Development of a Flavored Jelly Incorporated with Green Tea Extract

A.M.N.T. Sirisena, A.G.A.W. Alakolanga, H.M.S.K. Herath
Uva Wellassa University, Badulla, Sri Lanka

and

C.P. Wickramage
HVA Foods PLC, Linton Road, Kandana, Sri Lanka

Introduction

Tea (*Camelia sinensis*) is considered as one of the most popular non-alcoholic, non-carbonated beverage all over the world. It is rich with phenolic compounds, which have more health benefits. Green tea showed a higher polyphenol content than black tea (Anesini *et al.*, 2008). A cup of green tea (2.5 g of green tea leaves/200 ml water) may contain 90 mg of Epigallocatechin Gallate (Cabrera et al., 2006). At present, only 21% of the world tea market belongs to Sri Lanka however Sri Lankan tea industry produces 40 – 45 % of value added tea products from the total tea exports (Herath and Silva, 2011). Development of ready-to-use product by incorporating tea creates an additional value to the primary product of tea and it will attract more consumers towards. The objectives of this study were to develop a ready to serve jelly by incorporating green tea extract, and to determine total amount of polyphenol in the product, appropriate proportion of the ingredients, and the shelf life of the product.

Methodology

The research was conducted as three experiments. In experiment 1, the suitable jelling time and temperature combination were identified. The formulated sample was subjected for three levels of time and temperature combinations. To obtain proper texture for setting of green tea jelly, the mixture was heated up to the range of 100 – 110 C^{o} for about 5 to 10 minutes.

In experiment 2, by changing the green tea extract level (0, 1, 2 and 3%), suitable amount that should be incorporated to the product was identified by seven trained evaluators. Their responses were obtained under taste, aroma, texture, color and overall acceptability parameters. Pectin, sugar, water, permitted chemicals (citric acid, ascorbic acid, sodium benzoate) and green tea extract were used as the main ingredients.

In the third experiment, Apple flavor was used and by changing the flavor strength, the suitable flavor level for the product was identified. The developed flavored jelly was evaluated for taste, aroma, mouth feel and overall acceptability, using thirty non-trained evaluators. The data of the both sensory evaluations were collected through sensory ballots and their responses were obtained in five point hedonic scale.

Identification of yeast and moulds, *E'coli* / *Coliform* and aerobic plate count were done in order to evaluate quality of the product and determine the shelf life of the final product samples during ten weeks of storage period under both ambient and refrigerator conditions. The media solutions were prepared according to the Sri Lankan Standards 516 in 1991. Changes in pH value and dissolved solid content of final product were determined to identify the stability of the product.

As the chemical requirements of the jelly, determination of moisture, acid insoluble ash and pectin content were carried out according to the Sri Lankan Standards 585: part 5 in 1994. The polyphenol content was determined by following ISO 14502-1:2005. The cost analysis of the product was calculated by considering the expenses made for the ingredients and packing materials.

The data were analyzed by Kruskal-Wallis test (non parametric) with 95 % confidence level. To select the best treatment combination, mean separation was done by Conover-Inman method (Conover, 1999). Results were analyzed through MINITAB 15 and graphical methods were used to interpret the results.

Results and Discussion

There was a significant difference ($p<0.05$) in amount of the green tea extract added for the product. Green tea extract incorporation at 2% was found to be the best treatment level for the jelly under all considered conditions.

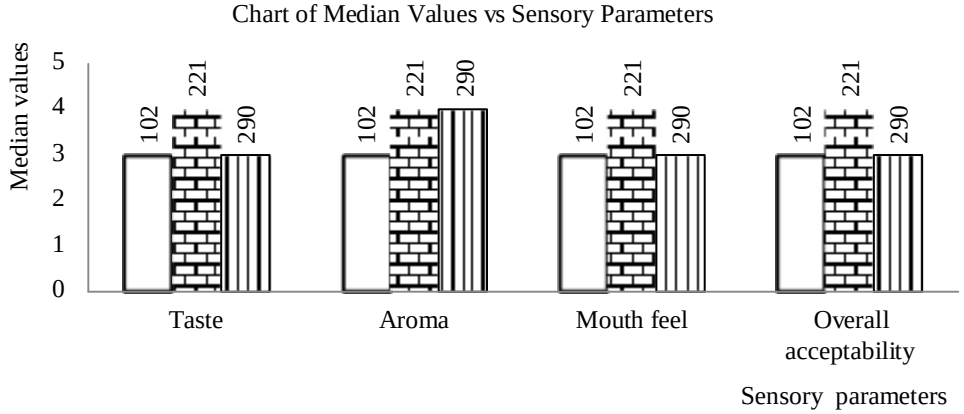

Figure 1. Medians values of taste, aroma, mouth feel and overall acceptability of three levels of apple flavor.

Figure 1 revealed that the formulated green tea jelly with 0.03% flavor strength (treatment 221) was the best flavor strength on all the sensory attributes and it used for the development of final product.

The total polyphenol concentration in green tea was found to vary from 21.02±1.54 to 14.32±0.45% of Gallic Acid Equivalents (GAE), whereas in black tea, the polyphenol content ranged from 17.62±0.42 to 8.42±0.55% of GAE ($p<0.05$) (Anesini et al., 2008). Polyphenol content in the green tea jelly was recorded as 13.65% (w/w). Therefore, the product is in the preferred and favorable range of polyphenol content both in black tea as well as green tea.

In shelf life evaluation, only yeast and mould were counted in the samples and it was very lower value. The pH value changed in the range of 2.8 -3.1 and dissolved solid content ranged from 57 to 60 within stored period. Moisture content of the samples was 53.69 % and the pectin content was 0.89%. The sample contained 0.08% of acid insoluble ash by mass. The total cost of manufacturing 20 g cup of the green tea jelly was Rs. 15.25 and highest cost was for the packing material.

Conclusions

Incorporation of 2% green tea extract and 0.03% apple flavor were superior for formulation of green tea jelly. Considering the least changes observed in the tested factors, it is suggested to keep the product under refrigerated condition. Changes of the tested factors were not harmful for the consumption and stability of the product within stored period.

References

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