Investigation on Biofuel Production Efficiency of Clostridium Pasteurianum BC1 and Yeast in Cellulosic Biomasses of Varying Latex Content

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Depleting fossil fuel reserves, the energy crisis, and alarming global warming concerns have driven global interest towards renewable and environmentally friendly alternatives like biobutanol and bioethanol. The biofuel production from cellulosic biomass with varying latex content viz., Calotropis gigantea, Ficus Benghalensis and Hibiscus rosa-sinensis using Yeast and Clostridium pasteurianum BC1 bacterial strains were investigated. The biomass were treated to produce fermentable components such as pentose, hexose, and glucose. Anaerobic fermentation using microorganisms were carried out to produce bioethanol and biobutanol and the percentage volume is estimated using GCMS. Untreated Calotropis gigantea leaves showed highest bioethanol and biobutanol yield of 49.98V% and 31.32V% respectively using Clostridium pasteurianum BC1 due to the high latex content. Similarly, biomass with moderate latex content, Ficus Benghalensis, exhibited a yield of 47.21V% (bioethanol) and 28.42V% (biobutanol) whereas biomass with low latex content, Hibiscus rosa-sinesis, showed 29.68V% (bioethanol) and 21.72V% (biobutanol). Biofuel production from untreated samples of the above biomass using Yeast showed much lower bioethanol yield of 2.03V%, 1.76V% and 0.74V% respectively. This study showed an enhanced biofuel conversion efficiency of 25 times for Clostridium pasteurianum BC1 strains than that of Yeast in cellulosic biomass. Further enhancement up to 3 times in Yeast based biofuel production was accomplished by different pre-treatment methods like steaming and freezing. However, these pretreatments have negligible effects in the case of bacteria based biofuel production. This study also established a proportional relation between latex content in cellulosic biomass and biofuel production.

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