

## **Development of a monitoring device for fermentation stage of black tea manufacturing**

T. Thevathayarajh<sup>1</sup> and D.D.C Wanniarachchi<sup>2\*</sup>

*Department of Science and Technology, Uva Wellassa University, Badulla, Sri Lanka  
'Instrument Center, Faculty of Applied Sciences, University of Sri Jayewardenepura,  
Nugegoda, Sri Lanka  
Country*

Tea is one of the popular industries around the world for its social influence. Taste, tea colour and odor are the ways to measure the quality on the final product, but Theaflavins/Thearubigins ratio is accepted as 1/10 for a high quality. In general factory officers estimate the optimum fermentation time visually. However, optimum fermentation time might depend on humidity, temperature, moisture content of leaves, which are processing on a particular day. Thus, there is a need for a system independent from human decision. An electronic device was developed, in order to determine the optimum fermentation time for the black tea. A set of sensors such as humidity, moisture and temperature were attached to the device to store the physical environment data of the fermentation bed. Colour changes during the fermentation were monitored using an iPhone 6s camera, which have 12 mega pixels. First set of tea particles from a batch of fermentation was selected for the research. This device was allowed to collect data until the factory officer asked to stop the fermentation according to his own decision. A sample of each monitored batch was collected after firing to measure percentage of Theaflavins. Tea infusion was monitored using Ultraviolet spectrophotometer. Finally, data were analyzed statistically. Theaflavins content decreases with the fermentation time which is the trend expected. The average temperature, temperature difference and average room temperature are statistically significant with fermentation time at 0.05 level of significance and percentage of variance is 96.6. Moisture content is constant because this is expected as we focused on dry season leaves. Finally, study confirms the importance of measuring physical parameters when monitoring fermentation stage to obtain quality tea. Some advanced test has to be done on the fermentation tea colour in future.

*Keywords:* Black Tea, Optimum fermentation time, Theaflavins, Tea quality, Electronic eye