

Consolidated bioprocessing for biofuel production

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Consolidated bioprocess (CBP) is one of the methods used in the production of biofuels and chemicals to simplify the usual process and reduce the cost of productivity. This is an approach in which enzyme production, saccharification and fermentation are achieved in a single operation. The demand for biofuel is elevating because of its feature of reducing the amount of carbon monoxide that helps in improving the environment. The reducing fuel reserves globally has shifted the scientists's interest towards alternative fuels search; and bioethanol production with the help of microbes through CBP is emerging as one of the promising alternatives. CBP could potentially convert the plant biomass (lignocellulose) into ethanol with three biologically mediated steps, such as cellulase production, enzymatic hydrolysis, and microbial fermentation. Thermotolerant microorganisms are preferred in CBP as high temperature resisting characteristics result in optimum enzyme production. For CBP, microorganisms could be developed through a native cellulolytic strategy or recombinant cellulolytic strategy. The former involves the identification of naturally occurring cellulolytic microbes and improving their ability to ferment sugars into ethanol at high yields and titres. The latter involves the recombinant cellulolytic strategy in which non-cellulolytic organisms are engineered so that they can utilise cellulose to produce ethanol at high yields and titres through heterologous cellulase expression. The number of operation steps and the production of chemical inhibitors could be reduced with the best combination of advanced systems in CBP. Therefore, improvement in each aspect of CBP is essential through research to achieve cost-effective as well as high yield bioethanol operations.

Keywords: Biofuel, Bioethanol, Enzyme production, Cellulase, Engineered microorganisms, Saccharification, Thermotolerant microbes, Lignocellulose

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