

PRODUCT DEVELOPMENT OF PURPLE SWEET POTATO ICE CREAM

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Abstract - The research objective of this study the production of purple sweet potato ice cream. The result form 3 ice cream recipes in quality of sense test was used for select the recipe to develop the standard recipe for development of purple sweet Potato ice cream product. The ingredients of standard recipe milk 500 ml. whipped cream 250 grams sugar 160 grams salt 1/8 teaspoon egg yolks 3 eggs water, 120 ml and vanilla 1 teaspoon The first recipes was the ratio had satisfaction score appearance, color, texture (smoothness) and overall 7.75 7.70 7.15 7.25 and 7.70 respectively. This study on the amount of purple sweet potato in ice cream. It was found that the amount of purple sweet potato 10, 20, 30 supplemented with 30% purple sweet potato was found in appearance and the average color range was 7.00 and 7.16 the ratio had satisfaction score between minimum score to median score, 10% and 20%, because the amount of purple sweet potato, the color of the ice cream is darker. For the study of Carboxymethyl Cellulose, CMC in the development of purple sweet potato ice cream. The stabilizer interacts with the protein and captures the water molecule. The amount of free water in the ice cream decreases, thereby reducing ice crystals. When added to the stabilizer, the viscosity of the ice cream was higher.

Keywords - Purple sweet potato, Ice Cream Product, Recipes, Cost

I. INTRODUCTION

Ice cream is a product that is very popular in Thailand because of the weather in Thailand and the behavior of consumers changed, they turn to consume ice cream as needed, such as to relax the heat, a dessert after eating. The texture and taste of ice cream are also important for the consumption of local people to enjoy more ice cream. On average 30-50% , an increase in sale of ice cream during summer sales are higher than normal; this is due to increased purchasing power, the continued economic growth of 300 baht, the policy of the pledge of agricultural crops, and also focus on an increased promotion activities according to the intensity of the competition in the ice cream industry. (Kasikorn Research Center, 2016) Ice cream is generally composed of milk, stabilizer, emulsifiers, flavoring agent, and other ingredients such as flour, food colors, etc., (Marshall and Arbuckle, 1996). According to the Ministry of Public Health, there are five types of ice cream: milk ice cream, modified ice cream, mixed ice cream, liquid ice cream, dried or powdered and sweet ice cream. Sherbet products are frozen products of fruit juice contains: sugar or fruit, fruit acid, fruit coloring agent, stabilizer, and there is a small amount of milk fat and less concentrated than milk ice cream. The ice cream's texture has the roughness or appearance of ice crystals over milk ice cream. (Notification of Ministry of Public Health, 2011)

Sweet potato is a root crop. It is the world's seventh most important food crop after wheat, corn, potato, barley and cassava. The sweet potato is important because it is easy to grow and has high yields (Kamonwan, 2011 and Melada, 2014). The sweet

potato can be grown in all parts of Thailand; central region has the most potential to produce sweet potatoes; average yield per rai is about 9 tons, price of sweet potato in Thailand in 2015 is 20 baht per kilogram. (Ministry of Agriculture and Cooperatives Department of Agriculture, 2015) Sweet potato is a source of carbohydrates, proteins, fiber, foods, vitamins, minerals and many health-promoting compounds, especially vitamin C, carotene and anthocyanin. The sweet potato will look different flesh colors which affects the nutritional value, the orange-fleshed sweet potatoes are found in high doses of beta carotene. Yellow sweet potato contain vitamin B, vitamin C and antioxidants. The purple sweet potato is found anthocyanin substances; it has antioxidant properties that can reduce inflammation; it helps prevent blood vessels lower cholesterol; it reduces the risk of cancer, heart disease and stroke. Therefore, this research studies the development of purple sweet potato ice cream to increase the variety of purple sweet potato products, consumers have a choice. This results in bringing purple sweet potato into the product development of the ice cream. As the consumption of ice cream in the country has continued to grow. The product development of purple sweet potato ice cream will result in more products from purple sweet potato. It also encourages consumers to enjoy the benefits of eating ice cream; there are more colors to eat, which can increase the value and can be produced in the industry to increase income for Thai people today.

II. OBJECTIVE

1. Study the standard recipe for making purple sweet potato ice cream.

2. Study the appropriate quantity of purple sweet potato for making purple sweet potato ice cream.
3. Study the stabilizer quantity in the production process of purple sweet potato ice cream.

III. RESEARCH METHODOLOGY

1. The standard recipe for making purple sweet potato ice cream.

Selection of standard recipes and methods for making ice cream; there were 3 recipes, sensory quality assessment by acceptance test method, used 9 – Point Hedonic scale to assess the appearance, color, odor, taste, texture (melt in the mouth) and overall preference; the experimental study used testers who were not trained 50 peoples, the experimental design was Randomized Complete Block Design: RCBD, analysis of variance, and compared the difference between the average by Duncan’s New Multiple Range Test method at the 95% confidence level.

2. Study the appropriate quantity of purple sweet potato in the production of the purple sweet potato ice cream.

The preparation of raw sweet potato; brought purple sweet potatoes to boil and peel and then the purple sweet potato mashed thoroughly, it had a fleshy purple sweet with fine texture. After that the researcher brought the most standard recipe of ice cream accepted by consumers to produce sweet potato ice cream; varying the purple-fleshed sweet potato at 25%, 50%, and 75% of total weight. Sensory quality assessment by acceptance test method, used 9 – Point Hedonic scale to assess the appearance, color, odor, taste, texture (melt in the mouth) and overall preference. The experimental study used testers who were not trained 50 peoples, the experimental design was Randomized Complete Block Design: RCBD, analysis of variance, and compare the difference between the average by Duncan’s New Multiple Range Test method at the 95% confidence level.

3. Study the stabilizer quantity in the production process of purple sweet potato ice cream.

Selection of the ice cream recipe of purple sweet potato accepted by consumers to study the stabilizer, in the experiment was selected substance of Carboxy Methyl Cellulose which was used in the development of the ice cream product; the ice cream recipe was varied the stabilizer quantity at 0.35, 0.40 and 0.45 percent of total weight. Sensory quality assessment by acceptance test method, used 9 – Point Hedonic scale to assess the appearance, color, odor, taste, texture (melt in the mouth) and overall liking. The experimental study used testers who were not trained 50 peoples; a sample form of the sensory quality assessment was touched in Appendix B. The experimental design was Randomized Complete Block Design: RCBD, analysis of variance, and compare the difference between the average by Duncan’s New Multiple Range Test method at the 95% confidence level.

IV. RESULTS

1. The results of the standard recipe for making ice cream.

There were evaluation of the sensory quality of the standard recipes of the ice cream standard and to test the acceptance by the testers used 9 – Point Hedonic scale to assess; by the assessment of 50 students and the general public testers. It found that the quality, appearance, texture, texture and overall preference were 7.75, 7.70, 7.15, 7.25 and 7.70, respectively. The 1st recipe was more preferable to the 2nd and the 3rd recipe because of the composition of milk fat and whipped cream, fat acted as a flavor and improves taste, this was consistent with Marshall and Arbuckle (1996). In the process of spinning ice cream, fat cells were surrounded by air cells in a thin film, reducing the size of ice crystals. The ice cream had a smooth texture, the melting of the ice cream slowed down. Fat was a flavor carrier; the better a flavor carrier, this resulted in the better flavor. As a result, the overall preference of the 1st ice cream recipe was in the middle, which was significantly higher than the 2nd and the 3rd recipe, respectively; there was a statistically significant difference at 95% confidence level.

Sensory Characteristics	Standard Recipe		
	1	2	3
Appearance	7.75±0.91 ^a	6.85±0.98 ^b	6.65±1.75 ^b
Colour	7.70±0.93 ^a	6.80±1.19 ^b	7.15±1.34 ^{ab}
Odor ^{ns}	6.80±0.89	6.55±0.82	6.65±1.78
Taste ^{ns}	7.15±1.30 ^a	5.60±1.60 ^b	5.85±2.00 ^b
Texture ^{ns}	7.25±1.01 ^a	6.40±1.42 ^b	5.90±1.71 ^b
Overall ^{ns}	7.70±0.65 ^a	6.35±1.26 ^b	6.25±1.44 ^b

Remark : Mean ± Standard Deviation

^{a,b,c...} Means with the different letters are significantly different (p≤0.05).

^{ns} Means are not significantly different (p>0.05).

Table 1. Sensory characteristics of standard recipe of making purple sweet potato ice cream.

2. The results of the study on the appropriate quantity of purple sweet potato for making ice cream products.

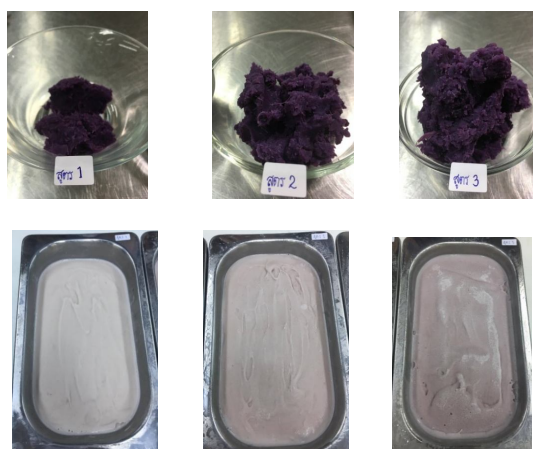
Sensory quality assessment was to find the basic recipe of the purple sweet potato ice cream; this study selected the first recipe for making purple sweet potato ice cream to study the appropriate quantity of purple sweet potato added to the purple sweet potato ice cream, by adding purple sweet potato at 10, 20 and 30 percent. After that, the 9-point Hedonic Scale was evaluated by using 50 untrained testers who were students and the

general public testers. The quality, appearance, and color were evaluated which all three levels were statistically significant difference at the 95% confidence levels. The recipe supplemented the purple sweet potato at 10 % have an average of 6.42 and 6.12, 20% of added purple sweet potato had an average of 6.56 and 6.36, and the 30% purple sweet potato added recipe had an average of 7.00 and 7.16. This indicated that the testers accepted the appearance and color of the percentage level, which the 30% purple sweet potato was preferred to be mild to moderate.

Sensory Characteristics	Purple sweet potato quantity per wheat flour (percent)		
	10	20	30
Appearance	6.42±1.19 ^b	6.56±1.16 ^{ab}	7.00±1.30 ^a
Colour	6.12±1.36 ^b	6.36±1.17 ^b	7.16±1.43 ^a
Odor ^{ns}	6.06±1.34	5.98±1.58	6.22±1.43
Taste ^{ns}	6.64±1.36	6.36±1.17	6.22±1.67
Texture ^{ns}	6.68±1.31	6.70±1.41	6.70±1.41
Overall ^{ns}	6.66±1.18	6.66±1.49	6.96±1.19

Remark : Mean ± Standard Deviation
^{a,b,c...} Means with the different letters are significantly different (p≤0.05).
^{ns} Means are not significantly different (p>0.05).

Table 2. Sensory characteristics of the appropriate quantity of purple sweet potato for making ice cream products at 10, 20 and 30 percent.



3. The results of the study on the appropriate stability quantity of the purple sweet potato ice cream.

Sensory quality assessment was carried out to determine the optimum stability quantity in the purple sweet potato ice cream at 0.35, 0.40 and 0.45 percent. The study were evaluated by 50 untested testers who are students and general public guests; it found that the quality, color, odor and taste were not significantly different at the 95% confidence level, and the statistical difference found that the texture and overall preference scores of the first recipe have higher preference score than the others; showed that the

stabilizer reacted with protein and captured water molecules. This resulted in the amount of free water in the ice cream decreased, thus reducing ice crystals. The study found that an increase in the stabilizer quantity at 0.35%, 0.40% and 0.45%, corresponded with Arbuckle (1986), when increasing the stabilizer quantity, the viscosity of the ice cream was higher, reduced the leavening amount of ice cream while aerated in the freezing process; this increase smoothness and slow down the melting of ice cream.

Sensory Characteristics	% CMC		
	0.35	0.40	0.45
Appearance	7.26±1.34 ^a	6.70±1.63 ^b	6.62±1.57 ^b
Colour ^{ns}	7.38±1.18	7.00±1.54	7.08±1.53
Odor ^{ns}	6.78±1.52	6.68±1.53	6.44±1.69
Taste ^{ns}	7.02±1.46	6.44±1.89	6.42±1.94
Texture	6.72±1.42 ^a	5.96±1.80 ^b	5.86±1.62 ^b
Overall	7.24±1.29 ^b	6.74±1.47 ^{ab}	6.58±1.55 ^a

Remark : Mean ± Standard Deviation
^{a,b,c...} Means with the different letters are significantly different (p≤0.05).

^{ns} Means are not significantly different (p>0.05).

Table 3. Sensory characteristics of the purple sweet potato ice cream which use CMC at the level of 0.35, 0.40 and 0.45percent flour.

CONCLUSION

1. Study the standard recipe for making ice cream.

The results of the sensory quality assessment of the 3 standard recipes for selection as a standard recipe for the development of purple sweet potato ice cream; the

study found that the optimal recipe was used the development of the purple sweet potato ice cream; it was the first recipe of which consists of 500 ml of fresh milk, 250 grams of whipped cream, 160 grams of white sugar, 1/8 teaspoon of salt, 3 egg yolks, 120 ml of water and 1 teaspoon of vanilla.

2. Study the appropriate quantity of purple sweet potato for making ice cream products.

Sensory quality assessment of the study of purple sweet potato in ice cream; it found that the quantities of purple sweet potato with 10%, 20% and 30% ; with 30% had the highest score of preference, 10% and 20% had the score of preference which were between low to moderate. When added the purple sweet potatoes, this resulted in the appearance and color of the ice cream was darker.

3. Study the optimal stabilizer quantity for making purple sweet potato ice cream.

The study of the quantity of Carboxymethyl Cellulose showed that the addition of Carboxymethyl Cellulose into the purple sweet potato ice cream were at 0.35, 0.40 and 0.45 percent of total weight; the test results showed that the addition of the substance of Carboxymethyl cellulose at 0.35 percent had a score of preference for appearance, texture and overall preference. The stabilizer substance resulted in the viscosity of the ice cream; reducing the leaven amount of ice cream while aerated in the freezing process; this increase smoothness.

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REFERENCES

- [1] Journal of Natural Agriculture. Traditional sweet potato, multicolored sweet potato, healthy food store. Bangkok, Thailand. 3/2010. 80 pp.
- [2] Kamolpipat Chanasit, Patchaya Paemongkol and Nanon Dangsawan. (2013). **Product Development of yogurt Ice cream with supplemented aloe vera**. Faculty of Agriculture and Biology: Food Science, 7th National Science University, Rajamangala University of Technology.
- [3] Kamonwan Jaengchad. (2011). Development of instant soups from the sweet potato for the elderly. Bangkok: Kasetsart University.
- [4] Kasikorn Research Center. (2016) "Food and Beverages Industry." [Http://www.kasikornbank.com/SME/Documents/KSMEAnalyses/IndustrySolution_FoodsAndBeverages_2015.pdf](http://www.kasikornbank.com/SME/Documents/KSMEAnalyses/IndustrySolution_FoodsAndBeverages_2015.pdf) (Retrieved on July 1, 2016).
- [5] Malinee Phitak, Somsri Boonruang, and Rangsiman Samrit. (1999). **Sweet Potato Plantation**. Farmer Advocate Department of Agriculture.
- [6] Naraporn Promkaiworan (2012). **The Amount of Antioxidants the Composition and Physical Properties of Purple Starch Grown in Thailand**. Bangkok: Kasetsart University.
- [7] Nantaporn Ekkani (2011). **The development of herbal ice cream products**. Suan Sunandha Rajabhat University, Bangkok.
- [8] The Food and Drug Administration Notification of Ministry of Public Health No. 222. [Online] Source: <http://newsser.fda.moph.go.th> (Retrieved on June 3, 2016).
- [9] Wanna Tungcharoenchai and Vibulsak Kavilaya (1988). Milk and dairy products. Odeon Store, Bangkok.
- [10] Marshall, R.T. and Arbuckle. W.S. (1996). Ice cream. 5th ed. Chapman & Hall, New York. 349 p.

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