

## DEVELOPMENT OF DRAGON FRUIT INCORPORATED ICE-CREAM

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### INTRODUCTION

Dragon fruit (*Hylocereus undatus*) is a well established new crop in China, Israel, Malaysia, Taiwan, Vietnam; it has become a major export, which gets a hold of a higher price than a durian (*Durio zibethinus* Murr.), the “king of fruits” in Southeast Asia. It is a fast return perennial fruit crop with full production after five years (Gunesena et al., 2006).

Dragon fruit has been reported as a source of beta- carotene, lycopene, and vitamin E; it can reduce the risk of cancer (IkāoeOikeda et al., 2010). Thus dragon fruit has potential for use as a source of functional ingredients to provide nutrients that may prevent nutrition-related diseases and improve physical and mental wellbeing of the consumers (Omenn et al., 1996).

The shelf life of dragon fruit is drastically reduced with the movement of fruits from in and out of cold storage (Gunaseena et al, 2006). Evidence show that after harvesting the respiratory rate decreases and the weight loss increases showing visible shriveling within eight days of storage (Arevalo-Galarza and Ortiuz-Herrnandes, 2004). Therefore, alternative methods are required to maintain the quality of the product for an extended shelf-life as of the fresh fruit. The main objective of this research was to convert the pulp obtained after harvest into value added products and to minimize the economical losses.

Key words: Dragon fruit, Anti oxidant, Ice cream, value addition

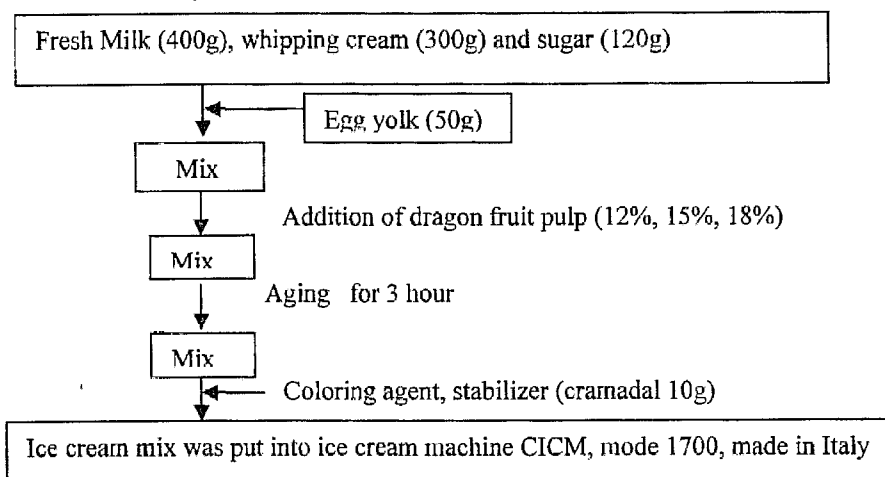
### METHODOLOGY

#### Collection of Samples

Sixty Fresh ripened Dragon fruits were purchased from farm and transferred to Food Processing laboratory of Department of Food SCIENCE and Technology, Faculty of Livestock Fisheries and Nutrition, Wayamba University of Sri Lanka.

#### Processing of dragon fruit pulp incorporated ice cream

Dragon fruit pulp was separated from the skin by peeling it away or scooping out the fruity flesh then it was sliced into small pieces (1x1cm) and frozen at -14<sup>o</sup>c to get dragon fruit pulp thereafter it was gently blended for 2minutes to obtain homogenous fruit pulp.



Distribute in small cups and keep under frozen condition at -14°C

Figure 1: Procedure of Ice cream making is given in the diagram

**Sensory analysis**

**Table 1. Treatments assigned to find out the best formula**

changed character	Treatment	W/W%
pulp content	T1	12
	T2	15
	T3	18

Sensory evaluation for each ice cream sample was carried out with 30 semi-trained panelists after the preparation of ice cream and each week on texture, flavor, appearance, overall acceptability.

The scores were analyzed by Fried Mann ranking test ( $p < 0.05$ ) and mean separation (Meilgaard, 1999) using MINITAB 11

**Microbiological analysis**

Total plate counts were determined in serial dilutions for each ice cream sample on weeks by using pour plate method according to the microbiological test methods (FDA, 1992).

**Chemical analysis**

pH, titratable acidity, fat content and protein content of ice cream samples were measured using different laboratory techniques recommended by AOAC (1995). The samples were analyzed weekly for 13 weeks of storage at  $-14^{\circ}\text{C}$ .

The pH of dragon fruit ice cream was measured by using a laboratory pH meter after the calibration and titratable acidity was measured by titrating 10.0 mL of filtered ice cream with 0.1 M NaOH Using phenolphthalein as an indicator.

The dry matter content of the ice-cream samples was determined using air oven at  $100 \pm 1^{\circ}\text{C}$  for 3.5h (TSE, 1994). The fat content of ice cream sample was determined in dry basis by using soxlet method, for the estimation of protein; kjeldahl analysis was conducted to the dry ice cream sample.

**Physical analysis**

**Total soluble solids (TSS)**

TSS of ice cream was estimated using a handheld refractrometer N-4E, made in Japan.

**Over run**

The overrun of the final product was calculated using the following equation (Akin, 1990):

$$\text{Overrun} = \frac{\text{Weight of unit mix-weight of Equal volume of ice-cream}}{\text{Weight of equal volume of ice-cream}} \times 100\%$$

**Complete melting time**

Complete melting times were measured according to Guven and Karaca (2002). 25 g of tempered samples were left to melt (at room temperature,  $20^{\circ}\text{C}$ ) on a 0.2 cm wire mesh screen above a beaker and the complete melting time of the ice cream was found out.

**Statistical Analysis**

Result of sensory evaluation was analyzed by Friedman rank test ( $p < 0.05$ ) using MINITAB 11 and results of chemical analysis was analyzed by ANOVA using MINITAB 11.

## RESULTS AND DISCUSSION

**Table.1.** Mean scores given by panellist for different treatments with Standard deviation

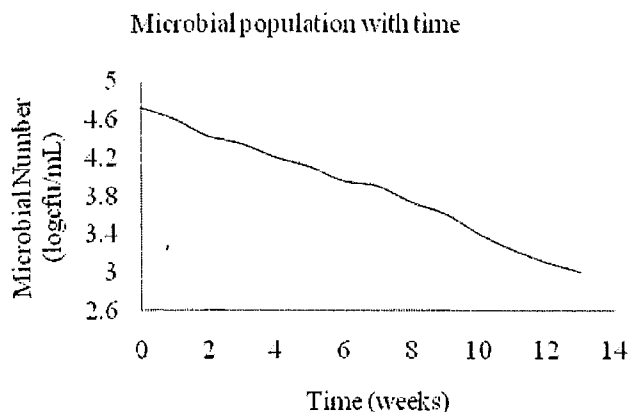
Character	p value	mean	+SD
Texture	0.005	5.48	0.718
Flavor	0.002	5.53	0.671
Appearance	0.000	5.58	1.041
Overall Acceptability	0.000	5.51	1.073

There was significant difference between the sensory characters ( $p < 0.05$ ). When increase the dragon fruit pulp content the overall acceptability was reduced it is due to the increment of fiber content and the change in the texture of dragon fruit incorporated ice cream. According to the sensory evaluation, formula of 12% of pitaya pulp was selected as most acceptable product.

According to the Frozen Confections Regulation, any frozen confection for sale should not contain more than 50 000 bacteria per gram. According to the microbial evaluation for the dragon fruit incorporated ice cream sample, the initial microbial population was less than 50,000 /ml and it was in the acceptable microbial range (Figure 2). Although the freezing temperature reduces the total microbial count since the degradation of nutrient is continued and it can not be completely stopped thus, there is a slight change in pH, titratable acidity and also the brix value.

There was no significant difference between the pH of dragon fruit incorporated ice cream ( $p > 0.05$ ), it remain as  $6.56 \pm 0.031$  during the storage time. There is slight increase in the pH was observed, it was due to oxidation reaction of antioxidants, chemical and bio chemical mechanism (Hui, 2006). In the dragon fruit, malic acid is produced through the chemical reaction during the storage period (Nomura et al, 2005).

Even in the storage period, there was slight reduction in bacterial count was observed. The decline in bacterial counts, as a result of freezing, was likely due to the freeze injury of cells, leading eventually to the death of cells. However, the mechanical stresses of the mixing and freezing process and also the incorporation of oxygen into the mix may have resulted in a further decrease in bacterial count. Similar results were reported by Ravula and Shah (1998), Shah and Ravula (2001) and Haynes and Playne (2002).



**Fig 2:** microbial population with the time tly changing with the storage time. There is no significant difference between the total soluble solid ( $p > 0.05$ ).

### **Chemical and physical characteristics**

Chemical composition of ice cream incorporated with 12% of dragon fruit pulp was determined according to (TSE, 1994). pH  $6.56 \pm 0.031$ , Ash content  $3.7 \pm 0.161$ , Dry matter  $39.58 \pm 0.281$ , and fat content  $45.37 \pm 0.99\%$ , protein content  $7.73 \pm 0.34\%$  and also other measurements like complete melting time  $4572 \pm 20$ s, overrun value 22.84%.

### **CONCLUSION**

Study concluded the feasibility for valuable venture of producing ice cream with 12% of dragon fruit pulp and with higher acceptability thus the possible post harvest losses can be reduced by this value addition process.

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