Journal of Food and Dairy Sciences

Journal homepage: www.jfds.mans.edu.eg
Available online at: www.jfds.journals.ekb.eg

Making Ice Cream Fortified with Sapota Fruit Pulp as a Functional Dairy Product

Nasr, W. I. A.*

Dairy Technology Research Department, Animal Production Research Institute, Agric. Research Centre, Dokki, Giza, Egypt.

ABSTRACT

The work was conducted to study physical, chemical and sensory properties of ice cream fortified by sapota fruit pulp. Treatments were carried out by fortifying the ice cream mixture with 5, 10, 15% of sapota fruit pulp and sucrose in proportions of 10, 12, and 14% of the mixture without using stabilizers and compare it with the control. The resultant ice cream was analyzed for physical, chemical and sensory properties. It was observed that the titratable acidity of the mixture, pH values, freezing point, melting time, specific gravity, specific gravity / gallon, protein, carbohydrates, ash, and fiber content were affected by the addition of sapota fruit pulp to the mixture. Reduction of protein and fat contents was noticed, while an increase in carbohydrates and ash contents was observed. The obtained results indicated that there was an increase in the ice cream content of minerals such as calcium, phosphorous, potassium, iron, zinc and vitamins A and C by the increase of the fortification of the sapota fruit pulp. An increase in the time required for melting, and decrease in the freezing point, specific gravity and specific gravity / gallon were observed by increasing the concentration of sapota fruit pulp. The highest score of flavor, body &texture, melting properties and palatability were observed in the ice cream made with added 15% sapota fruit pulp, 12% sucrose without addition of emulsifiers.

Keywords: Ice cream, Stabilizer, Minerals, Ascorbic acid, Sapota fruit pulp

INTRDUCTION

Fruits are known to be rich sources of antioxidants and are widely used to overcome oxidative stress Kurutas (2016). An increase in the demand for sources of antioxidant due to public awareness has been investigated. Presence of phytochemicals, such as phenolic, carotenoids, ascorbic acid and antioxidant activity in sapota was detected. Sapota has other names "chikoo" or "chiku" in Hindi, and "sapeta" in Bengali. Sapota is rich in calories and sugars. The fruit is a round or oval, of smooth and grainy texture with a sweet flavor due to the presence of fructose and sucrose. It is rich in vitamin C, and provides a good amount of proteins and minerals, which are stimulant to enrich the blood, increase muscle strength. Fortifying dairy products with sapota juice will not only improve the flavor but also the nutritional quality and taste (Gopalan *et al*., 1977, Shambharkar *et al*., 2011, Kasote *et al*., 2015 and Kurutas (2016).

Consequently, there is a need to develop new functional dairy products to reflect consumer interest in health (such as making use of a fruit source with phytochemicals) and natural. Sapota is one of the tropical desert fruits belonging to the family *Sapotaceae*. Sapota fruit is rich of calories and dietary fibers, which reduce constipation and protect colon from cancer. Sapota fruit pulp is a good source of digestible sugar and contains a large amount of protein, fats, fibers, minerals, calcium, phosphorus and iron. It is also rich in potassium, copper, iron, and vitamins such as folic acid, niacin, and pantothenic, which are essential in the metabolic processes in the body. Sapota is rich in mucilage and is used in the manufacture of chewing materials that giving the opportunity to use it in the manufacture of ice cream without adding stabilizers. (Gopalan, *et al.* (1977, Anon 2007 and Padmavathi, 2018),

Ice cream is a delicious, healthy, nutritious frozen dairy product. One hundred. The development of new types of ice cream depends on fruit extracts. Frozen preserved and sugary fruit preparations have been used regularly in ice cream. (Anon., 1981 and Olenev, 1989)

The aim of the present study is to produce a functional ice- cream with high nutritional value by enriching with sapota pulp.

MATERIALS AND METHODS

Fresh buffalo milk and cream were obtained from the Dairy manufacture Unit, Animal Production Res. Inst. Agric. Res. Center. Skimmed milk powder; sucrose; Cacao and Vanilla were purchased from the local market. Carboxy methyl cellulose(as stabilizer) was obtained from the Pharmaceutical Chemicals Nasr. Co., Abo- Zaabel, Kalubia, Egypt.Sapota fruits were purchased from the local market.

Preparation of fruit pulp was carried by washing selected ripe sapota fruits with water, cutting, removing the inside seed and by appropriate blending of the pulp and storing it under freezing conditions at -18ºC. until use.

Vanilla ice cream was made as described by Marshall and Arbuckle (1996). The mixture was prepared to contain 10% fat, 11% solids not fat, 14% sugar, and 0.5% stabilizer. Skim milk powder was mixed with sugar and CMC, and the fresh skimmed milk was heated to 40°C. Sapota fruit pulp was added to ice cream mixtures at 3 levels (5, 10, and 15%) of the weight of the mixture. Sugar was

* **Corresponding author.**
E-mail address: waheedibrahim80@yahoo.com
DOI: 10.21608/jfds.2021.153285

used in three different proportions (10, 12 and 14%) for treatments fortified with sapota fruit pulp without the use of stabilizer. The resulting ice cream mixtures were well blended, frozen and whipped in a frozen ice cream freezing system (IGLC Ice Cream Freezing Machine, Italy). The resultant ice cream samples were packed into plastic cups and stored at -18 ° C until the physical, chemical and sensory properties were carried out. All experiments were performed in three replications.

Total solids, protein, ash, titratable acidity and crude fiber were determined according to AOAC method (2007).The fat content of all ice cream samples and sapota fruit pulp were determined by Rose–Gottlieb method (AOAC, 1991). The carbohydrate content was calculated by deference. Ascorbic acid content was estimated in sapota fruit pulp and ice cream samples using HPLC apparatus for vitamins soluble in fat or in water. HPLC analysis was carried out using an Agilent 1260 series according to Santos *et al*., (2012).

Minerals content ofsapota fruit pulp and ice cream samples including (Ca, P, K, Fe, Zn) were determined by colorimetric methods according to Ginder and King (1972) for Calcium, El-Merzabani *et al*., (1977) for Phosphorus, Teitz (1983) for Potassium, Dreux (1977) for Iron and Hayakawa and Jap (1961) for Zinc.

The caloric value was calculated according to the following equation (FAO/WHO, 1985):

Caloric value = 4 (protein + carbohydrate) + 9 (fat).

pH values of ice milk mix samples were measured by a digital pH meter (Aqwa AD 1030). Specific gravity of ice cream mix and resultant were measured, Weight per gallon was calculated according to Arbuckle (1986).Overrun and melting resistance of ice milk were determined according to Marshall and Arbukle (1996).

Sensory evaluation of the examined ice cream samples was carried as described by Kaul and Mathur (1982).

Table (1) represents the chemical composition of sapota fruit pulp. There was an indication of the quality and importance of sapota as fruits, and their high content was total solids. Sapota fruit pulp is rich in carbohydrates, and it is also a good source of A and C vitamins. It has been shown from the chemical composition of sapota fruit pulp that it is a good source of many minerals such as calcium; phosphors; potassium; iron and zinc that can help overcome malnutrition. The presence of these minerals is one of the important nutritional qualities of sapota fruit pulp, because the lack of these minerals is still the most influencing factor in malnutrition worldwide, affecting a large proportion of people, most of them live in developing countries (Lynch 2005).

Table 1. Chemical Composition of Sapota fruit pulp.

Items	Concentration %
T.S %	28.71
Fat %	1.3
Protein %	0.85
Carbohydrate %	24.15
Ash %	2.41
Fiber %	1.86
Titratable acidity %	0.21
pH value	5.67
Ca (mg)	23.04
P (mg)	20.12
K (mg)	8.24
Fe (mg)	0.22
Zn (mg)	0.72
Vitamin A (mg/ 100 gm.)	3.16
Vitamin C (mg/ 100 gm.)	5.52

(Lynch 2005).

RESULTS AND DISCUSSION

Chemical composition of the ice cream mixture with sapota fruit pulp was recorded in Table (2). Results show an increase that in the total solids, ash, and carbohydrates of sapota fruit pulp in all treatments, compared to the controls due to the higher content of the total solids, ash and carbohydrates in the sapota, while the protein and fat content of the ice cream mix decreased. It was also found that increasing the concentration of sapota fruit pulp in ice cream resulted in a relative increase in the values of crude fiber due to the high content of sapota, which agree with Rajeswari *et al*., (2018). (Soukoulis *et al*., 2009 and Meghwal and Goswami, 2012). The pH values of the examined treatments decreased gradually with increasing sapota fruit pulp concentration. The decrease in acidity with low pulp concentration might be due to the low concentration of fruit pulp, which might be due to the acidity present in the pulp, which leads to the formation of organic acids by the decomposition of ascorbic acid and the use of sugars to produce organic acids. The results of this study agreed with those reported by Siddique *et al*., (1988)..

On the other hand, in terms of caloric values, sapota fruit pulp-fortified ice cream treatments were higher than control. The addition of sapota fruit pulp to the ice cream mix improved the chemical properties and nutritional quality of the final product.

Table 2. Chemical composition of ice cream mixes supplemented with different levels of sapota fruit pulp.

Items	Ice cream treatments									
	Control	5%sapota pulp			10 %sapota pulp			15 %sapota pulp		
		10% sugar	12% sugar	14% sugar	10% sugar	12% sugar	14% sugar	10% sugar	12% sugar	14% sugar
TS %	35.15	36.37	36.71	36.62	36.85	36.77	36.73	37.18	37.24	37.12
Fat %	10.7	10.4	10.3	10.3	10.2	10.3	10.2	10.4	10.2	10.4
Protein %	4.24	4.19	4.13	4.10	4.09	4.07	4.02	4.01	3.88	3.94
Ash %	0.65	0.79	0.76	0.78	0.84	0.83	0.81	0.94	1.07	0.98
Carbohy- drates%	19.56	21.01	21.46	21.54	21.62	21.65	21.72	21.83	22.09	22.23
Fiber %	0.02	0.11	0.13	0.16	0.19	0.20	0.23	0.25	0.27	0.31
Titratable acidity %	0.13	0.15	0.16	0.17	0.19	0.20	0.20	0.21	0.22	0.23
pH values	6.62	6.57	6.53	6.51	6.44	6.48	6.41	6.30	6.35	6.24
Caloric value Kcal./100g	191.50	194.32	195.30	194.86	195.04	195.26	195.58	196.96	196.68	196.56

Data presented in Table (3) illustrate the physical properties of ice cream mixes fortified with different proportions of sapota fruit pulp. The specific gravity and weight per gallon decreased gradually with increasing of the concentration of added sapota fruit pulp concentration. Moreover, results also showed decrease in freezing point with an increase in sapota fruit pulp concentration in all treatments, which came in harmony with the results obtained by Arbuckle (1986), Marshall *et al.* (2003). The specific gravity and weight / gallon of all sapota fruit pulp ice cream blend treatments were found lower than those detected in the control.

Table 3. Physical properties of ice cream mixes supplemented with different levels of sapota fruit pulp.

Items	Ice cream treatments									
	Control	5% sapota pulp			10 % sapota pulp			15 % sapota pulp		
		10% sugar	12% sugar	14% sugar	10% sugar	12% sugar	14% sugar	10% sugar	12% sugar	14% sugar
Titratableacidity %	0.13	0.15	0.16	0.17	0.19	0.20	0.20	0.21	0.22	0.23
pH values	6.62	6.57	6.53	6.51	6.44	6.48	6.41	6.30	6.35	6.24
Freezing point (°C)	-2.2	-2.4	-2.5	-2.6	-2.7	-2.6	-2.8	-3.1	-2.9	-3.2
Specific gravity (gm/cm^3)	0.974	0.968	0.961	0.954	0.940	0.936	0.933	0.921	0.927	0.925
Weight/ gallon (Kg)	3.815	3.763	3.752	3.741	3.623	3.653	3.632	3.614	3.586	3.596

Physical properties of ice cream supplemented with sapota fruit pulp:

Results recorded in Table (4) reveal each of the specific gravity and weight / gallon of all of the examined treatments of ice cream mixture with added sapota fruit pulp and the obtained overrun. The results showed that there was an increase in the overrun of ice cream with different concentration of added sapota fruit pulp added (5, 10, 15%), as the overrun in these treatments was higher, compared to the control, which might be due to the fact that sapota is rich in its content of fibers and stabilizers, which increase the level of emulsification (Ramulu and Rao, 2003).

The melting resistance of ice cream was estimated as weight loss (%) after 15, 30, 45, 60, 75 and 90 minutes, and the data were recorded in Table (4). The results indicated that the melting resistance of ice cream to which sapota fruit pulp was added gradually decreased with the increase in substitution levels of sapota fruit pulp, compared to the control. There was no effect of the added sucrose concentration on all of these properties.

Table 4. Physical properties of ice cream supplemented with different levels of Sapota fruit pulp.

Property	Ice cream treatments									
	Control	5% sapota pulp			10 % sapota pulp			15 % sapota pulp		
		10% sugar	12% sugar	14% sugar	10% sugar	12% sugar	14% sugar	10% sugar	12% sugar	14% sugar
Specific gravity (gm/cm^3)	0.736	0.665	0.688	0.696	0.652	0.662	0.641	0.617	0.602	0.586
Weight/ gallon (Kg)	2.615	2.584	2.566	2.556	2.512	2.507	2.472	2.466	2.452	2.448
Overrun %	42.26	43.56	43.51	43.66	44.17	45.36	45.28	48.57	48.71	48.65
Melting resistance as loss % after: 15 min.	22.04	20.34	18.43	17.78	16.87	16.17	16.08	15.23	15.11	6.15
30 min.	38.43	41.32	39.42	35.63	35.33	33.33	24.37	21.72	20.63	16.34
45 min.	65.85	62.72	63.47	53.17	51.83	50.83	42.15	41.37	38.28	32.18
60 min.	88.74	86.23	88.12	73.83	71.28	70.02	69.05	67.23	64.05	56.15
75 min.	97.51	95.17	96.25	94.22	93.17	88.71	86.63	81.14	78.23	70.81
90 min.	100	100	100	100	100	100	94.25	85.27	76.95	71.36

Results obtained in Table (5) revealed that supplementing of ice cream mix with sapota fruit pulp increased the Ca, P, K, Fe and Zn minerals as sapota is a rich source of these minerals (Selvaraj and Pal 1984, and Kulkarni *et al*., 2007). The iron content ranged from 0.053% to 0.088% in the treated samples, compared to the control, whose iron content was 0.041%. Zinc content range was 0.033 to 0.055 for ice cream fortified with sapota pulp treatments. On the other hand the control treatment contained lower concentration of 0.026% zinc. It could also observed that the concentrations of Ca, K and P were more pronounced in the samples supported with sapota fruit pulp, compared to the control mixture, which came in agreement with Kulkarni *et al*., (2007). The obtained results also showed that the concentration of sucrose is of an effect on the mineral content of the mixtures, as it was found that by increasing the proportion of sucrose added to the mixture resulted in decrease in the mineral content as shown in table 5.

Table 5. Minerals content of ice cream supplement with different levels of Sapota fruit pulp.

Minerals %	Ice cream treatments									
	Control	5% sapota pulp			10% sapota pulp			15% sapota pulp		
		10% sugar	12% sugar	14% sugar	10% sugar	12% sugar	14% sugar	10% sugar	12% sugar	14% sugar
Ca	0.155	1.540	1.43	1.28	1.64	1.62	1.58	1.85	1.76	1.71
P	0.180	1.18	1.05	1.00	1.37	1.25	1.20	1.52	1.48	1.42
K	0.236	0.960	0.852	0.794	1.120	1.040	1.021	1.153	1.141	1.133
Fe	0.041	0.053	0.048	0.043	0.074	0.062	0.053	0.088	0.083	0.078
Zn	0.026	0.033	0.030	0.025	0.045	0.040	0.037	0.053	0.051	0.048

Concerning the Vitamins contents of the treated samples of ice cream supplement with different levels of sapota fruit pulp results indicted in Table (6) show that supplementation with sapota fruit pulp highly increased vitamin A in ice cream treatments. It could also be seen that the content of vitamin C highly increased in ice cream supplemented with sapota fruit pulp in all of the treated samples, compared to the control. This effect attributed to the fact that the sapota fruit pulp is rich in vitamins (Padmavathi, 2018).

Table 6. Vitamin content of ice cream mixes supplemented with different levels of sapota fruit pulp.

Vitamin (µg/ml)	Ice cream treatments			
	control	5%sapota pulp	10 %sapota pulp	15%sapota pulp
A	33.37	48.45	61.83	74.32
C	40.20	77.64	82.14	98.17

It was clear that the ice cream fortified with sapota fruit pulp at 15% was evidently rich in vitamin A and C (74.32 and 98.17 µg / ml, respectively, when compared to the control which contained 33.37 and 40.20 ug / ml in the same order (more than twice) table 6.As vitamins play an important role in promoting the health of the nervous system (Ball, 2006).

Sensory evaluation:

Results indicated in Table (7) reveal the sensory evaluation of ice cream treatments with added sapota fruit pulp a. Overall, the results showed that ice cream fortified with 15% sapota fruit pulp combined with the use of 12% sucrose is of the highest scores for flavor, melting quality, body & texture, compared with 5 and 10% of sapota fruit pulp treated samples. It could also be observed that ice cream samples made with different levels of sapota fruit pulp and sucrose gained the highest ratings and they were very close to the control treatment. On the other hand, the ice cream treatments fortified with sapota fruit pulp and using 14% sucrose characterized with the defect of sugar taste, and the ice cream treatments made using sapota fruit pulp with the use of sucrose at 10% got the lowest scores when compared to the rest of the treatments. The results indicate that ice cream made by supplementing with sapota fruit pulp at 15% level and using 12% sucrose had the highest score.Based on the results obtained, it is possible to make high-quality ice cream by fortifying it with sapota fruit pulp.

Table 7. Sensory evaluation of ice cream supplemented with different levels of Sapota fruit pulp.

Property	Ice cream treatments								
	Control	5% sapota pulp			10 % sapota pulp			15 % sapota pulp	
		10% sugar	12% sugar	14% sugar	10% sugar	12% sugar	14% sugar	10% sugar	12% sugar	14% sugar
Flavour (50)	46	41	45	43	43	45	44	45	47	45
Body & Texture (40)	35	32	34	33	32	35	33	34	35	35
Melting Quality (10)	9	7	9	9	8	9	9	9	10	9
Total (100)	90	80	88	85	83	89	86	88	92	89

CONCLUSION

It can be concluded that sapota is a good source of carbohydrates and fiber. It is very rich in mineral content, A and C vitamins. Therefore it can be used in making ice cream as a functional food because these compounds have vital functions in the body. In addition, its fruits improve the quality and nutritional value of the final product. Thus, it is be recommended to cultivate it on a large scale so that it is widely available in order to achieve the goal of using it in food products to raise its nutritional value and improve its quality. Accordingly, it can be used in the manufacture of high-quality ice cream by fortifying it with sapota fruit pulp, as its use leads to lowering the cost of the final product due to decreasing the amount of sucrose and stabilizers used in preparing ice cream mixtures.

REFERNCES

Anonymous. (1981). Fruit puree and fruit puree preparations for ice cream manufacture. Zucker-und Susswarenwirtschaft, 34: 173 (Dairy Sci. Abstr. 46: 378, 1984).

Anonymous.(2007). Modern consumers want additional benefits for classic dairy products– real fruit chunks, new textures and recipes. *Asia & Middle East Food Trade*. 24(3): 28, 31 and 32.

AOAC (1991). Official; method of Analysis.16th ed. Vol. N. AOAC official 92:111 Arlington, VA: Association of Official Analytical Chemists.

AOAC (2007) Official; methods of Analysis (18 th Ed.), Chapter 33,pp.10, 70-72 chapter 45, pp. 101, Association of Official Analytical Chemists Washington, D.C., USA.

Arbuckle, W. S. (1986). Ice cream.Third Ed. Avi. Publishing Co. Inc. Westport,

Ball, G. F. M. (2006).Vitamins in foods, analysis, bioavailability and stability. pp. (211 – 219) Baoca Raton, FL : CRC Press.

Dreux, C (1977).I Selected method, Analysis of human serum assay of iron II.Method using bathophenanthroline.Se-Iron II(bathophenanthroline). Ann. Biol. Clin. 35: 275.

El-Merzabani, M.M., El-Aaser, A.A. and Zakhary, N.I (1977). A New method for Determination of inorganic phosphorus in serum Deproteinization. J. Clin. Chem. Clin. Biochem. 15: 715 - 718.

FAO / WHO(1985).Energy and protein requirement. Geneva report of a joint FAO/WHO/ UNU expert Consultation.WHO.Technical report Series No. 724.

Ginder, M. and King, I.D (1972). Chemical method for determination of calcium in serum . Am. J. Clin. Path.58: 376.

Gopalan, C., Ramshastri, B.V. and Balsubramanyam, S.C. (1977).Nutritive value of Indian fruits. I.C.M.R.Publication, Hydarbad.

Hayakawa, R. and Jap, J.(1961).Estimation of zinc.Toxic Environ. Health, 8,14 – 18.

Kasote,D. M., Katyare, S. S., Hegde, M. V. and Bae, H. (2015). Significance of Antioxidant Potential of Plants and its Relevance to Therapeutic Applications. Int. J. Biol. Sci., Vol. 11

Kaul, J. and Mathur, B. (1982). Development and assessment of unfermented ice cream containing Lactobacillus acidophilus .Indian J. Dairy Sci.35:3

Kulkarni, P.A., Policegoudra, R.S. and Aradhya, S.M. (2007). Chemical composition and antioxidant activity of sapota (*AchrasSapota*) fruit. J. of Food Biochemistry 31, 399–414.

Kurutas, E.B. (2016).The importance of antioxidants which play the role in cellular response against oxidative/nitrosative stress: current state. Kurutas Nutrition Journal 15:71.

Lynch, S.R. (2005).The impact of iron fortification on nutritional anemia. Best Pract. Res. Clin. Haematol. 18(2), 333–346.

Marshall, R.T. and Arbukle, W.S (1996).Ice Cream, Fifth Edition. Chapman and Hall.Int.Thomson Pub.

Marshall R.T., Goff HD. and Hartel R.W (2003).Inice cream (6 Ed), pp. 11-355.Kluwer Academic plenum publishers. London, USA.

Meghwal M. and Goswami TK (2012).A review the functional properties, nutritional content, medicinal utilization and potential application of fenugreek.J. Food Process Technol., 3: 9, 1 – 10.

Olenev, Y.U.A. (1989).The use of vegetable materials in ice cream manufacture.Dairy Sci. Abstract, 5: 39-40.

Padmavathi, D. (2018).A study on nutritional and health importance of "Sapotas".International J. of Food Sci. andNutri. 3: 184-187.

Rajeswari, H.; Jagadeesh, SL. and Suresh, G. (2018). Physicochemical and sensory qualities of bread fortified with banana, aonla and sapota powders. J. Nutr. Health Food Eng. 8(6):487–492

Ramulu, P. and Rao, PU. (2003).Total, insoluble and soluble dietary fiber contents of Indian fruits. J. of Food Composition andAnalysis 16: 677–685

Santos, J.;Mendiola, J.A;Oliveira, M.B.P.P; Ibáñez, E. and Herrero,M. (2012).

Sequential determination of fat-and water-soluble vitamins in green leafy vegetables during storage. Journal of Chromatography A, 1261: 179-188.

Selvaraj, Y. and Pal, D.K. (1984). Changes in the chemical composition and enzyme activity of the two-sapodilla cultivars during development and ripening. J. Hort. Sci. *59*, 275–281.

Shambharkar, A.D., Shelke, R.R., Gubbawar, S.G. and Bharad, P.M. (2011). Utilization of sapota pulp in the preparation ofShrikhand.*Food Sci. Res. J.* 2: 183-187.

Siddiique, M.I.; Mukhtar, M.; Rwhman, S. and A wan, J.A. (1988). Use of guar gum as a stabilizer in ice cream. *SciTechnol Dev.* 7: 10-14.

Soukoulis, C., Lebesi, D., Tzia, C., (2009). Enrichment of ice cream with dietary fiber: effects on the rheological properties, ice crystallization and glass transition phenomena. Food Chemistry 115, 665–671.

Teitz N. W. (1983). Clinical Guide to laboratory Tests. W.B.

تصنيع الآيس كريم المدعم بلب فاكهة السابوتا كمنتج لبنى وظيفى

وحيد إبراهيم عبدالعزيز نصر

قسم بحوث تكنولوجيا الألبان - معهد بحوث الانتاج الحيوانى - مركز البحوث الزراعية – الدقى - جيزة

أجريت هذه التجربة لدراسة الخصائص الفيزيائية والكيميائية والحسية للآيس كريم المدعم بلب فاكهة السبوتا. تمت المعاملات بتدعيم مخلوط الآيس كريم بنسب ٥ ، ١٠ ، ١٥٪ من لب السابوتا والسكروز بنسب ١٠، ١٢، ١٤٪ من المخلوط وبدون استخدام مثبتات مع جميع المعاملات لتحضير مخلوط الآيس كريم ومقارنته بمخلوط الآيس كريم المصنوع بالطريقة التقليدية. صنعت هذه المعاملات من ثلاث مكررات. تم تحليل الآيس كريم الناتج من حيث الخصائص الفيزيائية والكيميائية والحسية. تأثرت حموضة المخلوط، ورقم الأس الهيدروجينى، ووقت الانصهار، ونقطة التجمد، والوزن النوعى، والوزن النوعى / جالون، والبروتين، والكربوهيدرات، والرماد، ومحتوى الألياف بشكل ملحوظ بإضافة لب السابوتا إلى المخلوط. كما لوحظ انخفاض في محتوى البروتين والدهون، بينما كان هناك زيادة في محتوى الكربوهيدرات والرماد. اشارت النتائج المتحصل عليها أن هناك زيادة فى محتوى الأيس كريم من المعادن مثل الكالسيوم، الفوسفور،البوتاسيوم، الحديد، الزنك وفيتامينات A، C بزيادة التدعيم بعصير لب السابوتا. بالنسبة للخصائص الفيزيائية، لوحظ زيادة فى الوقت المطلوب للانصهار، وانخفاض فى نقطة التجمد، والوزن النوعى والوزن النوعى / جالون بزيادة كمية لبالسابوتا.في التقييم الحسي، لوحظت أعلى درجة في النكهة والقوام والتركيب وخواص الانصهار والاستساغة في الآيس كريم باستخدام ١٥٪ لب فاكهةالسابوتاو ١٢٪ سكروز وبدون إضافة مواد مستحلبة.