COMPARATIVE STUDY FOR ETHANOL PRODUCTION FROM EMPTY FRUIT BUNCH PALM (EFBP) BY *S. cerevisiae* AND *K. marxianus*

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Introduction

Palm industry is a growing business in Colombia which generates a lot of waste that cause environmental problems around the palm crops. The largest proportion of residues corresponds to empty fruit bunch palm (EFBP) which is a good source of cellulose [1] available for second generation ethanol production. In previous researches optimum conditions for this biofuel were determined such as type of pretreatment, solid – liquid ratio, pre-hydrolysis time, enzymatic load and concentration of inoculum [2], under these conditions the effect of supplementation with Zn^{2+} on simultaneous saccharification and fermentation systems (SSF) was evaluated using about the fermentations in simultaneous saccharification and fermentation (SSF) using the yeast *S. cerevisiae* and *K. marxianus* in order to enhance the ethanol production using EFBP as substrate.

Methods

Fermentations were performed in SSF systems with pre-hydrolysis of 36 hours. Glucose content was determined by glucose oxidase method), total reducing sugars (ATR) were measured by DNS method and, ethanol concentration was quantified by gas chromatography - SPME using an INNOWax HP 19091N -233 column.

Results

Table 1: Fermentation parameters for S. cerevisiae and K. marxianus in SSF system

	S. cerevisiae		*K. marxianus*	
	Zn^{2+}	Control	Zn^{2+}	Control
Ethanol [gL^{-1}]	22.3	20.7	25.9	26.1
Q [$gL^{-1}h^{-1}$]	0.376	0.349	0.357	0.360
Y [g /g]	0.127	0.118	0.147	0.148

Q: Productivity
Y: Yield [g ethanol/g dry biomass]

Overall it was found that the yeast *K. marxianus* was better in the fermentation system due to it achieves higher yields in ethanol, it does not have adaptation problems and operates at a higher temperature, but it has a strict requirement for nitrogen source. A significant influence on zinc supplementation effect was not detected. The yeast *S cerevisiae* was influenced by zinc supplementation, reaching an ethanol concentration of 2.3 times higher than the content obtained in basal state without optimization parameters.

Conclusions

Zinc supplementation improves ethanol production for the yeast *S. cerevisiae* but has no significant effect on *K. marxianus*. No increases in the yeast maximum working temperature were achieved.

References

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