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Rapid identification of contaminating bacteria protein profile present in ethanol fermentation process by matrix-assisted laser desorption/ionization (MALDI)

Juliana Guimarães Fonseca[1], Thais Regiani Cataldi[1], Maria Leticia Bonatelli[1], Mariana de Souza Silva[1], Fernanda Negrão Silva[2], Marcos Nogueira Eberlin[2] and **Carlos Alberto Labate[1]**
[1]University of São Paulo, Brazil
[2]State University of Campinas, Brazil

Bioethanol has gained space in the global energy sector in recent years, wherein Brazil is the second largest producer of this fuel. The process responsible for ethanol production is fermentation, in which sugars available in sugarcane are turned into alcohol by fermenting microorganisms. Nonetheless, large-scale fermentation does not occur in an aseptic environment. In this way, presence of contaminants, mainly acid-lactic bacteria (LAB), is a recurring problem in the process, which can cause a decrease in ethanol yield. Thus, identification of contaminating bacteria by mass spectrometry techniques allows a rapid and efficient identification of contaminating microorganisms, which can prevent drastic falls or interruption of fermentation process. We isolated and identified contaminating microorganisms from fermentative process by Sanger sequencing of gene 16S rRNA. We also characterize protein profile of these bacteria through matrix-assisted laser desorption/ionization (MALDI). We identified 13 bacteria that belonged to *Lactobacillus* genus. We also optimized the methodology used for MALDI to identify LAB from a small number of bacteria grown in MRS media using a 1 µL loop and suspended in 10% formic acid. For the identification of protein characteristic spectral profile, the best results were obtained when 1 µL of the mixture was spotted onto a polished steel target plate and overlaid with 0.5 µL of ethanol. The matrix used was saturated solution of α-cyano-4-hydroxycinnamic acid 50% acetonitrile – 2.5% trifluoroacetic acid. This is the first time that mass spectrometry was used to identify bacterial contaminants from fermentation tanks in large scale ethanol production.

Biography

Juliana Guimarães Fonseca is a Biotechnologist graduated from Federal University of São Carlos, Brazil, in 2012. She has Master's degree in Science from University of Sao Paulo, in 2014. Currently, she is PhD candidate at University of Sao Paulo and her research is on proteomics, more specifically, characterization of the protein profile of contaminating bacteria present in the first-generation ethanol fermentation process by MALDI TOF. She has already published papers in reputed journals and wrote book chapters.

junh_fonseca@hotmail.com

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