# Cellulase activity during different fermentation conditions of coffee fruits

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The growing demand for high-quality coffee has spurred research on post-harvest processing of coffee cherries. Fermentation is one of the post-harvest techniques employed to enhance the sensory qualities of coffee beverages. In this process, microorganisms produce enzymes that break down plant compounds that can negatively impact the taste of the beverage. Carboxymethylcellulase (CMCase) plays a crucial role in degrading carboxymethylcellulose, a substance with slow digestion in humans and the potential to introduce unpleasant flavors to coffee beverages. The primary objective of this study was to identify and assess CMCase production during spontaneous and/or induced fermentation using starter cultures in coffee cherry fruits (Coffea arabica L.), with or without the addition of microbial growth stimulants such as carbohydrates and cellulase. Starter culture Saccharomyces cerevisiae were reactivated and utilized in fermenting fruits with a concentration of 107 CFU/mL and a proportion of 1% (m/v). The fruits were macerated in 5% m/v solutions containing glucose, fructose, cellulase, and water. The fermentation process took place in a 500 L capacity bioreactor, lasting 120 h. Throughout the fermentation at different time intervals (24, 48, 72, 96, and 120 h), 50 mL samples of the mash were collected. CMCase activity was determined using the 3,5-Dinitrosalicylic acid method, measuring absorbance at 540 nm. Both spontaneous and induced fermentations exhibited significant differences, irrespective of the fermentation duration. Each fermentation process displayed a unique regression model and coefficient of determination concerning the addition of microbial growth stimulants. These findings highlight that the choice of these stimulating compounds can impact CMCase production throughout the fermentation period. Spontaneous fermentation proved more effective in CMCase production when supplemented with glucose and fructose, showing the most significant increase at the 72 h mark. In induced fermentation, a progressive increase in CMCase activity was observed in the presence of glucose and cellulase throughout all time periods. This indicates that, while induced fermentation performed less efficiently than spontaneous fermentation, there is still potential for improvement. The correlation between sensory attributes of these fermentations and CMCase activity is currently under evaluation.

**Key words**: Cellulase, Coffee, CMCase, Fermentation.

**Atividade de celulases durante diferentes condições fermentação de frutos de café**

*A fermentação do café é uma técnica pós-colheita que pode melhorar os atributos sensoriais da bebida. A enzima CMCase degrada compostos vegetais que podem causar sabores desagradáveis. O estudo comparou fermentações espontâneas e induzidas com e sem adição de estimulantes do crescimento microbiano. Os resultados mostraram que a fermentação espontânea com suplementação de glicose e frutose foi a mais eficiente na produção de CMCase.*

**Palavras-chave**: Celulase, Café, CMCase, Fermentação.

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