Bioremediation of distillery effluent by *Pleurotus sajor-caju*: evaluation of the influence of pH in vinasse derived from molasses

Moniky Aragão1, Diego Menezes1*, Helon Oliveira1, Jaqueline Souza1, Osiris Vital-Brazil1, Luiz Romanhlo-Ferreira2, Regina Monteiro2, Ana Queijeiro-Lopez3, José Teixeira4, Maria Hernandez-Macedo1, Denise Ruzene1, Daniel Silva5

From 5th Congress of the Brazilian Biotechnology Society (SBBIOTEC) Florianópolis, Brazil. 10-14 November 2013

**Background**

The alcohol industry is an excellent representation of the development process in Brazil, it considers the sugar cane as one of the biggest monocultures. As a result of this high production, there is the vinasse, a residue from the alcohol production after the pulp fermentation and distillation of the wine (Pulp after fermentation), ensuing from 8 to 15 liters for each liter of ethanol produced. This high colored effluent and an objectionable odor is rich in nutrients, mainly in organic matter, having a high potential pollutant when it is inappropriately in the environment [1,2]. Lignolytic fungi can be used to the remediation of the pollutants, such as vinasse, by the action of peroxidases. So, the search is interested in reducing the contaminations caused by the direct application of the vinasse on the earth without a previous treatment. Therefore the objective is to characterize the biodegradation of the residue through the basidiomycetes *Pleurotus sajor-caju* CCB 020 and consequently to produce enzymes with biotechnological potential, decoloring the vinasse and minimizing the pollutant potential.

After the treatment of the vinasse, it shows several goals as the fertirrigation, the water reuse for the washing process of the sugar cane and/or other activities related to the industrial process.

**Methods**

The fungi were inoculated in the vinasse which had its pH previously corrected to 4.0 e 6.0 using solutions of NaOH (2.5 M) and/or HCl (5.0 M), during a period of 16 days at 82.4º F in agitation of 180 rpm with no light. The control consisted in material without the fungi inoculation and in the synthetic environment MSF. After it was realized 7 collections to determine the pH variation and the decolorization factor according to the formula used by Itoh (2005) [3] and Sirianuntapiboon et al. (1995) [4] from the absorbance standart at 475 nm: Decoloration (%) = ((absorbance initial - absorbance observed)/absorbance initial). Besides these parameters, the production taxes of the fungi biomass were evaluated. All the reactions were realized in triplicate and the lectures of the absorbance made with the spectrophotometer support FEMTO 432.

**Results and conclusion**

According to the results, the presence of different levels in the vinasse decoloration which was concomitant with the toxicity decrease, and the production increase of the fungi biomass. However these parameters were more satisfactory when they were at 82.4ºF and pH 6.0, reaching an utmost of 90% of decoloration and a value of biomass concentration equivalent to 11.07g/L. Therefore it is concluded that the *P. sajor-caju* is able in the applicability of the color remotion and in the degradation of the vinasse toxic compounds from the sugar cane, it can be reused after the treatment in biotechnological process aggregating values to a subproduct that causes environment problems. These factors indicate a possible and promissor process of use of residues in a viable way to industrial objectives.

**Acknowledgements**

The authors thank FAPESP, FAPITEC/SE, CAPES and CNPq.

**Authors’ details**

1Universidade Tiradentes, Instituto de Tecnologia e Pesquisa, Aracaju, SE, Brasil. 2Universidade de São Paulo, Centro de Energia Nuclear na Agricultura, Piracicaba, SP, Brasil. 3Universidade Federal de Alagoas, Instituto de Química. Full list of author information is available at the end of the article.

© 2014 Aragão et al.; licensee BioMed Central Ltd. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The Creative Commons Public Domain Dedication waiver (http://creativecommons.org/publicdomain/zero/1.0/) applies to the data made available in this article, unless otherwise stated.
Published: 1 October 2014

References


Cite this article as: Aragão et al.: Bioremediation of distillery effluent by Pleurotus sajor-caju: evaluation of the influence of pH in vinasse derived from molasses. BMC Proceedings 2014 8(Suppl 4):P190.