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Study on the black tea volatile compounds during the fermentation process

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The quality of black tea depends on several factors such as leaf standard, geographical parameters, climatic conditions, fertilizer usage, cultivar grown, and processing conditions. Among these factors, processing conditions strongly influence the quality parameters such as taste, aroma, and liquor color of black tea. Among all the processing stages, the fermentation stage performs a crucial role since the quality-related compounds develop during this stage, where tea particles (“dhool”) are exposed to air for the development of a unique aroma varying from “grassy” to “sweet” scent. Studies on monitoring the variation of aroma compounds during fermentation for Sri Lankan tea are rare; therefore, we focused on studying the variation of the composition of volatile compounds in black tea aroma during the fermentation. The tea samples for this study were collected from St. Coombs Tea Factory, Thalawakelle, in every 15 minutes during the fermentation and immediately oven-dried at 120 °C for 20 minutes for analysis. Approximately, 72 volatile compounds were identified and quantified as a percentage (%) of total volatile compounds, and classified into chemical groups of aldehydes, ketones, esters, alcohols, and hydrocarbons. The variation of those groups during fermentation was studied thoroughly. The results showed that the composition of hydrocarbons was declining, while the content of alcohols and esters fluctuated during the fermentation. Aldehyde content showed an increasing trend while ketones showed a decreasing trend with the fermentation time. In order to calculate the flavor index, a quality parameter of black tea, the identified compounds were classified as Volatile Flavor Compounds (VFC) Group I, which produces a grassy odor, and Group II, which generates a sweet flowery aroma based on the literature. That flavor index reflected an increasing trend with the fermentation time reaching a maximum value at the end of the fermentation process. The higher value of the flavor index indicates the higher quality of black tea. Therefore, we can realize how crucial tea fermenting is for the development of volatile compounds producing a desirable black tea aroma. These findings are extended in research to develop an instrument to determine the optimum fermentation time for obtaining quality black tea.

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