Effects of High Hydrostatic Pressure Treatment on Microbial Flora and Sensory Characteristics in Coffee Cherry

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Outline

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Abstract

To alter or enhance flavors, it is common to add strains for fermentation or use emerging pretreatment methods to change fermentation flavors. The aim of this study is to use high hydrostatic pressure processing (HPP) to change the coffee structure and alter the action of microorganisms, thereby shortening the drying time and change the microbial flora of coffee, resulting in a change in flavor. During fermentation periods, the moisture content of the Control (CON), 100 MPa, and 200 MPa groups showed a decreasing trend. Structural damages caused by HPP, were confirm with scanning electron microscopy, result in increased drying rate from day 0 to day 4 compared to the CON. HPP reduced the number of mesophilic and lactic acid bacteria, with slight changes to the microbial flora of coffee cherry. 16S rRNA sequencing identified two major categories of microorganisms: the family *Leuconostocaeae* and the *Enterobacteriaceae*. *Leuconostoc* showed the highest relative abundance at both the beginning and end of fermentation in all three groups, making it as the most common genus during the coffee fermentation. ITS sequencing identified only yeast species *Hanseniaspora* commonly found in coffee cherry. Sensory evaluations of the three groups revealed unique characteristics: the CON displayed caramelized flavors. After the 100 MPa treatment, a tropical fruit profile emerged. Following the 200 MPa treatment, floral notes were observed, although the specific types of floral aromas could not be precisely identified. In the electronic tongue analysis, the 100 MPa treatment had a higher astringency, the 200 MPa treatment had a more pronounced bitterness, and body was also higher than the other two groups. Overall, the populations of mesophilic and lactic acid bacteria decreased due to high pressure. The microbial flora consisted of *Leuconostocaeae*, *Enterobacteriaceae*, and *Hanseniaspora*. In sensory evaluations, the CON showed a caramel flavor, whereas treatment at 100 MPa resulted in a peppery taste, and treatment at 200 MPa produced a floral aroma. Electronic tongue analysis indicated higher astringency at 100 MPa and increased bitterness at 200 MPa. To clearly the changes in microbial flora and flavor will require further illustration through subsequent analyses using HPLC and GC-MS.