Foods 2024 Conference

The 5th International Electronic Conference on Foods

28–30 October 2024 | Online

MDPI

Performance enhancement of an old Endless Chain Pressure (ECP) tea dryer for black tea manufacturing

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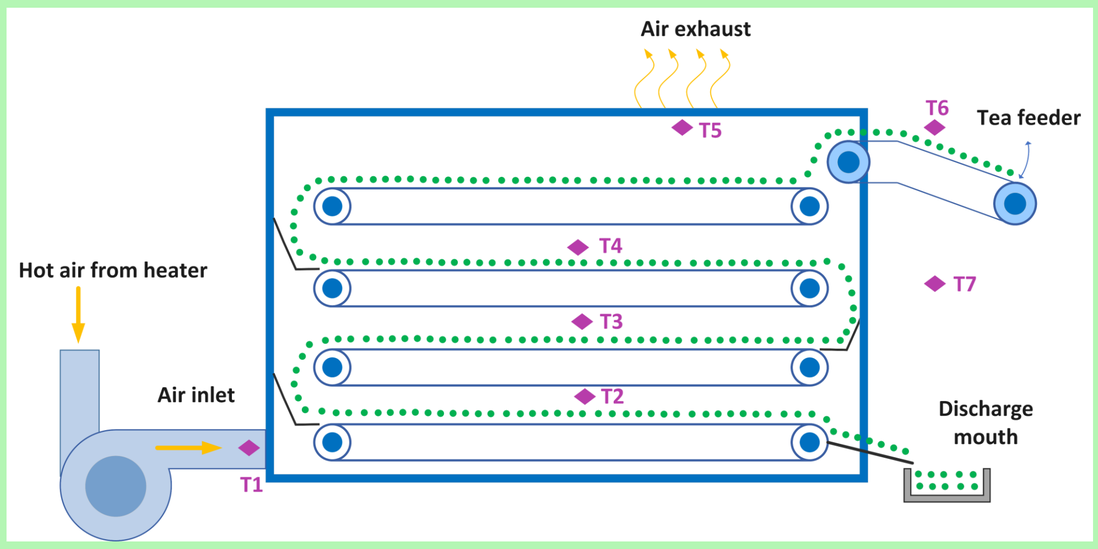
INTRODUCTION & AIM

- The drying is the most energy-intensive step in black tea production, next to withering, constituting roughly 21% of the overall energy consumption.
- In Sri Lanka, endless-chain pressure (ECP) tea dryers have been used for black tea production.
- Over time, the performance of ECP dryers tends to decline, resulting in the production of lower-quality tea and increased energy consumption.
- Hence, periodical optimization is necessary to ensure the dryers produce the best possible output.
- This study was undertaken to optimise the tea drying temperature to minimize energy consumption and increase the made tea characteristics

METHOD

- Treatments (Temperatures): 240, 245, 250, 255 & 260 ºF
- Temperatures were measured at different points as shown in figure below



Measurements;

- Specific energy consumption (SEC);

$$SEC = \frac{H_{In} - H_{Out}}{Initial\ weight\ of\ tea\ dhool}$$

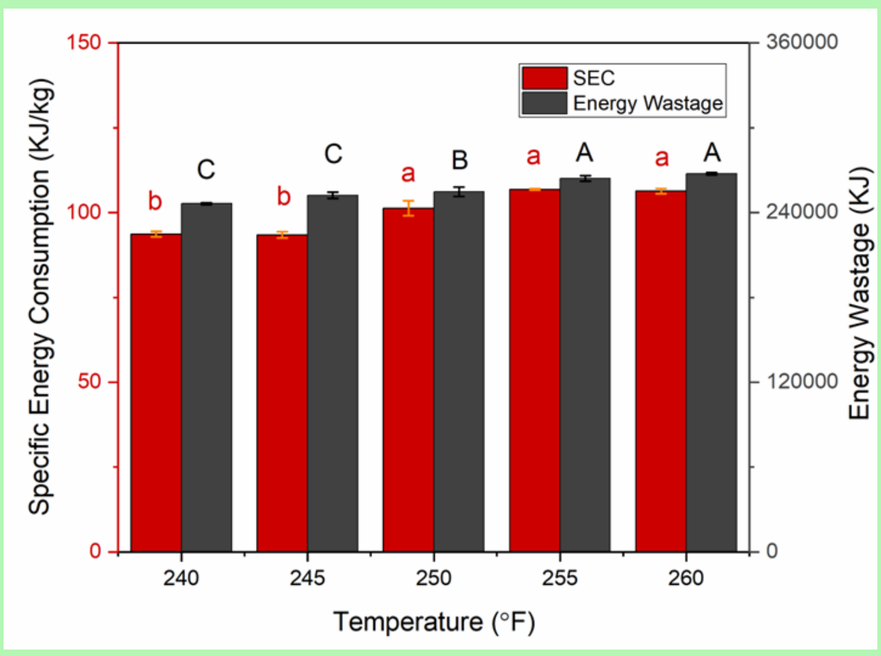
- Energy wastage

$$E_{wastage} = (H_{In} - H_{Out}) - H_{Tea}$$

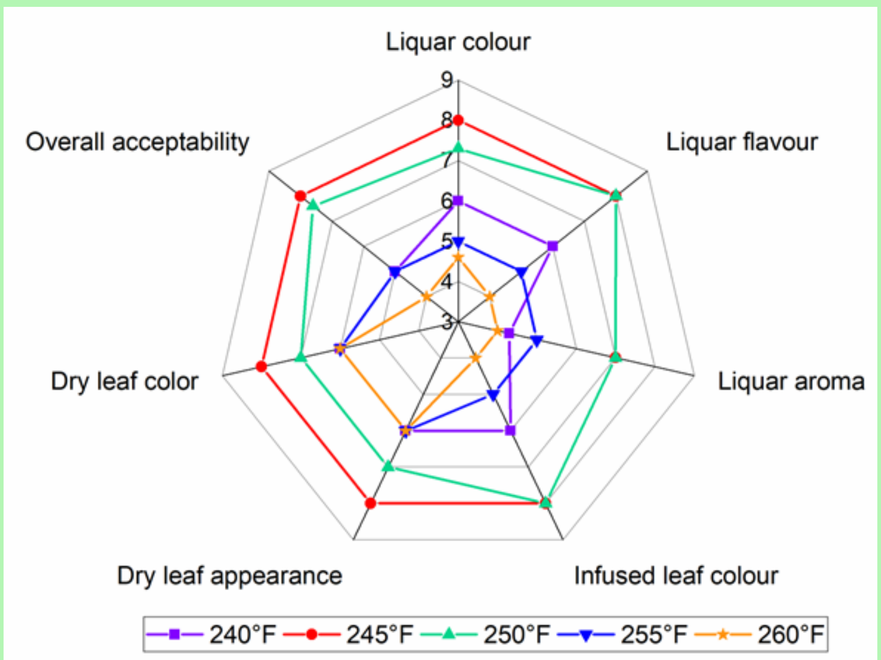
- Sensory evaluation
- Data analysis: One-way ANOVA & Tukey HSD (P=0.05)

RESULTS & DISCUSSION

- Specific energy consumption and Energy wastage



- Sensory evaluation



CONCLUSION

- Treatments 240 & 245 °F - lower SEC and energy wastage (P<0.05)
- Treatment 245°F showed superior sensory properties
- Optimum drying temperature - 245°F

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