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Influence of Stabilizers on Whey Separation and Sensory Attributes of Papaya (Carica Papaya L.) Based Drinking Yoghurt

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Abstract: *Drinking yoghurt is a type of stirred yoghurt of low viscosity. Serum separation is the main textural defect in drinking yoghurt during storage, which is industrially called "Wheying off". Hydrocolloids are commonly used to prevent serum separation in drinking yoghurt by increasing the viscosity, electrostatic and steric repulsion. Papaya is a good source of ascorbic acid, carotene, riboflavin which has high demand in local and international markets. Thus the objective of this study was to select the best suitable stabilizer with least whey separation of papaya based drinking yoghurt. Papaya drinking yoghurts were prepared according to standard method with slight modification to its composition. Acidophillus culture was used as starter culture. There were two preliminary trials to select the best level of three types of stabilizers among gelatin, pectin and CMC (Carboxy Methyl Cellulose) and to select the best level of incorporation of stabilizer. There were three treatments by varying level of stabilizers as 0.50% of CMC 0.50% of pectin and 0.50% of gelatin as the second trial based on first trial. All treatments were analyzed for the flavor, color, aroma, taste, texture, mouth feel and overall acceptability sensory attributes at 4 °C using 30 untrained panelists. Whey separation, pH, titratable acidity, total plate count of treatments were assessed for 15 days at 4 °C. Whey separation, microbial and chemical data were analyzed using one way ANOVA and sensory data were analyzed using Freidman non parametric test using Minitab 16 software. Based on the sensory analysis, 0.5% of gelatin incorporated treatment showed significant difference ($P<0.05$) between other two treatments. Incorporation of both gelatin and CMC showed the least whey separation at 0.5% level of incorporation. There was no significance difference ($P>0.05$) between pH, titratable acidity, total plate count with storage for 15 days at 4 °C of 0.5% of gelatin incorporated papaya based drinking yoghurt.*

Keywords: *CMC, Drinking yoghurt, Gelatin, Pectin, Whey separation*

1. INTRODUCTION

Yoghurt is defined as fermented dairy products obtained from coagulation of milk by the agency of organisms of types *Streptococcus thermophillus* and *Lactobacillus bulgaricus, Lactobacillus acidophillus* may be present [6]. The product having a semi solid or liquid consistency intended for drinking is defined as drinking yoghurt [6]. Drinking yoghurt is categorized as stirred yoghurt of low viscosity, and this product is consumed as a refreshing drink. Many types of yoghurt can be considered to be oil-in-water emulsions [7]. Drinking-type fermented milk products are prepared through adding water to yoghurt and can be considered as variations of stirred types with a rather lower viscosity [7]. Optimum consistency and homogeneous texture for good mouthfeel and no serum separation are desired characteristics for fermented milk beverages. Serum separation occurs in fermented milk beverages without the use of stabilizers [4]. Serum separation is the main textural defect in drinking typefermented milk products during storage, which isindustrially called "Wheying off". It is the separation ofproduct into a casein-rich lower layer and a clear upperlayer of serum [3].

Hydrocolloids are very commonly used to prevent serum separation in fermented milk products by increasing the viscosity, electrostatic or/and steric repulsion[3]. In this capacity, the hydrocolloids, which are generally added to the milk prior to fermentation, can improve the viscosity, maintain the yogurt structure, inhibit syneresis, alter the mouthfeel, and, in the case of yogurt with added fruit, help to keep the fruit in suspension [1]. Gelatin, carboxy methyl cellulose, and high methoxy pectin all may be used to achieve these results.

Papaya (*Carica papaya* L.) is a delicious and good source of ascorbic acid, carotene, riboflavin and a fair source of iron, calcium, thiamin, niacin, pantothenic acid, vitamin B-6 and vitamin K which has high demand in the local and international markets. However, post-harvest losses of papaya fruits in Sri Lanka considerably higher (45%) [5]. Thus the objective of this study was to select the best suitable stabilizer with least whey separation of the papaya based drinking yoghurt.

2. MATERIAL AND METHODS

Papaya drinking yoghurts were prepared according to standard method as described in Tamime& Robinson (2007)[7] with slight modification to its composition. *Acidophillus* culture was used as starter culture. There were two trials to select the best level of three types of stabilizers as gelatin, pectin and CMC (Carboxy Methyl Cellulose) and to select the best level of incorporation of stabilizer. As the second trial, there were three treatments by its level of stabilizers as 0.50% of CMC 0.50% of pectin and 0.50% of gelatin on the basis of first trial.All treatments were analyzed for the flavor, color, aroma, taste, texture, mouth feel and overall acceptability sensory attributes at 4 °C using 30 untrained panelists. Whey separation of treatments were assessed for 15 days at 4 °C. pH, titratable acidity, total viable plate count, were assessed for selected samples at 4 °C for 15 days. Whey separation and microbial and chemical evaluation were analyzed by using one way ANOVA and sensory data were analyzed using Freidman non parametric test using Minitab 16 software.

3. RESULTS AND DISCUSSION

There was a significant difference (P<0.05) between each stabilizer and levels that added to papaya incorporated yoghurt drink. Incorporation of both gelatin and carboxy methyl cellulose showed the least whey separation at 0.5% level of incorporation.

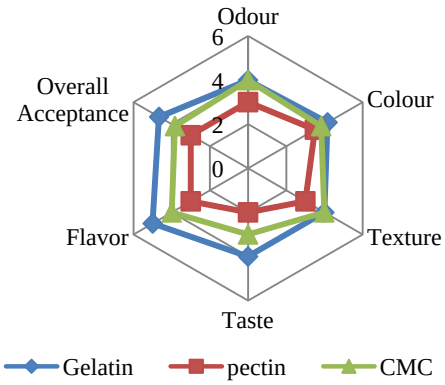

Fig. 1: Web diagram for sensory analysis of 0.5% level of incorporation of stabilizers

However, based on the sensory analysis, 0.5% of gelatin incorporated treatment showed significant difference (P<0.05) between other two treatments. According to Fiszman*et al*., (1999)[2], this may due to gelatine is neutral in taste therefore, used widely in the textural stabilization of yoghurt.

There was no significance difference (P>0.05) between pH, titratable acidity, total plate count and yeast and molds with storage duration for 15 days at 4 °C of selected sample.

4. CONCLUSION

Both gelatin and CMC at 0.5% of incorporation level showed lowering of the whey separation in papaya based drinking yoghurt. Among gelatin and CMC, 0.5% of gelatin incorporated treatment showed higher acceptance with respect to all sensory attributes except odour and texture.

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