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Effect of Fermentation and Drying Methods on the Quality of *Syzygium samarangense* Leaf Infusion

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Structured Abstract

Background: Black tea, traditionally made from the fermented leaves of *Camellia sinensis*, is a globally cherished beverage. Interestingly, the leaves of *Syzygium samarangense* hold bioactive compounds with potential health benefits, making them suitable for a black tea-like beverage. However, under Food Regulations 1985, the product cannot be legally classified as "tea" since it is not derived from *Camellia sinensis*. By optimizing fermentation methods and drying techniques, this study aims to transform waste into a commercially viable beverage with enhanced health benefits and sensory appeal while adhering to regulatory standards.

Methods: *Syzygium samarangense* leaves were harvested, cleaned, soaked, withered, size-reduced, fermented and dried to achieve the final tea product. Fermentation was conducted for 14 days and 21 days at 25°C and 35°C using leaf sizes greater and less than 2 millimetres. Following samples were dried by different drying methods, including oven drying and microwave drying. Then, the physical properties were determined including moisture content, bulk density, tapped density, specific gravity, pH value, colour L*a*b*, total ash content and water extraction. Chemical analysis has been examined including antioxidant capacity, tannin content and total phenolic content. The *Syzygium samarangense* drink was evaluated using a 9-point hedonic scale, and the selecting percentage identified the best formulation.

Results: This study reveals fermentation process and drying methods, show a significant difference in physical and chemical analysis of drink. Based on the research, drying method and leaf size were the most influential factors affecting physical properties of *Syzygium samarangense* leaf infusion. In addition, chemical quality was significantly affected by processing conditions, especially smaller leaf size and oven drying, which enhanced phenolic extraction, antioxidant activity, and tannin content. The most appropriate method for producing high-quality *Syzygium samarangense* drink is fermenting for 14 days at 25°C with oven drying with leaf size less than 2 millimetres with selective percentage of 78.41% which was identified as the optimal processing condition, confirming the potential of *Syzygium samarangense* leaves as a functional herbal tea.

Conclusion: In conclusion, optimized fermentation and oven drying of small Syzygium samarangense leaf particles produced a high-quality functional herbal beverage with enhanced physical, chemical, and sensory properties.

Keywords: *Syzygium samarangense*, Fermentation, Drying Method, Oven, Microwave

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