

# Development of Non-Dairy Protein-Rich Frozen Dessert

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## Abstract

A healthy and delicious eating habit is essential for improving mood, providing energy to the body, enhancing cognitive function, and controlling weight. According to studies by reputable universities, the majority of the world's population is experiencing issues with allergies to animal milk, which has led to an increase in demand for healthy, lactose-free products. As a result, there is a need for the development of vegan products that are made of plant-based milk. The aim of study was to develop non-dairy protein rich frozen dessert product having sweet spicy taste. Various compositions of soy extract which is developed from soy milk by reducing water content by fifty percentages to increase texture as required for frozen dessert also coconut milk, spice mix (cinnamon powder, ginger powder and white pepper powder), with other minor ingredients for better palatable acceptability of product were used to develop a vegan frozen dessert product. Raw material range was finalized by preliminary trials. Frozen dessert was developed with various compositions of optimized proportions soy extract (44%), coconut milk (16.6%), spice mix (0.06%). The comparison between control sample which is with same proportion as spice mix frozen dessert but without spice mix were carried with different parameters such as antioxidant properties, storage life, other physico-chemical parameters were compared in this study. The optimal product quality was obtained at protein content  $5.7 \pm 0.16$  %, fat content  $9.93 \pm 0.12$  %, Carbohydrate  $48.13 \pm 0.2$  %, Moisture content 63.83%, antioxidant properties (DPPH method) of radical scavenging activity 59.28% and overall acceptability of product was 8.15. Hedonic scale methodology was used to examine the sensory analysis of the developed product. The produced product's technological and economic viability was estimated. From given study concluded that vegan frozen dessert with help of plant-based milk can be prepared with protein content rich source could be healthy and nutritious option with delicious taste.

## 1. INTRODUCTION

Ice cream containing non-dairy fat is defined as a "Frozen Dessert" under Indian law. Frozen desserts are difficult to beat when it comes to a tasty treat that will appeal to a wide variety of tastes. Frozen desserts are positioned as sector competitors in the Indian market, and are generally appealing to consumers, as well as being a less expensive option. Asia-Pacific is expected to increase at a CAGR of 4.1 percent by

2022, headed by India, because of the growing middle economic people and a significant youth population that enjoys and seeks out innovations, especially Western-like ones (Ravi Menon et al., 2020).

As a result, people's stomachs lack lactose tolerance, creating the necessity for frozen desserts that do not contain dairy-based ingredients. In India alone, lactose intolerance affects almost 1.3 billion people (Storhaug C. L. et al., 2020 March 26). Lactose intolerance develops as lactase enzyme synthesis decreases over time. To address these obstacles, there are a variety of options available, such as plant-based, non-dairy, and vegan frozen desserts. Due to religious convictions, lactose sensitivity, vegetarianism, or other connected ideas, some people are unable to consume ice cream since it contains dairy products. As a result, plant-based milk alternatives such as soy, coconut, almond, oat, and peanut milk products have become increasingly popular and have gradually made their way into the mainstream market (Malochleb M. et al., 2018, May).

On this basis an increasing requirement for Indian Frozen Dessert (FD) market of soy & coconut-based FD with enrichment of spices to enhance its nutritional as well as aromatic properties it was found based on a review of literature that there is a need for new FD enriched with spice mix for lactose intolerant population & all type of people in the Indian market. This lack of FD enriched with spice mix recipe is preventing this product from manufacturing in a continuous process by using various machinery and automation. As most people are showing interest in health benefits as well as different aromas, flavours of FD can be easily fulfilled by standardization of FD enriched with spice mix recipe. FD manufactured of Soy milk, coconut milk, and spice mix could be a delicious treat after a meal.

## 2. MATERIALS & METHODOLOGY

### 2.1 Raw Material Preparation

#### a. Soy Extract

N., Khaliq, A., & Umar, M. (2015) studied that soy milk can be prepared by the traditional method in which soybean grains are soaked overnight at room temperature after draining excessive water then blanching is carried out with tap water in 1:3 ratios, grinding through a grinder with sufficient water (1 Liter), then heating slurry at 60°C for 10 min. then

filtration through muslin cloth, the addition of sugar, the flavor of the bottling, and storage.

### b. Coconut milk preparation

K. D. S. S. Perera et al., (2021) mature fresh coconuts were split and scraped with the use of a stainless-steel electric coconut scraper (Maggi RIO, India). Milk was extracted by blending the scraped coconut with water (water = 3:1). After blending extract was filtered through muslin cloth, fruit juice stabilizer CMC powder (Eagle India) was added, and 5g as a thickening agent were mixed and added to the coconut milk.

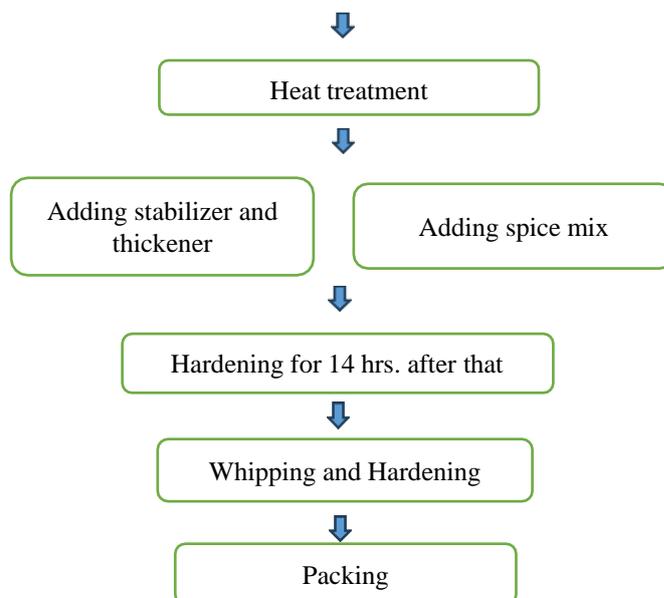
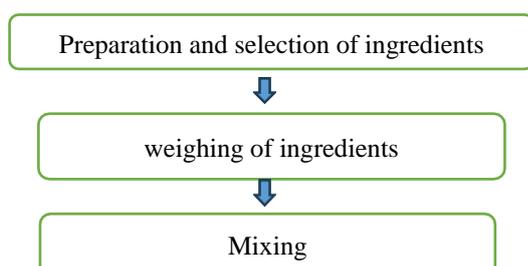
### 3. Preliminary Trials

The preliminary trials were taken as a control sample was prepared by formulating the soy extract, coconut milk, and other ingredients' percentages in three different trials, from which one sample was selected as the control sample. Then a selected control sample was used for preliminary trials of frozen dessert in three different percentages of spice mix, such as 0.06, 0.08, and 0.1%. From those three samples, 0.06% added spice mix frozen dessert was finalized by the trainee sensorial panel.

Table 3. Preliminary Trials

Ingredients	Control sample	T3S1(%)	T3S2(%)	T3S3(%)
Soy extract	44	44	44	44
Coconut milk	16.6	16.6	16.6	16.6
Soy based whipping cream	18	18	18	18
Sugar	17	17	17	17
Corn flour	3.2	3.14	3.12	3.1
CMC & GMS powder	0.6	0.6	0.6	0.6
Spice mix	-	0.06	0.08	0.1
Flavor (Vanilla)	0.6	0.6	0.6	0.6

### 3.2 Methodology for preparation of frozen dessert



### 4. Result & Discussion

#### 4.1 Physical characteristics of frozen dessert

##### 4.1.1 Overrun test

A test was conducted on a frozen dessert that was tangy and created with coconut milk and soy extract. Its reported overrun of  $69.47 \pm 0.98$  and  $63.86 \pm 2.23$  percent of control sample and frozen dessert respectively is within the permissible limit (60-90 percent). Frozen dessert's overrun was affected by both the fat source and the fat concentration. There was no significant difference between the overrun of the spicy frozen dessert and the control sample, which contained no spice combination (with a p value of 0.74), despite the fact that coconut milk and soy-based whipping cream were both used as the main sources of fat for both.

##### 4.1.2 Melt down test

When measurements were made against melting times, it was found that the spicy frozen dessert melted more quickly than the control sample, which had the same formulation but no spice component. Low freezing points are the main cause of rapid melting, but excessive air and fat insertion (overrun) tends to make the melting go more slowly. It is assumed that the overrun has no impact on melting rate because it is more or less similar in both types of frozen desserts. The structure of the frozen dessert mix was made more unstable by the addition of the spices, and the spicy frozen dessert melted more quickly than the control sample.

#### 4.2 Frozen dessert's chemical composition

##### 4.2.1 Carbohydrate

Carbohydrate content was calculated by FSSAI manual 2016 method, calculated by deducting from a total of 100 the sum of moisture, protein, fat, and total ash. The result obtained was  $47.34 \pm 0.3$  and  $48.13 \pm 0.2$  of control sample and frozen dessert respectively with p-value 0.05 and there is no significant difference obtained when spice mix added to the product.

#### 4.2.2 Protein content

Protein content was all plant based due to addition of soy extracts which is major source of protein. It is determined using Kjeldahl method the result obtained was  $5.6 \pm 0.12$  and  $5.7 \pm 0.16$  with p value 0.89 on that basis of calculation it can be seen there is no significant difference in both products. The protein content can be increase by increasing the soy extract percent or addition of protein rich ingredient as required.

#### 4.2.3 Fat content

Fat content in the spicy frozen dessert is  $9.93 \pm 0.12$  percent and in the normal control sample is  $10.2 \pm 0.12$  percent, respectively. This characteristic shows that both frozen desserts have comparable fat amounts because coconut milk and soy-based whipped cream both contribute significantly to the total fat load. According to Hui, Y. H., Legarretta et al., (2004), ice cream should have a fat content of 8 to 12 percent. Spicy frozen dessert falls within this range.

### 5. SUMMARY AND CONCLUSION

The major objective of the current study, titled "Development of Non-Dairy Protein Rich Frozen Dessert," was to create a protein-rich soy extract and coconut milk based frozen dessert that is both organoleptic and economically feasible for vegan people. Based on a review of the literature, it was determined that new food products needed to be developed for the Indian frozen dessert industry despite the country's growing desire for healthy frozen dessert. A frozen dessert's nutritional value and acceptability are increased by the use of soy extract and coconut milk. For those who are lactose intolerant due to the indigestibility of dairy products, a frozen treat made with soy extract and coconut milk may be a better option. A frozen dessert's nutritional value and acceptability are increased by the use of soy extract and coconut milk with addition of spice mix also for sweet spicy taste. For those who are lactose intolerant due to the indigestibility of milk protein and are looking for vegan items, frozen desserts made with soy

extract and coconut milk may be a healthier alternative to dairy products. For those who are lactose intolerant due to the indigestibility of milk protein and are looking for vegan items, frozen desserts made with soy extract and coconut milk may be a healthier alternative to dairy products. With the addition of a locally accessible spice mix (cinnamon, ginger, and white pepper) as a unique product, the frozen dessert was created utilizing soy extract and coconut milk as a substitute to cow milk. Spice-incorporated sample number 01, which is 0.06 percent achieved superior overall sensory acceptability among the developed three alternative formulas, mainly 0.06, 0.08, and 0.1.

This soy extract and coconut milk-based dessert with spice mix had physicochemical values that were remarkably similar to those of the control sample, which had the same composition but no spice mix cream. However, the spice mix dessert may have had better antioxidant qualities than the control sample. As a result, a frozen dessert made with protein-rich spice mix based on soy extract and coconut milk can be launched to the market as a non-dairy product with the appropriate sensory qualities.

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