



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating 2017: 5.03
TPI 2017; 6(9): 05-08
© 2017 TPI
www.thepharmajournal.com
Received: 04-07-2017
Accepted: 05-08-2017

Vipin Kumar Verma
M.Sc. (Dairy Tech) Student,
Warner College of Dairy
Technology, SHUATS, Naini,
Allahabad, (UP), India

Shanker Suwan Singh
Assistant Professor, Warner
College of Dairy Technology,
SHUATS, Naini, Allahabad,
(UP), India

Preparation of ice cream blended with Cocoa and Sago powder

Vipin Kumar Verma and Shanker Suwan Singh

Abstract

Ice cream cocoa powder is one of the most popular dessert options all over the globe liked by people of all age groups. Cocoa originates from beans of the cocoa tree (*Theobroma cacao* L.) and it is an important commodity in the world and the main ingredient in chocolate manufacture. Its value and quality are related to unique and complex flavors. Bulk cocoas (Forastero type) exhibit strong basic cocoa notes, whereas fine varieties (Criollo, Nacional) show aromatic, floral, or smoother flavor characteristics in ice cream. The obtained ice cream made from cocoa and sago powder is effective in thickness and stability quality. The role of sago powder was as stabilizer. A combination of cocoa and sago powder was used ratio (1.5:2), (1.5:3), (1.5:4) for different treatment i.e. for the combination was effective in ice cream without affecting the physico-chemical analysis and sensory of formed ice cream. The microbiological analysis was performed to study the consumption quality of the manufactured ice cream. The standard plate count was highest 2.40×10^3 , coli form count was NIL and highest yeast and mould 10 indicating that the product is safe for consumption. According to the analysis, treatment T₂ with 1.5% sago powder and 3% cocoa powder was found the best among the four.

Keywords: cocoa powder, sago powder, Ice Cream.

1. Introduction

Ice cream is a frozen food made from milk fat, milk solids-not-fat, sweeteners, and flavorings; a variety of fruits, nuts, and other items also may be added. Ice cream in the United States has a legal definite, which can be found in the Code of Federal Regulations (CFR 2003b), which specifies solids, fat, and air contents. These specifications state that vanilla ice cream must contain a minimum of 10% milk fat by weight, a minimum of 20% milk solids and at least 192g of total food solids per liter of ice cream, with each liter of ice cream weighing a minimum of 540 g. Other ice cream categories exist, such as reduced calorie ice creams, which in the United States must meet the nutrient claims that comply with "reduced fat." (CFR 2003a) These legal requirements soften dictate the types and ratios of ingredients used in frozen desserts as well as some of the processing conditions. Because minimum contents (except air content) normally are stated in the federal requirements, commercial ice creams vary considerably in body, flavor, melt, and texture characteristics. Recent statistics have shown that 61% of all frozen dessert products manufactured in the United States fall into the ice cream category and 26% into the non fat and low fat ice cream category. The remaining portions of frozen dessert products consist of frozen yogurt (5%), water ices (4%), sherbets (3%), and other (1%) categories [International Dairy Foods Association (IDFA) 2002].

Cacao is a top source of antioxidants, and it contains an abundance of magnesium and iron. To make our cacao powder, the finest cacao beans are milled at low temperature to protect the nutrients and flavor. Our cacao powder is a healthy alternative to conventional over-processed "cocoa" used for baking, hot chocolate, desserts and smoothies.

The present study was planned and conducted to evaluate the suitability of sago (tapioca starch) as a functional ingredient in ice cream. In this study an attempt was made to prepare a regular fat (10.0%) ice cream using a combination of sago and whey protein concentrate (WPC-70) as stabilizer and emulsifier respectively and see whether it can compare favourably with premium ice cream. The experimental ice cream (10.0% fat) was compared against two control ice creams, one having 10.0 % fat and other having 14.0% fat using commercial stabilizer (Na-alginate) and emulsifier (glycerol monostearate). The tentative formulation of sago and WPC based ice cream was studied using vanilla as flavouring. Sago and WPC was incorporated in experimental ice cream mix at 1.0 and 0.5% (w/w) respectively.

Correspondence
Vipin Kumar Verma
M.Sc. (Dairy Tech) Student,
Warner College of Dairy
Technology, SHUATS, Naini,
Allahabad, (UP), India

Sago in combination with WPC helped in imparting desired body and texture, and richness quite similar to premium ice cream. The sensory characteristics of experimental ice cream were at par with those of premium ice cream but significantly greater than those of regular control ice cream. It can be concluded that regular ice cream can be successfully prepared using sago and WPC with sensory characteristics at par to that of premium ice cream. Such ice cream was sensorily more acceptable than regular ice cream made using commercially available stabilizer and emulsifier.

Nutritional information of sago powder

Characteristics	Amount percent per 100 gram
Carbohydrate	94gm
Protein	0.2gm
Fat	0.2gm
Calcium	10mg
Iron	1.2mg
Potassium	5mg

There are several health benefits of sago powder

- Sago or sabudana is a food which is full of energy and carbohydrates. It is extracted from the centre of sago palm stems in the form of starch.
- Pearl sago is used as one easily digestible non-irritating baby food as well as a food in inflammatory cases.
- Sago grains are about 2mm in diameter. They are source of pure carbohydrate with very little protein, vitamin C, calcium and minerals.
- The main content of sago is carbohydrate and has an ancient history in aiding to certain herbal medicines. Sago along with rice is used to cool the body.
- Various dishes are made from sago as it is easily mixed with wide variety of tastes and spices. However, sago is low in proteins, vitamins and minerals, its combination with other supplements can result into high nutrition and taste.
- Sago food is full of energy, and often served as a food to break the fast. It has high beneficiaries for sick people as a supplement providing enough energy to combat the weakness and ailments.
- In weeks only you can gain weight with the help off sago. People who are suffering from eating disorder or lack of appetite can increase their weight with the help of the rich calories containing in the tapioca.
- Five milligrams of potassium is contained by 100 grams of sago. Potassium is known for improving the circulation of blood and also the whole cardiovascular system.

Materials and Methods

Plan of Work

FCM: Milk was collected from local market of Allahabad.

SMP: Skim milk powder was collected from local market of Allahabad.

CREAM: Cream was collected from local market of Allahabad.

STABILIZER&EMULSIFIER: Stabilizer and emulsifier was collected from local market of Allahabad.

SUGAR:-Sugar collected from local market of Allahabad.

COCOA POWDER: cocoa powder was collected from local market of Allahabad.

SAGO POWDER: sago powder was collected from local market of Allahabad.

Tretments Combination

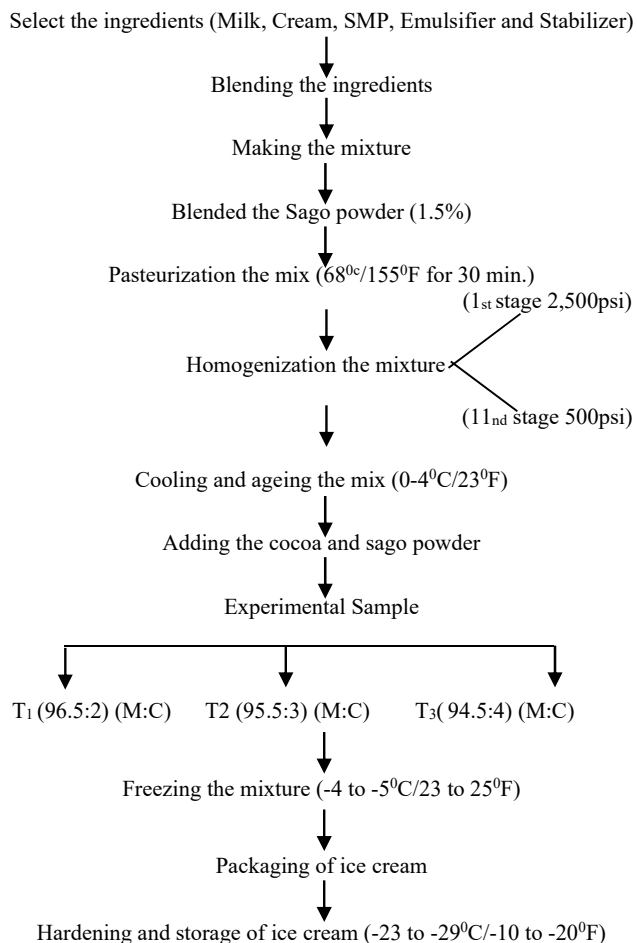
Composition of Ice cream mixture control

Parameter	Amount in %
Fat	10
Sugar	15
Milk SNF	12
Stabilizer & Emulsifier	0.5

- T₀-Control prepared from ice cream (100:00:00)
- T₁-Experimental sample prepared from ice cream with sago &cocoa powder (96.5:1.5:2)
- T₂- Experimental sample prepared from ice cream with sago &cocoa powder (95.5:1.5:3)
- T₃- Experimental sample prepared from ice cream with sago &cocoa powder (94.5:1.5:4)

Plan of Work

Flow diagram for manufacturing of sago ice cream blinded with cocoa powder (Experimental sample)



Average of data obtain on different parameter of fortified cookies by using wheat flour, flaxseed flour and Dried carrot Pomace

The different parameter of control and experimental Ice Cream

Parameter	TREATMENT				C.D VALUE
	T ₀	T ₁	T ₂	T ₃	
CHEMICAL ANALYSIS (%)					
Fat	10.11	10.20	10.39	10.52	0.16
Protein	3.54	3.57	3.61	3.64	0.06
Carbohydrates	22.94	23.20	23.47	23.83	0.39
Moisture	62.68	62.25	61.72	61.15	0.55
Total Solids	37.32	37.75	38.28	38.85	0.55
Acidity	0.16	0.18	0.21	0.23	0.02
Ash	0.73	0.77	0.82	0.86	0.04

Organoleptic Scores (9 Point Hedonic Scale)

Colour & appearance	8.15	7.96	7.64	7.83	0.49
Flavour & taste	8.20	7.75	8.13	8.19	0.33
Body & texture	7.96	7.56	7.84	7.56	0.19
Melting resistance	8.10	7.69	7.87	7.68	0.18
Overall acceptability	8.10	7.72	7.88	7.82	0.17

Microbiological Analysis

SPC(10³cfu/g)	1.60	2.60	2.20	2.40	1.14
Coliform test (10²cfu/g)	N	N	N	N	-
Yeast&Mould count(10 cfu/g)	0.20	0.60	1.00	0.80	1.09

Cost Analysis

Ice cream Rs./Liter	101.70	101.19	101.09	101.29	-
----------------------------	--------	--------	--------	--------	---

Result and Discussion

Chemical Parameters of Ice Cream

Fat

The highest Fat percentage was recorded in the sample of T₃(10.52), followed by T₂(10.39) T₁(10.20) and T₀(10.11). There was non-significant difference b/w T₀-T₁, T₂-T₃ and there was significant difference b/w the all treatment.

Protein

The highest Protein percentage was recorded in the sample of T₃ (3.64), followed by T₂ (3.61) a T₁ (3.57) and T₀(3.54). There was non-significant difference b/w T₀-T₁, T₁-T₂, T₂-T₃ and there was significant difference b/w the all treatment.

Carbohydrate

The highest Carbohydrate percentage was recorded in the sample of T₃ (23.83), followed by T₂ (23.47), T₁ (23.20) and T₀ (22.94). There was non-significant difference b/w T₀-T₁, T₁-T₂ T₂-T₃ and there was significant difference b/w the all treatment.

Moisture

The highest Moisture percentage was recorded in the sample of T₀ (62.68), followed by T₁ (62.25) T₂(61.72) and T₃(61.15). There was non-significant difference b/w T₀-T₁, T₁-T₂ and there was significant difference b/w the all treatment.

Total Solids

The highest Total Solid percentage was recorded in the sample of T₃ (38.85), followed by T₂ (38.28), T₁ (37.75) and

T₀(37.32). There was non-significant difference b/w T₀-T₁, T₁-T₂ and there was significant difference b/w the all treatment.

Acidity

The highest mean acidity percentage was recorded in the sample of T₃ (0.23), followed by T₂ (0.21), T₁ (0.18) and T₀ (0.16). There was non-significant difference b/w T₀-T₁, T₂-T₃ and there was significant difference b/w the all treatment.

Ash

The highest mean Ash percentage was recorded in the sample of T₃ (0.86), followed by T₂ (0.82) T₁ (0.77) and T₀ (0.73). There was non-significant difference b/w T₀-T₁, T₂-T₃ and there was significant difference b/w the all treatment.

Organoleptic Parameters of Ice Cream

Color & Appearance

The highest mean Color & Appearance score was recorded in the sample of T₀ (8.15), followed by T₁ (7.96), T₃ (7.80) and T₂ (7.64). There was non-significant difference b/w T₀-T₁, T₀-T₃, T₁-T₂, T₁-T₃, T₂-T₃ and there was significant difference b/w the all treatment.

Flavor & Taste

The highest mean Flavor & Taste score was recorded in the sample of T₀ (8.20), followed by T₃ (8.19), T₂ (7.40) and T₁ (7.75). There was non-significant difference b/w T₀-T₂, T₀-T₃, T₂-T₃ and there was significant difference b/w the all treatment.

Body & Texture

The highest mean Body & Texture score was recorded in the sample of T₀ (7.96), followed by T₂ (7.84), T₁ (7.56) and T₃ (7.56). There was non-significant difference b/w T₀-T₂, T₀-T₃, T₁-T₃ and there was significant difference b/w the all treatment.

Melting Resistance

The highest mean Melting Resistance percentage was recorded in the sample of T₀ (8.10), followed by T₂ (7.87), T₁ (7.69) and T₃ (7.38). There was non-significant difference b/w T₀-T₂, T₁-T₂, T₁-T₃ and there was significant difference b/w the all treatment.

Overall Acceptability

The highest mean highest overall acceptability score was recorded in the sample of T₀ (8.10), followed by T₂ (7.88), T₃ (7.82) and T₁ (7.72). There was non-significant difference b/w T₀-T₂, T₁-T₂, T₁-T₃, T₂-T₃ and there was significant difference b/w the all treatment.

Microbial Parameters of Ice Cream

S.P.C (x 10³)cfu/g

The highest mean S.P.C (x 10³) cfu/g highest percentage was recorded in the sample of T₁ (2.60), followed by T₃ (2.40), T₂ (2.20) and T₀ (1.60). There was all non-significant difference b/w The treatments.

Coli form (x 10²)cfu/g

None of the samples of coca ice cream samples showed the presence of the coli forms at 0 day which indicates that proper hygienic conditions were maintained during the preparation and storage of the product.

Yeast and Mould

The highest mean yeast and mould highest percentage was recorded in the sample of T₂ (1.0) followed by T₃ (0.80), T₁ (0.60) and T₀ (0.20). There was all non-significant difference b/w the treatments.

Based upon the above study the following inferences can be drawn:

- Ice cream was prepared using Coca powder i.e. H₀₁ is accepted.
- Ice Cream of acceptable sensory qualities i.e. H₀₂ is accepted.

Conclusion

In view of the experimental result obtained during the present investigation, it may be concluded that the Ice-cream made from Ice cream mix with 2%, 3% 4% coca powder with 1.5% sago powder i.e. T₀ received highest score and was liked very much by the panel of judges in the Organoleptic evaluation, best in chemical characteristic (maximum total solids, acidity, protein, carbohydrate and ash), best in microbial analysis (minimum yeast and mould count; and negative in coli form test) thereby indicating good storage stability of Ice cream. The cost of preparation of Ice-cream in T₂ 101.09 per liter of ice cream. However, since this is based on one-time experiment, further trial may be needed to substantiate the results.

Reference

1. Abu-Jdayil B, Mohameed HA, Eassa A. Rheology of wheat starch–milk–sugar systems: effect of starch concentration, sugar type and concentration, and milk fat content. *Journal of Food Engineering*, 2004; 64:207-212.
2. Adi Mulyanto, Titiresmi. Implementation of Anaerobic process on wastewater from tapioca starch industries, Institute for environmental technology, 2000.
3. Akalin AS, Karagözlü C, Ünal G. Rheological Properties of Reduced-fat and Low-fat Ice Cream Containing Whey Protein Isolate and Inulin. *European Food Research and Technology*, 2008; 227:889-895.
4. Akesowan A. Influence of Soy Protein Isolate on Physical and Sensory Properties of Ice Cream. *Thai Journal of Agricultural Science*, 2009; 42(1):1-6.
5. Augustin MA, Udabage P. Dairy Ingredients in Ice Cream. *The Australian Journal of Dairy Technology*, 2003; 58(1):21-25.
6. Bahramparvar M, Tehrani MM. Application and Functions of Stabilizers in Ice cream. *Food Res. Inter*, 2011; 27:389-407, 8755-9129.
7. Buchheim W, editor. Ice cream. International Dairy Federation, Brussels, Belgium Special issue, 1998, 9803,
8. Cottrell JIL, Pass G, Phillips GO. The effect of stabilizers on the viscosity of an ice cream mix. *Journal of Food Science and Agriculture*, 1980; 31:1066.
9. Decha Pimpisuth. Application of information Technology for development of Eco-efficiency toward Tapioca starch industry, Bureau of water technology and industrial pollution management department of industrial works that Tapioca starch association, 2010, 061-074.
10. Devi A, Gondi MK, Sakthivelu G, Giridhar P, Rajasekaran T, Ravi Shankar G. Functional Attributes of Soybean Seeds and Products with Reference to IsoFlavone Content and Antioxidant Activity. *Food Chemistry*, 2009; 114:771-776.
11. Flores AA, Goff HD. Ice Crystal Size Distributions in Dynamically Frozen Model Solutions and Ice Cream as Affected by Stabilizers. *Journal of Dairy Science*, 1999; 82:1399-1407
12. Gandhi AP. Soybean- The Greater Bean, World Grain (USA), February issue, 2006, 59-62.
13. Giese J. Fats, Oils and Fat replacers. *Food Technology* 1996; 50(4):78–83.
14. Guner A, Ardic M, Keles A, Dogruer Y. Production of Yogurt Ice Cream at Different Acidity. *International Journal of Food Science and Technology* 2007; 42(8):948-952.
15. Horst, Doelle. Socio- economic microbial process strategies for a sustainable development using environmentally clean technologies sago palm a renewable resource, Livestock Research for Rural Development, 1998; 10-1.
16. Igbera JC, Jory M, Griffon D. Selective mechanization for cassava processing, *Agricultural mechanization in asia*, 1992; 23:45-50.
17. Jain Chandrakanth. Sgo Food Processing, www.sabuindia.com. 2010.
18. Manickavasagam A, Thangavel K. A survey of water consumption and product output from ten sago factories in India, Department of agricultural processing, Agricultural University, Coimbatore, 2006; 29(1&2):68-70.
19. Marshall RT, Goff HD, Hartel RW. Ice cream Kluwer Academic Press, New York, 2003, 56-59.
20. Patel AS, Jana AH, Aparnathi KD, Pinto Suneeta. Evaluating sago as a functional ingredient in dietetic mango ice cream. *International Journal of Food Science, Technology and Nutrition* 2010; 4(1):61-69.
21. Patel M, Pinto S, AJ, KD, A. Evaluation of Suitability of Sago (Tapioca Starch) As a Functional Ingredient in Ice Cream in. *J. of Funl and App. L. Sc.* 2011; I(2):111-11, 2231-634.
22. Periasamy M. Study on aerobic digestion of cassava wastes, Tamilnadu agricultural university, India, 1996.
23. Prindiville EA, Marshall RT, Heymann H. Effect of milk fat, cocoa butter and whey protein fat replacers on the sensory properties of low fat and non fat chocolate ice cream. *Journal of Dairy Science*, 2000; 83(10):2216-2223.
24. Rajasekar. Tapioca starch prices zoom on supply crunch, *The Financial Express*. 2005.
25. Ramesh. Salem's sago units in a spot, *The Hindu, News Paper articles with reference to tapioca industry*. 2009.
26. Risk Assessment Studies Microbiological Risk Assessment of Ice-Cream. Food and Environmental Hygiene Department HKSAR. 2001.
27. Sarawak Cuisine. Good old sago. www.sabuindia.com. 2010.
28. Thanuskodi S, Kalyani KS. Information support systems for small-scale industries in salem district: with special reference to tapioca processing industries, Library philosophy and practice. 2010.
29. Vigneswary, S Shim, YL Thambirajah, Blakebrough N. Possible microbial utilization of sago processing wastes, Institute for advanced studies, University of Malaya, kuala lumpur, Malaysia science direct, 1994; 11(1&4):289-296.