

Biotechnological Studies Concerning the Ethanol Obtaining from Sugar Beet Molasses or from Hydrolyzed Corn Flour, in a Pilot Scale Fermentor [†]

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This paper presents the obtained results concerning the screening of different yeast strains selected from different natural sources (such as wine manufacturing wastes) and their use in order to obtain a natural preparation containing pure distilled ethanol. After the first step of distillation, a level of 74.37 kg EtOH was obtained, with MeOH less than 0.02%, which means that this preparation can be used for human applications, like pharmaceutical or food industries, according to the literature data [1,2].

The screening of the yeast's development (mainly represented by strains of *Saccharomyces cerevisiae*, *Hansenula sp.*, *Candida scotii*, and *Candida robusta*) was carried out on a Sabouraud media first at a laboratory scale, and the better developed strains were then tested for their potential activity on a culture media containing sugar beet molasses 200 g/L (with 9.1% reducing sugar), KCl 0.8 g/L, KH₂PO₄ 0.8 g/L, NH₄H₂PO₄ 0.8 g/L, and being sterilized for 30 min at 110 °C.

The optimal fermentation parameters for the laboratory researches were 400 mL culture media/ 750 mL capacity of the flasks, the temperature of 30 °C, and static culture conditions. For the case of using hydrolyzed corn flour first at a laboratory scale, the parameters were the following: flasks with 750 mL capacity containing 90 g corn flour (18% corn flour), 0.25 g MgSO₄ (0.05%), 2 g KH₂PO₄ (0.4%), 410 mL water, and 10 mL H₂SO₄ (2%). The chemical hydrolysis was then followed by a thermal process for 2 h at 125 °C. The parameters for the yeasts inoculum used in order to upgrade the researches to a pilot scale were: a specific bioreactor with 100 L capacity containing 80 L culture media composed of 24 kg sugar beet molasses (46% reducing sugar in molasses), 400 g KH₂PO₄, 400 g (NH₄)₂SO₄ (30 min of sterilization at 115 °C), pH 4.9, aeration 0.3 L/L/min, pressure 0.3 atm, temperature at 30 °C, and process with continued agitation. The parameters for the EtOH fermentation at a pilot level were the following: a metallic bioreactor with capacity of 2000 L containing 1700 L culture media composed of 380 kg sugar beet molasses, 500 g KH₂PO₄, 1.25 kg (NH₄)₂SO₄, sunflower oil 200 mL, sterilization of the medium during 30 min at 115 °C, pH 4.8 (corrected with H₂SO₄), aeration 0.1 L/L/min, pressure 0.1 atm, temperature at 30 °C, and process with agitation only for 5 min from 4 to 4 h.

After the first step of distillation, a level of 74.37 kg EtOH was obtained, with MeOH less than 0.02%, which means that this preparation can be used for human applications, like pharmaceutical or food industries.

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