PERFORMANCE ANALYSIS OF COMBINED FAR INFRARED AND FLUIDIZED BED DRYING ON QUALITY OF BLACK TEA AND COST OF PRODUCTION AGAINST CONVENTIONAL FLUIDIZED BED DRYING

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ABSTRACT

In the world normally using convectional type Endless pressure dryers, Fluidized bed dryers and Tempest dryers. Those dryers using firewood and they are energy inefficient. Those dryers produce smoke taint and have environment pollution. Far-Infrared based pre dryers unavailable for industry at present. Therefore, this study was conducted with an objective of developing tea pre dryer using FIR radiation and black tea pre-drying with temperature and time control before drying in Fluid Bed Dryer. Further, the performance of the developed dryer and the quality of black tea dried using this dryer were assessed. Fermented tea dhool were dried by four 1000 W infrared panels, changing the combination of far infrared radiation temperatures (350 °C, 300 °C, 250 °C, 200 °C and 150 °C) and exposure times (2.02 min, 3.02 min) with the design of two factor factorial design replicating each three times. A K-type thermocouple thermometer was used to measure the temperature. The results revealed that, TF/TR ratio of dried tea samples increase with the temperature levels. Specific energy consumption showed direct proportional relationship with the temperature. The liquid flavor, liquid aroma and infused leaf colour were almost similar for the tea samples dried using prototype tea pre-drier and normal factory dried tea samples. However, the optimum combination of temperature and exposure time of dhool was found to be 250 °C and 2.02 min for sample 5. Further sample 5 showed better estimated median value for infused leaf colour, liquor colour, dry leaf colour and dry leaf appearance too. Therefore, it can be concluded that, far-infrared has high potential as a source for pre-drying the fermented tea dhools. Further studies should be conducted to improve the time control which could possibly control belt speed of tea pre drier.

Keywords: Far-infrared radiation, Dryer performance, Black tea manufacturing, Specific energy consumption, Sensory evaluation