Effect of aeration and nutrients on saccharomyces cerevisiae cultivation using lignocellulosic hydrolysate from empty fruit bunch

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Indonesia has wide palm oil plantation which produce Empty Fruit Bunch (EFB) waste around 32 million tons per year. EFB is a potential material for bioethanol through pretreatment, saccharification, and fermentation. Fermentation has important role in bioethanol production because this process will convert glucose into ethanol. The most common microorganism used in fermentation process is Saccharomyces cerevisiae. But, the use of S. cerevisiae in bioethanol fermentation using lignocellulosic hydrolysate have a problem that microorganisms cannot grow well. This is due to the presence of inhibitor in the hydrolysate. Solution for this problem is using S. cerevisiae which cultivated on hydrolysate media that will be used in the fermentation (in this case EFB). This research will investigate cultivation of S. cerevisiae on EFB hydrolysate, to obtain the optimum operating conditions such as aeration and nutrients. Fed-batch system is used for cultivation. Optimum condition are determined after analyzing cell number and ethanol yield from dried S. cerevisiae. Optimum condition for cultivation are 1 v/v per min aeration and glucose 5 g/L which produce ethanol yield 24%. We also scale-up the dried yeast into 43.7 g and need a cost Rp 19,958/g which is more expensive than commercial yeast.