

عنوان مقاله:

Optimizing bioethanol production from cassava peels through agitation timing variation in separate hydrolysis and co-fermentation

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خلاصه مقاله:

Background: This study assessed the effect of various agitation timings on bioethanol production from cassava peels (CP) using separate hydrolysis and co-fermentation (SHCF) technique. **Methods:** The milled CP was divided into three groups each of ۲۰ g and subjected to two-stage hydrolysis carried out at ۱۰۰ °C for ۶۰ min and ۵۰ minutes, respectively. Experimental layouts were Sample ۱ (B۱) [۰ hours i.e., no shaking], Sample ۲ (B۲) [۳ hours shaking with an electric shaker at ۲۰۰ rev/min-۱], and Sample ۳ (B۳) [۶ hours shaking at ۲۰۰ rev/min-۱]. Fermentations were carried out at ۳۰ °C for ۷۲ days. Data were analyzed using descriptive statistics, one-way ANOVA, and New Duncan's multiple range test at $P = ۰.۰۵$. **Results:** The TSS and pH readings of the treatment groups before and after fermentation were: B۱ – TSS (۲۷.۱۵ ± ۰.۱۵ , ۱۷.۲۵ ± ۰.۰۷ oBx), pH (۵.۵۰ ± ۰.۰۰ , ۴.۵۳ ± ۰.۰۴); B۲ – TSS (۲۷.۳۲ ± ۰.۰۸ , ۱۴.۷۸ ± ۰.۱۲ oBx), pH (۵.۵۰ ± ۰.۰۰ , ۴.۷۴ ± ۰.۰۶); and B۳ – TSS (۲۷.۱۷ ± ۰.۰۷ , ۱۰.۲۴ ± ۰.۰۸ oBx), pH (۵.۵۰ ± ۰.۰۰ , ۴.۷۷ ± ۰.۰۵) ($P < ۰.۰۵$). The mean fermentation efficiency (FE) and ethanol productivity (EP) were B۱ ($۱۵.۱۷ \pm ۰.۰۷\%$, ۰.۱۲۲ ± ۰.۰۰۱ gL-۱h-۱), B۲ ($۱۵.۷۰ \pm ۰.۱۸\%$, ۰.۱۲۶ ± ۰.۰۰۲ gL-۱h-۱), and B۳ ($۱۸.۸۰ \pm ۰.۱۴\%$, ۰.۱۵۱ ± ۰.۰۰۱ gL-۱h-۱) ($P < ۰.۰۵$). All treatment groups attained the maximum ethanol yields at ۷۲ hours of fermentation ($P < ۰.۰۵$). Agitation at ۲۰۰ rev/min-۱ for ۶ hours gave the optimal FE (%), EP, and ethanol yield. **Conclusion:** The established condition improved the Bioethanol quality and yield of CP. Thus, optimizing bioethanol production from CP would help enhance sustainable biofuel production without affecting food security.

کلمات کلیدی:

Ethanol, Fermentation, Hydrolysis, Saccharomyces cerevisiae, Sugars

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