

Fermentation of coffee cherries by selected yeast strains and its impact on the final aromatic quality of the coffee

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Introduction

The use of novel yeast strains in coffee cherry fermentation is a captivating and innovative approach that promises to revolutionize the world of coffee. Traditionally, coffee bean fermentation was a natural process, shaped by the environment's microorganisms. However, the introduction of specific yeast strains opens up a realm of possibilities for crafting unique and extraordinary coffee flavors. The purpose of the study presented below was not only to screen a panel of yeast strains on different synthetic culture media defined to mimic the stressful conditions of the coffee cherry fermentation but also to assess the potential of the best ones in real conditions.

Materials & Methods (Fig. 1)

20 *Saccharomyces cerevisiae* yeasts pre-selected from Lesaffre collection (based on temperature and acid organic resistances) were evaluated for their ability to grow under different stresses to mimic the conditions of the coffee bean fermentations. The strains were robotically pinned onto solid agar plates in a high-density format. Then, the most robust yeast strains were subjected to on-farm small-scale trials in Nicaragua, where coffee fermentation experiments were conducted using *C. arabica* var. *Marsellesa*. A sensory analysis of the different products was carried out following SCAA protocol.

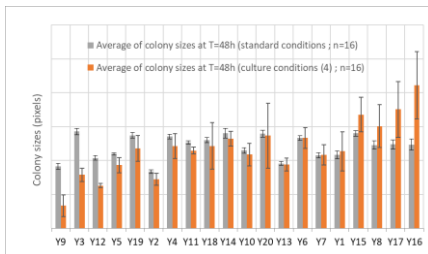


Figure 2: Comparison of the colony sizes (standard condition vs condition 4)

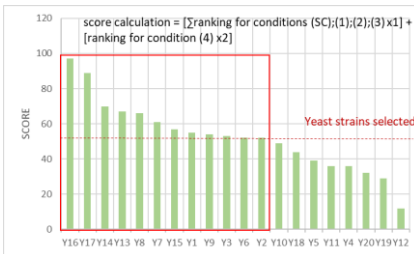


Figure 3: Scores calculated for strains Y1 to Y20 according to their rank in the 5 culture conditions

Conclusion / Perspectives

The use of novel yeast strains in coffee bean fermentation has the potential to transform coffee flavors. All the selected yeasts introduced a diversity of fruity, floral, sweet or cereal notes, creating an enticing aroma and taste. These preliminary trials are the first steps towards opening up a world of delightful and surprising aromas and flavors, where Fermentis blends tradition and innovation to enhance the coffee experience.

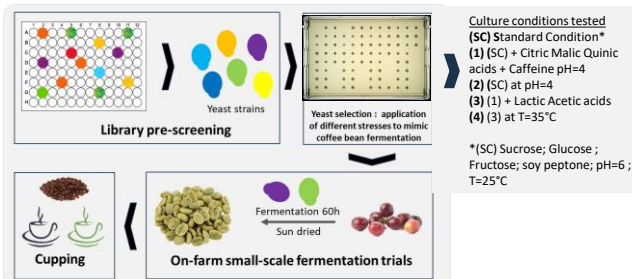


Figure 1: Methodology of yeast selection and applicative test conditions

Results / Discussion

1. Selection of yeasts : depending on the stresses applied, we noticed that the growth of the pre-selected yeast strains was more or less affected. Clearly, the condition (4) was the most stressful for lots of them (Fig 2). To select the most robust candidates, these 20 strains were ranked in all the culture conditions and an overall score has been calculated for each ones, applying a double coefficient for the condition (4). The Y8, Y13, Y14, Y16 and Y17 strains demonstrated a strong ability to withstand high-temperature stresses in the presence of organic acids and low pH (Fig 3).

2. On-farm fermentation trials : the 12 yeasts tested showed a very wide diversity of aromatic profiles (Fig 4). Aromas of caramel, fruits and cocoa predominated, with a wide range of intensity detected in body, acidity, aftertaste. For example, Y14 yielded very encouraging results, offering a complex cup with delightful aromas of dry fruits, nuts, cocoa, and caramel, complemented by flavors of aromatic herbs, chocolate, and orange fruits, with medium acidity and a mild to long aftertaste.



(1) Control fermented = spontaneous fermentation
(2) Control not fermented = coffee cherries dried directly

Figure 4 : Aromatic profiles of the coffee obtained with the different fermented products

Reference: Isolation, selection and evaluation of yeasts for use in fermentation of coffee beans by the wet process (2014) : G.V. de Melo Pereira *et al.* International Journal of Food Microbiology 188 60–66.