

# Development of a biscuit enriched with Tea polyphenols

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## Introduction

Tea is receiving increased interest from food scientists due to its purported antioxidant properties and health benefits. Polyphenols in tea are believed as excellent chemical compounds. Several clinical studies have proved polyphenols to be active in disease prevention in several ways. Polyphenols have also been recently recognized as functionally active molecules, possessing antioxidant, anticancer, anti-mutagenic properties, as well as exerting protective effects against cardiovascular and other diseases.

## Methodology

The current study was carried out at Eswaran Brothers Export (Pvt) Ltd, 104/11 Grandpass Road, Colombo 14. Laboratory analysis was done at Uva Wellassa University laboratories. In order to find better extraction method for tea polyphenol, preliminary study was conducted by using ethanol and water. Extraction efficiencies of water and ethanol were tested in different time and temperature combination. The total polyphenol content in the tea extract was determined by measuring the color development with Folin-Ciocalteu phenol reagent in alkaline medium (ISO 14502-1), at absorbance of 765 nm using UV-VIS spectrophotometer. Gallic acid was used as a standard and the total polyphenol were expressed as mg / g Gallic acid equivalents (GAE). For this purpose, the calibration curve of Gallic acid was drawn. Through preliminary study of the polyphenol extraction, as a polyphenol source 40 g BOPF black tea concentrated extracts were used for final product development. Three kind of final products were developed such as without extract, with water extract and ethanol extract. Organoleptic properties of the biscuits were evaluated using sensory analysis. Total polyphenol content of the final consumer accepted product also test with Folin-Ciocalteu phenol reagent in alkaline medium method.

## Results and Discussion

Through preliminary study high polyphenol content was obtained water at 80 C with 30 min extraction and 40 % ethanol solution at 40 C with 2 hr. extraction.

Table 1: Detail of total polyphenol content in water and ethanol extracts

Solvent at 40°C	Solvent type	Time (hr.)	Yield mg GAE/g	Solvent	Temperature (°C)	Time (min)	Yield mg GAE/g
Ethanol	100 %	4	507.38 ± 1.33	Water	100	60	84.71 ± 7.96
	100 %	2	618.98 ± 0.48		100	30	234.56 ± 20.21

	80 %	4	606.59 ± 1.26		80	60	275.78 ± 6.16
	80 %	2	529.13 ± 6.34		80	30	320.50 ± 7.29
	40 %	4	396.08 ± 1.06		60	60	274.73 ± 14.56
	40 %	2	671.28 ± 2.18		60	30	241.65 ± 0.98

Through the sensory analysis higher acceptance for overall acceptability ( $p < 0.05$ ) was observed for ethanol extract incorporated biscuit.

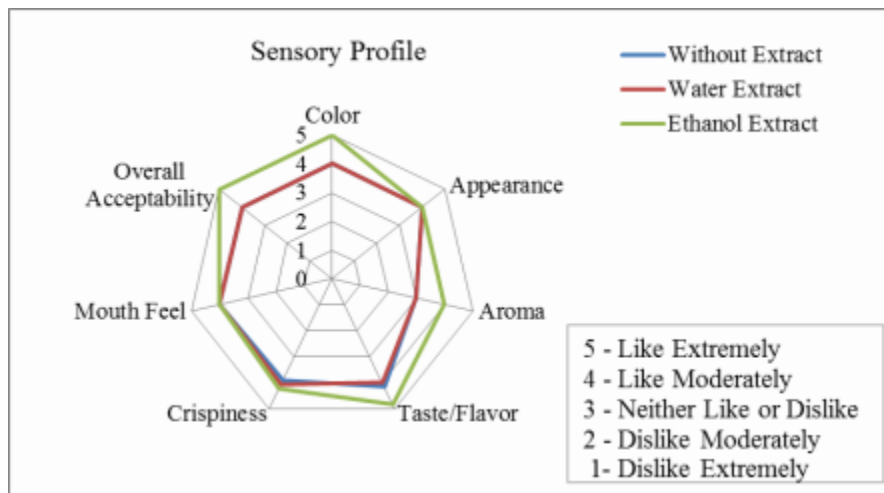


Figure 1: Overall sensory profile for developed product

On the basis of the United States Department of Agriculture “Serving Sizes” (for tea 240 ml), Balentine (2001) showed that black tea having 120 – 300 mg flavonoids / serving. (USAD Serving Sizes Hand Book). Total polyphenol content in consumer accepted biscuit ranged between 551.25 – 521.07 mg/10g (one biscuit), that mean one biscuit is equal to two cup of tea according to USAD Serving Sizes. If one person consume one cup of tea with developed biscuits that will give equal benefits (Tea Polyphenol) of consuming three cups of tea.



**Polyphenols rich biscuit**

Plate 1: Cup of tea with made biscuit

## Conclusion

The results from this study show that variations in the polyphenol content of various extracts depending on type of solvent used and that aqueous solvents were more efficient in extracting total polyphenol, compared to their corresponding absolute ones and using water.

Present study indicated that ethanol extracts were accepted by consumers as a polyphenol rich source in food product constituents, and might be an interest of wider usage as food components.

## References

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