ZYGOSACCHAROMYCES SPP YEAST ISOLATION AND BIOETHANOL PRODUCTION FROM BANANA WASTE

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Introduction. At present, we face problems of fossil fuel depletion and environmental pollution. The biofuel production could be achieved reducing oil dependence. The production of bioethanol from sugar-rich organic waste is a promising method for use as biofuel. The state of Veracruz is the third producer of banana (1) (*Musa cavendishii);* however, large quantities of banana are discarded because their very short maturation process. On the other hand, it is possible to isolate native strains producing ethanol from typical fermented beverages and foods.
Therefore the aim of this study was to isolate native strains producing ethanol from fermented foods by uncontrolled fermentation of ripped waste of hydrolyzed banana.

Methods. Different fermented typical products of central Veracruz (tepache, sourdough, fruit preparations liquor) were analyzed and cultured for isolation of ethanol-producing microorganisms. Ethanol-producing microorganisms were recognized in fermentation banana medium (FBM) (1 mL in 100 mL FBM) at room temperature, and their ethanol production was detected qualitatively with the iodoform reaction every 24h for 72h. Fermentation banana medium (FBM) was prepared with 40% (w/v) ripped waste banana pulp (7 ripeness degree), adjusted to 20 °Brix with saccharose, and hydrolyzed by autoclaving at 121°C for 15 min at pH 6.0. Ethanol production kinetics was also carried out in FBM by 72h with the best ethanol-producing strains. Ethanol was quantified by redox titration with potassium dichromate (3) and sugar consumption was determined by Fehling method every 24h. Microorganism identification was achieved to species level using dichotomous key of Pitt and Hocking (2).

Results. Twenty-three strains were isolated from fermented typical foods, but only six produced ethanol (Table 1). From these, three strains of ethanol-producing yeasts were identified as *Zygosaccharomyces* spp.

Table 1. Percentage of isolation of native ethanol-producing strains in FBM.

Morphology	% Native strains isolated	Ethanol-producing strains
Yeats 13 strains	52.2	6
Bacteria 10 strains	43.4	0

Ethanol production and reducing sugars consumption by *Zygossacharomyces* spp. strains are show in Figure 1. The consumption rate of reducing sugars was similar among *Zygosaccharonyces* spp strains, with an average of 0.183. Furthermore, the rate of ethanol production was different for each of the strains, with a minimum of 0.256 and a maximum of 0.932 g/Lxh, being the best ethanol-producing strain *Zygosaccharomyces* spp strain 015.

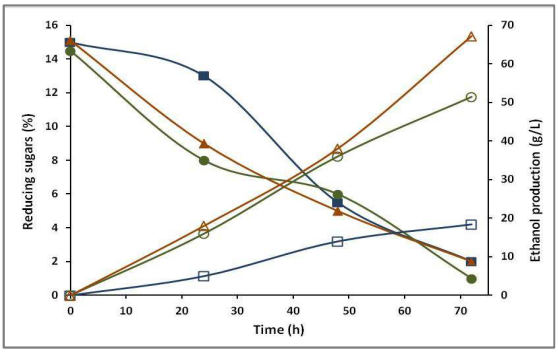

Fig.1 Ethanol production and reducing sugars consumption of strains *Zygossacharomyces* in FBM, at environmental temperature. -■- strain 001, -●- strain 012, -▲- strain 015. Full figures show sugar consumption and empty figures show ethanol production.

Conclusions. Three ethanol-producing *Zygosaccharomyces* spp strains were isolated from typical fermented foods, and used for ethanol production in waste hydrolysates banana (*Musa cavendishii*).

References.

1 Comisión Veracruzana de Comercialización Agropecuaria. (2010).
2 Pitt, J. I. Hocking, A. D. (2009) *Fungi and Food Spoilage*. Springer. USA. 53-57
3 Winnick, T. (1942). *Ind. Eng. Chem. Anal*. 14 (6):523-525.