Pantida Treeyoung 2006: Xylitol Production by Thermotolerant Methylotrophic Yeasts Isolated in Thailand. Master of Science (Microbiology), Major Field: Microbiology, Department of Microbiology. Thesis Advisor: Mrs. Nantana Srisuk, Ph.D. 145 pages.
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Thirty-eight isolates of methylotrophic yeasts capable to use methanol for growth at 37°C were isolated from 71 natural samples. Among these, 24 isolates showed good growth when cultivated in 1% (v/v) methanol broth at 37°C. These 24 isolates as well as 39 isolates obtained from the previous screening for methylotrophic growth at 37°C were screened for xylitol production at 37°C and 40°C. Seven isolates showed the ability to produce xylitol at 37°C and five of them also produced xylitol at 40°C.

Xylitol production of those five methylotrophic yeasts was studied. Results indicated that the isolate N22 was the best producer of 4.7 and 4.1 gram xylitol per liter when cultivated at 37°C and 40°C, respectively. The isolate FS96 also showed good yield of xylitol produced at 37°C. However, lower yield of xylitol was found when cultivated this isolate at 40°C. The isolate N22 was therefore selected for the optimization of xylitol production. In addition, this isolate was identified as thermotolerant methylotophic yeast based on its higher maximum specific growth rate observed at 30°C compared to those observed at 37°C and 40°C.

The highest xylitol productivity was observed in shake-flask culture using the optimized medium containing 1.5% (v/v) methanol, 100 gram per liter of xylose, 5 gram per liter of casamino acids, 0.5 gram per liter of $MgSO_4.7H_2O$ and adjusted the pH to 7. Using this medium, the isolate N22 produced 52.3 gram xylitol per liter (0.54 gram xylitol per gram xylose) after 12 days of cultivation at 37°C. To optimize the aeration rate, 1 liter of the optimized medium was used for xylitol production in 2.5 liter fermenter. Results showed that the aeration rate of 1.75 vvm gave the highest xylitol production, i.e., 82.8 gram xylitol per liter (0.83 gram xylitol per gram xylose) after 11 days of cultivation at 37°C. This indicated that xylitol production by the isolate N22 increased by 16.6 folds compared to the results obtained prior to the optimization. Xylitol production of this yeast under the optimized conditions but incubated at 40°C was appeared to be not much lower than that was observed at 37°C after 11 days of cultivation (80.8 gram xylitol per liter equivalent to 0.81 gram xylitol per gram xylose).

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