

Session 5 - Cocoa fermentation

Oral Session Cocoa 05.01

Inhibition of growth and ochratoxin A production of *Aspergillus carbonarius* by *Bacillus* strains isolated from cocoa bean fermentation.

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Text Ivorian raw cocoa beans are recurrently subject to ochratoxin A (OTA) contamination. The use of chemical and physical means to reduce or prevent the OTA production in cocoa beans is prohibited or inefficient. The present study aimed to improve the sanitary quality of raw cocoa bean by determining the potential for biological control of fungal growth and OTA production of *Aspergillus carbonarius* using *Bacillus* sp strains isolated from fermented cocoa beans. Results of both direct and indirect tests carried out using the double layer agar technique showed seven (7) *Bacillus* strains with *A. carbonarius* growth inhibition abilities at up to 50 %. In addition, inhibition of fungal growth tests in a liquid culture medium have revealed OTA production inhibition abilities of tested *Bacillus* strains, whether by the culture supernatant or the cell suspensions. The cell suspensions of strains BC35, BC46, BC52, BC53 and BC54 showed an important antagonistic effect to OTA production ranging from 78.7 to 95.8 %. However, only liquid culture supernatants of strains BC35, BC54 and BC46 recorded the best activities about 6.4, 48.4 and 70.0 % respectively against to OTA production. Results suggest a direct or an indirect action via metabolites produced by tested *Bacillus* strains on *A. carbonarius* growth coupled probably with consumption and / or OTA binding. We could hope tested *Bacillus* strains could be a promising agent for biological control of growth and OTA production of *A. carbonarius* in raw cocoa beans during the post-harvest processing.

Oral Session Cocoa 05.02

Influence of specific *Saccharomyces cerevisiae* yeasts on cocoa beans flavor and final chocolate quality

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Text Abstract

Chocolate is a “pleasure” food whose organoleptic quality is essential to the product’s value. The aromatic quality of chocolate comes from many parameters, some are intrinsic to the raw material, and others are driven by the manufacturing process. In the frame of a

Short Oral Communications

research project dealing with the management of cocoa fermentation process, we investigated the impact of specific yeasts inoculation on the quality of cocoa beans after fermentation and on the final sensory quality of the chocolate

Two different yeasts have been inoculated and fermentations were compared to a spontaneous fermentation (standard cocoa). Then, the beans were transformed into chocolate via a standard process and the sensory characterization of these samples was carried out. The analysis of the volatile fraction and the biochemical composition have also been done on beans and chocolate.

The results of the beans fermented by selected yeasts show levels of sugars (sucrose, glucose and fructose) lower than in standard cocoa. The polyphenol contents are also impacted by depending on the fermentation process.

The analysis of the volatile compounds were also performed on all fermented beans, and important differences were detected. Among the various chemical families measured, the alcohols and esters are more abundantly present in the fermentations carried out with the yeast starters. The sensory tests also confirm that the quality of these beans are also considered better. In conclusion, these studies confirmed the high interest to better control the fermentation step with specific yeast inoculation, in order to improve the final quality of chocolate.

Keywords : cocoa beans, yeast, fermentation, organoleptic quality

Oral Session Cocoa 05.03

Polycyclic Aromatic Hydrocarbons (PAH) Contamination of Raw Cocoa and Degradation by Bacterial Strains

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Text Polycyclic Aromatic Hydrocarbons (PAH) contamination in raw cocoa beans and derivative products has become more and more alarming. The European Union has set maximum rates in PAHs for cocoa beans and derived products (Regulation 853/2004). No chemical or physical method to reduce or prevent PAH occurrence in cocoa beans appears to be efficient. Thus, this study aimed to test the capacity of bacterial strains isolated from cocoa beans to detoxify cocoa beans contaminated by PAH. Firstly bacterial strains were selected from cocoa bean samples for their ability to grow in PAH synthetic media. Secondly the strains were isolated after successive cultures using mineral liquid media containing PAHs as sole carbon source. Results shows that ten (10) different bacterial isolates were pre-identified as belonging to the *Bacillaceae* family. Using 16S