xylose to the xylan medium resulted in a decrease of ß-xylanase production with 1.3 and 1.1 fold by *B. pumilus* DMKUB39 and *M. siamensis* DMKUA245^{T}, respectively. To optimize the production of ß-xylosiase and ß-xylanase, the mixed culture strains of *B. pumilus* DMKUB39 and *B. amyloliquefaciens* DMKUB24 were investigated using Plackett–Burman (PB) experimental design, central composite design (CCD) and response surface methodology (RSM). The optimized medium for ß-xylanase production consisted of (g/l): NaOH-pretreated rice straw, 18.7; peptone, 2.0; $MgSO_4.7H_2O$, 0.3 and initial pH 8.3 could enhance ß-xylanaseproduction to 21.1 U/ml. The optimized medium for ß-xylosidase production consisted of (g/l): NaOH-pretreated rice straw, 20.1; peptone, 2.0; $MgSO_4.7H_2O$, 0.28 and initial pH 8.03 could enhance ß-xylosidase production to 31.2 U/ml. The maximal ß-xylanase and ß-xylosidase production of 49.3 and 46.1 U/ml in a 1L stirrer fermentor were obtained from the optimized medium of each enzyme production. The optimum temperature of ß-xylanase and ß-xylosidase were 50 and 55°C, respectively. The optimum pH of ß-xylanase and ß-xylosidase were 5.0 and 5.5, respectively. The ß-xylanase and ß-xylosidase were stable at temperature of 65 and 60°C and pH of 5.0-11.0 and 4.5-11.0, respectively. However, the ß-xylanase and ß-xylosidase activity remained when kept at 75 °C and 70 °C for 1 h.

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