7th International Conference of Multidisciplinary Approaches (iCMA), 2020
Faculty of Graduate Studies,
University of Sri Jayewardenepura,
Sri Lanka.
ISSN: 2386 – 1509
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CORRELATION BETWEEN TOTAL POLYPHENOL CONTENT VARIATION OF AUTOMATED TEMPERATURE AND HUMIDITY MONITORING DEVICE IN BLACK TEA FERMENTATION PROCESS

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Abstract
The identity of "tea" is unique and cannot be substituted by any other beverage due to its health benefits. The manufacturing process of black tea has several stages such as withering, rolling, fermentation, drying, grading, sorting, and packing. The manufacturing process alters the biochemistry of tea and the concentrations of the constituents that determine the quality of the tea. The current method in practice involves humans to detect the optimum fermentation by smelling tea particles, observing colour changes and moisture content variation. The project proposed here will focus on monitoring the variation of total polyphenol content (TPP) during the fermentation stage and develop a correlation between temperature and moisture detection system to find optimum fermentation time. The sample collection was conducted at a tea factory in Avissavella, Sri Lanka, which is a wet zone low country tea manufacturing factory. The tea samples collected for polyphenol analysis were oven-dried at every 15 minutes intervals at 110-120^{o}C temperature, humidity device data collection was conducted simultaneously for selective batches. The mean variation of TPP content during the fermentation process in morning tea batches was (30.20±3.53% of Gallic acid equivalent (GAE), n=52), evening tea batches (31.19±3.41% of (GAE), n=73). Range of TPP variation in the morning tea batches, during the fermentation, was 19.84±3.53-41.37±3.53% of (GAE), evening tea batches 24.53±3.41-39.66±3.41% of (GAE). Inside the fermentation bed temperature varied from 28.9±1.42℃-35.8±1.42℃. Pearson correlation analysis was indicated a significant linear positive correlation with TPP and fermentation bed temperature in the morning tea batches. However, significant linear negative correlation, with the evening tea batches. The overall results show the study of TPP content and bed temperature variation appropriate to optimize quality variation in tea leaves in the fermentation process with minimum human involvement.

Keywords: fermentation, black tea, polyphenol