

Yeasts in sustainable bioethanol production: a review

Abstract

Bioethanol has been identified as the mostly used biofuel worldwide since it significantly contributes to the reduction of crude oil consumption and environmental pollution. It can be produced from various types of feedstocks such as sucrose, starch, lignocellulosic and algal biomass through fermentation process by microorganisms. Compared to other types of microorganisms, yeasts especially *Saccharomyces cerevisiae* is the common microbes employed in ethanol production due to its high ethanol productivity, high ethanol tolerance and ability of fermenting wide range of sugars. However, there are some challenges in yeast fermentation which inhibit ethanol production such as high temperature, high ethanol concentration and the ability to ferment pentose sugars. Various types of yeast strains have been used in fermentation for ethanol production including hybrid, recombinant and wild-type yeasts. Yeasts can directly ferment simple sugars into ethanol while other type of feedstocks must be converted to fermentable sugars before it can be fermented to ethanol. The common processes involves in ethanol production are pretreatment, hydrolysis and fermentation. Production of bioethanol during fermentation depends on several factors such as temperature, sugar concentration, pH, fermentation time, agitation rate, and inoculum size. The efficiency and productivity of ethanol can be enhanced by immobilizing the yeast cells. This review highlights the different types of yeast strains, fermentation process, factors affecting bioethanol production and immobilization of yeasts for better bioethanol production.