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YST033 - ORANGE PEELS AND BASIL LEAVES HERBAL TEA

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ABSTRACT

The increasing demand for natural and health-promoting beverages has led to this innovation of a herbal tea infusion with orange peel powder (OPP) and basil leaf powder (BLP). The project aims to create a functional herbal tea drink using these two materials with the delivery of health benefits as well as protecting the environment by the utilization of fruit peels. A 50:50 OPP-BLP blend was prepared and evaluated for physicochemical properties, antioxidant activity, and sensory acceptability, with green tea serving as the control. The OPP-BLP herbal tea exhibited a golden-brown hue. Total phenolic content (44.71 mg GAE/L) and antioxidant activity (1700 $\mu\text{mol TE/L}$) of OPP-BLP herbal tea, though slightly lower than green tea, remained within a range that suggests meaningful health benefits. Sensory evaluation confirmed that the OPP-BLP herbal tea was lower in color and odor that may likely due to panelist familiarity with green tea but the OPP-BLP herbal tea scored higher for flavor, aftertaste and overall acceptability, reflecting a pleasing and harmonious flavor experience from the citrusy and aromatic herbal infusion. The innovation lies in waste valorization and the novel combination of herbal ingredients, offering a sustainable alternative to traditional teas. This product addresses consumer demand for natural, functional, and eco-friendly beverages, positioning it as a promising product in the herbal tea market.

Keywords – herbal tea infusion, orange peels, basil leaves, sustainable product development

INTRODUCTION

In recent years, natural and health-promoting drinks have been in rising demand among consumers as people seek something better than artificially flavored beverages. Herbal tea is an attractive choice among consumers due to its medicinal and functional properties. The current project involves the development of OPP-BLP herbal tea, a unique infusion with orange peel powder (OPP) and basil leaf powder (BLP). Orange peel, a fruit waste by-product normally discarded as waste, is rich in phytochemicals with antioxidant activity. While leaves of the basil plant have been known traditionally to have medicinal properties such as anti-inflammatory and antioxidant effects. However, their applications in commercial herbal beverages are restricted. The motivation for this product innovation lies in the need to create a value-added, sustainable tea product which, beyond the improvement of health, supports minimizing food wastage. The combination should be

unique in experience and offer functional health benefits in order to cater to the increasing consumer demand for natural drinks.

OBJECTIVE

To develop an innovative herbal tea infusion made from dried orange peels and basil leaves.

DESCRIPTION OF THE PROJECT

The developed product is an herbal tea infusion made from the combination OPP and BLP, designed as a health-promoting and sensory appeal drink. This herbal tea drink utilizes orange peels, a fruit by-product that helps contribute to food waste reduction and environmental sustainability. Table 1 shows results of the analysis of OPP-BLP herbal tea and green tea as a control.

Table 1: Result of analysis on OPP-BLP herbal tea and control

Sample	Color	TPC (mg GAE/L)	FRAP (umol TE/L)	Sensory Acceptability				
				Color	Smell	Taste	After taste	Overall acceptability
OPP- BLP Herbal Tea	L*:41.55±1.28 ^A a*:0.08±0.04 ^A b*:0.26±0.35 ^A	44.71± 2.50 ^B	1700± 28.28 ^B	3.68± 1.96 ^B	5.74± 2.13 ^A	4.06± 0.42 ^A	4.26± 0.34 ^A	4.42± 0.26 ^A
Green Tea	L*:40.84±0.90 ^A a*:-0.25±0.14 ^B b*:-1.20±0.45 ^A	257.94± 3.40 ^A	6056.25± 203.30 ^A	6.29± 2.48 ^A	5.87± 1.89 ^A	3.16± 0.54 ^B	3.10± 0.47 ^B	3.71± 1.44 ^B

Note: The different A-B capital letters indicate significant difference ($p < 0.05$) among sample and control.

The results showed a promising value of $L^*a^*b^*$ color analysis close to the color exhibited by control, in which the OPP-BLP herbal tea produced a golden-brown color of tea while control sample produced green color that is due to the chlorophyll pigments (Li et al., 2022). Golden-brown color of the OPP-BLP herbal tea may be attributed by the combinations of pigments present in both orange peels and basil leaves such as anthocyanin and carotenoid (Landi et al., 2012; Habibi et al., 2023). The major antioxidant compound in orange peels is hesperidin and due to its phytomediated character, orange peels are able to exhibit anticancer properties (Shrinath et al., 2023). Rosmarinic acid identified in basil leaves has proved to show high antioxidant activity compared to other compounds contained in basil (Nadeem et al., 2022). Rosmarinic acid acts as an antioxidant that guards against oxidative stress and aids in the prevention of cardiovascular and degenerative illnesses (Romano et al., 2022). This combination of both antioxidant compounds has the ability to work together synergistically in producing herbal tea infusion drink with great antioxidant capacity. Although the TPC and antioxidant activity of this formula are lower compared to the control sample, it nevertheless represents the most promising formulation, demonstrating substantial potential in approaching the efficacy of the control. In terms of sensory aspect, OPP-BLP herbal tea obtained low scores of color and smell compared to control, partly may be due to the familiarity of the panelists towards the green color and smell of green tea. However, regarding the aspect of taste and aftertaste, the developed OPP-BLP herbal tea obtained a higher score in comparison to the control sample. This may be because the citrusy flavor exhibited by the orange peels with the aromatic flavor of basil leaves produced a well-balanced taste that does not overtake or overshadow their respective tastes. In terms of the overall

acceptability, the OPP-BLP herbal tea also exhibited a higher scores compared to green tea indicating higher acceptance of herbal tea by the panelists.

NOVELTY

The novelty of this herbal tea lies in the utilization of underused agricultural waste products and medicinal plants in a new functional, health-promoting beverage. Herbal teas typically use well-known common ingredients like chamomile or mint, but this study incorporates orange peels that are normally regarded as waste products, as the primary ingredient together with basil leaves, an herbal plant that gives a synergistic mixture combination that elevate health benefits and flavor-wise. The tea drink is made entirely from plant-based materials; hence, it is caffeine-free. This may be suitable for individuals seeking non-stimulant drinks. This product has added value in offering specific health benefits along with current trend of herbal tea drinks. Hence, this study have been conducted in determining the best formulation of herbal tea drink and revealed that formulations incorporating 50% OPP and 50% BLP exhibit an overall great color, antioxidant activity and sensory acceptability. Apart from its functionality for being eco-friendly, it offers an aromatic profile from the synergy of the citrusy flavors of orange peels combined with the herbal scent from basil leaves.

CONCLUSION

In conclusion, the development of an herbal tea infusion from orange peel powder and basil leaf powder is an innovative, health-oriented, and sustainable approach to functional beverage formulation. The product is successful in utilizing agricultural waste and medicinal herbs to create a tea infusion that shows good antioxidant activity and sensory acceptability. Though it has lower total phenolic content and antioxidant activity than the green tea control, the herbal tea has excellent potential in its well-balanced taste, aftertaste and overall acceptability which were given higher sensory scores. Its golden-brown color and fragrance from natural pigments and bioactive compounds such as hesperidin and rosmarinic acid are additional values. Overall, this product not only aids consumer health but also environmental sustainability by upcycling fruit waste into a valuable, usable drink.

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