Analysis of the performance of a newly designed fermenter built in local materials for improvement of cocoa fermentation, in Ivory Coast

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ABSTRACT
Objective: Cocoa beans fermentation is a spontaneous chemical process, traditionally done in box or in a heap. Equipment is also important in achieving the final chocolate aroma. This study analyzes the performances of a new-designed cocoa bean fermenter.

Methodology and results: In this study, a new type of fermenter, a rotating cylindrical fermenter (RCF) has been designed in order to improve the fermentation of cocoa that remains difficult to control, because of the spontaneous nature of the microbiota. The performances of this fermenter was analyzed and compared to those of the traditional wooden box (TWB) fermenter that is commonly used on farm. During the 6 days of fermentation in both fermenters, the growth of microorganisms such as yeasts, lactic bacteria, acetic bacteria, bacillus and moulds as well as chemical and physical changes of the fermenting cocoa were monitored. The results showed that in the fermenter (RCF) a rapid temperature increase was observed in the course of the fermentation process with a temperature reaching 51°C within 73 h comparatively to the traditional fermenter (48°C within 118 h). This leads to a higher proportion of brown beans, indicator of a good fermentation from RCF fermenter as assessed by the cut test. This proportion was 94.44% for RCF and 85.88% for TWB. Moreover the optimization of heat generated in the RCF fermenter, allowed a normal browning (final gray level was 77 in both fermenters) despite modification of microbiota growth order (early growth of acetic bacteria and stunted growth of yeast in RCF, but not for TWB).

Conclusion and application of results: The high proportions of brown beans in RCF suggest that this equipment is liable to contribute to the improvement of standard quality of cocoa beans.