หายไปหรือตรวจไม่พบ ซึ่งอาจเกิดจากการดูดซับไว้ของเซลล์ และการก่อตัวเป็นสารแขวนลอยของเบนซาลดีไฮด์-เซลล์ ระหว่างผิวหน้าที่สัมผัสกันของชั้นน้ำ/ชั้นสารอินทรีย์ในระบบที่ผลิต PAC ได้น้อย

Thesis Title The Production of Ethanol and Phenylacetylcarbinol from Dried Longan Extract and Digested Dried Longan Flesh Hydrolysate

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ABSTRACT

The selection of suitable addition strategy for three commercial enzymes, namely, a-amylase, carbohydrase and endo-xylanase using enzyme activity of 100 kNU (Novo α - amylase unit), 25 FBG (fungal beta - glucanase unit) and 500 FXU (fungal xylanase unit), respectively as well as 200 kNU, 50 FBG and 1000 FXU, respectively both with/without a pressurized steamer for digestion of dried longan flesh resulted in the optimal procedure was the one which adopted the simultaneous addition of all three enzymes. The highest specific sugar production level ($p \leq 0.05$) was obtained when 100 kNU, 25 FBG and 500 FXU, respectively either with or without pressurized steamer was employed (10.72 ± 0.10 and 10.70 ± 0.04 g sugar/g enzyme/l, respectively). For the commercial viability for specific sugars production, the implementation of all three enzymes at the same time without application of the pressurized steamer was the most economical statistically ($p \leq 0.05$) ($1,097 \pm 10$ μg/baht/l). The economical specific sugar production in this

case was higher than the situation where the pressurized steamer was employed by 3.3 folds.

The selection of suitable the digestion mixture ratio were subsequently investigated for digestion of dried longan flesh. The digestion condition with the dried longan flesh to acetic acid solution/sodium hydroxide solution ratio at 2:10 using of 2%(w/v) acetic acid solution and 0.1%(w/v) sodium hydroxide solution at 1:1 ratio resulted in the maximum increase of specific sugar production level ($p \leq 0.05$) of 11.33 ± 0.01 g/g/l. This condition was also the most commercially viable ($p \leq 0.05$) ($1{,}159 \pm 47$ μg/baht/l) in comparison with the other conditions.

The growth, sugars consumption, ethanol production kinetic study of *S. cerevisiae* TISTR 5606, *C. utilis* UNSW 709400 and 709700 in which dried longan extract (DLE) and digested dried longan flesh hydrolysate (DDLFH) medium were employed as the carbon sources with the addition of the ammonium sulphate in 5,000 ml scale were investigated. The resulted showed that *S. cerevisiae* TISTR 5606 in the condition of batch cultivation with DLE at 48^{th} h fermentation period could produce the highest level of dried biomass concentration (7.04 ± 0.07 g/l), the best sugar consumer (82.9 ± 2.0, 33.0 ± 0.8 and 38.0 ± 0.7 g/l for consumed sucrose, glucose and fructose, respectively), and could produce the highest level of ethanol production at 61.9 ± 5.5 g/l with the ethanol yield of 0.40 ± 0.04 g ethanol/ g sugars consumed. Fed batch system illustrated the toxicity effect of DDLFH medium in comparison to DLE medium. DDLFH medium feeding had a slower increasing trend of ethanol production than DLE medium.

PAC production from the utilization of whole cells biomass of *S. cerevisiae* TISTR 5606, *C. utilis* UNSW 709400 and 709700 cultivated in DLE and DDLFH medium with the addition of the ammonium sulphate in two-phase emulsion biotransformation system were carried out. The whole cells of *S. cerevisiae* TISTR 5606 from the condition of batch cultivation with DLE at 48^{th} h fermentation period could produce the highest overall concentration of PAC in both phases at 15.6 ± 0.5 mM. This PAC concentration level was significantly different ($p \leq 0.05$) from the whole cells harvested from condition of fed batch cultivation

with DLE and DDLFH at 60th h fermentation period (13.5 ± 0.7 and 11.7 ± 0.4 mM, respectively). The whole cells from *C. utilis* UNSW 709400 and 709700 in the conditions of batch cultivation with DLE at 48th h fermentation period and the condition of fed batch cultivation with DLE at 60th h fermentation period were able to produce PAC at the highest levels with the corresponding values between 7.59 – 10.1 mM. These were significantly different ($p \leq 0.05$) from the whole cells harvested from the condition of fed batch cultivation with DDLFH at 60th h fermentation period of 2.25 ± 0.06 mM (*C. utilis* UNSW 709400) and 3.43 ± 0.12 mM (*C. utilis* UNSW 709700), respectively. However, the certain lost/undetected concentration of substrate benzaldehyde was observed. This might be due to the absorption by cells and formation of the benzaldehyde-cells suspension between the interfacial layer of aqueous/organic phase in the system which generated a relatively smaller amount of PAC.