

## **TITLE: OCCURRENCE OF MULTIDRUG-RESISTANT MICROORGANISMS IN BRAZILIAN FUEL-ETHANOL FERMENTATION PROCESSES**

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### **ABSTRACT:**

Brazil is the second largest bioethanol producer in the world, generating around 30 billion liters in 2018. Brazilian distilleries make bioethanol through fermentation process using sugarcane juice and/ or molasses. Fuel-ethanol fermentations are subject of huge selective pressures since the conditions with high concentration of sugars and non-sterile environment allows the growth and persistence of contaminating microorganism, mostly bacteria, reducing the ethanol production yield. In this context, in alcoholic fermentation processes in Brazilian distilleries, it is a common practice use antibiotics in order to control bacterial contaminants. The frequent antibiotic's use in this industry can be an important factor as selective pressure to increase the occurrence of multidrug-resistant (MRD) microorganisms. Therefore this research aimed to verify the occurrence of MRD bacterial contaminants isolated from Brazilian bioethanol industry. The contaminants were isolated from two fermentation processes in 2017 harvest season period. The assessed sugar mills are located in Brazilian Center and Southeastern regions, herein designated Unit A and Unit B. For this purpose, we screened 10 microorganisms isolated from fermentation tanks capable to grow using 100ppm of monensin, the most common antibiotic used in this industry. After that, we examined the sensibility of these microorganisms through microdilution test determining Minimal Inhibitory Concentration (MIC) and Minimal Bactericidal Concentration (MBC) using four antibiotics also used in industrial processes to control bacterial contamination. The higher concentration used, 6ppm, was twice recommended commercially for all antimicrobials. Considering all isolates, 80% presented MRD profile, in which 70% were resistant to all of the antibiotics tested, 10% presented partial sensitivity for two antibiotics and 10% presented a single resistance profile. Several MRD studies have demonstrated that uncontrolled antibiotics' use should be considered a determinant factor in multi-resistant bacteria population selection and proliferation. Our results support this information and show the effect of the arbitrary use of the antibiotics. Thus, this research highlighted the importance to understand multi-resistant bacteria contamination in industrial context and point out the urgent necessity to replace traditional approach using antibiotics to control bacteria contamination in fuel-ethanol fermentation processes.

**Keywords:** Multidrug-resistant microorganism, antibiotics, bioethanol industry

**Development Agency:** CAPES / PROEX; CPQBA/UNICAMP