

## Intisari

Kinerja fermentasi etanol oleh *Saccharomyces cerevisiae* dipengaruhi oleh galur, substrat, dan sistem fermentasi yang digunakan. Nira sorgum manis berpotensi sebagai substrat kaya gula sederhana, sedangkan *sistem repeated batch* menawarkan efisiensi melalui pemanfaatan inokulum secara berulang. Namun, kinerja galur PA5 dan BB3 pada sistem ini belum banyak dilaporkan. Penelitian ini bertujuan mengevaluasi kinerja fermentasi etanol *Saccharomyces cerevisiae* galur PA5 dan BB3 pada sistem *repeated batch* menggunakan nira sorgum manis KCS105 dan FS510 sebagai substrat hingga sepuluh siklus fermentasi. Parameter kinerja diamati melalui laju evolusi CO<sub>2</sub> (metode manometri) dan kadar etanol (metode mikrodifusi). Hasil penelitian menunjukkan bahwa laju evolusi CO<sub>2</sub> dan produksi etanol pada kedua galur cenderung menurun seiring bertambahnya siklus fermentasi. Laju evolusi CO<sub>2</sub> spesifik tertinggi pada nira KCS dicapai oleh galur PA5 dan BB3 masing-masing sebesar 0,1099 dan 0,1080 L/jam, sedangkan pada nira FS oleh galur PA5 dan BB3 sebesar 0,1301 dan 0,1519 L/jam. Produksi etanol maksimum pada nira KCS diperoleh galur BB3 sebesar 5,93% (v/v) pada siklus ketujuh, sementara pada nira FS mencapai 7,73% (v/v) pada siklus ketiga. Berdasarkan kestabilan kinerja fermentasi, galur PA5 dan BB3 pada nira KCS layak digunakan sebagai inokulum berulang hingga siklus ketiga dan kelima, sedangkan pada nira FS masing-masing hingga siklus keenam dan ketiga.

Kata kunci: fermentasi etanol, *repeated batch*, *Saccharomyces cerevisiae*

### ***Abstract***

Ethanol fermentation performance of *Saccharomyces cerevisiae* is influenced by the yeast strain, substrate characteristics, and the fermentation system employed. Sweet sorghum juice represents a potential substrate rich in readily fermentable sugars, while the repeated batch fermentation system offers improved process efficiency through repeated utilization of the inoculum. However, the performance of *S. cerevisiae* strains PA5 and BB3 under this system has not been extensively reported. This study aimed to evaluate the ethanol fermentation performance of *S. cerevisiae* strains PA5 and BB3 in a repeated batch system using sweet sorghum juice KCS105 and FS510 as substrates for up to ten fermentation cycles. Fermentation performance was assessed based on the rate of CO<sub>2</sub> evolution (manometric method) and ethanol concentration (microdiffusion method). The results indicated that both the CO<sub>2</sub> evolution rate and ethanol production of the two strains tended to decrease with increasing fermentation cycles. The highest specific CO<sub>2</sub> evolution rates in KCS juice were achieved by strains PA5 and BB3 at 0.1099 and 0.1080 L h<sup>-1</sup>, respectively, whereas in FS juice the corresponding values were 0.1301 and 0.1519 L h<sup>-1</sup>. Maximum ethanol production in KCS juice was attained by strain BB3 at 5.93% (v/v) at the seventh cycle, while in FS juice it reached 7.73% (v/v) at the third cycle. Based on fermentation performance stability, strains PA5 and BB3 in KCS juice were suitable for repeated inoculum use up to the third and fifth cycles, respectively, whereas in FS juice they were suitable up to the sixth and third cycles, respectively.

Key words: Ethanol fermentation, repeated batch, *Saccharomyces cerevisiae*