

**EFFICIENCY OF ENRICHED MICROBIAL CONSORTIA FROM DIFFERENT NATURAL SOURCES ON CONSOLIDATED BIOETHANOL PROCESSING COMPARED TO SEQUENTIAL FERMENTATION**

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The efficiency of enriched microbial consortia from compost, cow dung, and coir retting water to degrade lignocelluloses, i.e., rice straw, corn straw, sawdust and their potential to produce bioethanol via Sequential Fermentation (SF) and Consolidated Bioprocessing (CBP) were investigated in this study. The microbial consortia were obtained by repeated four-day enrichment culturing of compost, cow dung and coir retting water in a basal medium containing the respective alkaline pretreated (1% NaOH) lignocellulosic substrate as the only source of carbon. Pretreated lignocelluloses were incubated with the three enriched microbial consortia separately and a mixture of the three (in equal proportions). The extent of lignocellulose biodegradation (w/w) was estimated by treating the filtered residue from the culture broth with acetic acid-nitric acid reagent after 5 days of incubation. Since rice straw exhibited the highest degradations of 66.70% and 58.12% by enriched microbial mixture and compost, respectively, rice straw was used to compare SF and CBP. For the SF, the culture broths were inoculated with 1% (w/v) yeast after 5 days of incubation, and for CBP, no inoculation was done. The bioethanol content (v/v) of both SF and CBP experiments was estimated on the eighth day after the initial inoculation by solvent extraction-dichromate oxidation method following absorbance at 595 nm using a UV spectrophotometer. Statistical analysis was done by one-way ANOVA ( $p < 0.05$ ) and Tukey's pairwise comparison using Minitab version 19.2. The highest bioethanol yield of 6.85% was detected by an enriched microbial mixture on rice straw via the SF pathway, probably due to the higher saccharification. Bioethanol yields of SF by enriched coir retting water, compost, and cow dung were 2.98%, 1.96% and 0.32%, respectively. Bioethanol production was not detected in CBP by any of the enriched microbial consortia. This could be mainly due to the absence of ethanologenic microbes in the enriched microbial consortia. Further research on microbial consortia having cellulolytic and ethanologenic properties is needed to compare CBP's efficiency with SF.

**Keywords:** Bioethanol, Consolidated Bioprocessing, Lignocellulose Biodegradation, Sequential Fermentation