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"A STUDY ON THE DEVELOPMENT AND NUTRITIVE CALCULATION OF CHOCOLATE INCORPORATED WITH PAPAYA SEED AND COCONUT SPROUT"

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Abstract: A coconut sprout and papaya seed incorporated with chocolate is a food that is literally bakers' confections onto food items such as sweet and candy. Coconut sprout (Cocos nucifera L.) belonging to Arecaceae is well known for all its utilities. India is the 3rd largest coconut producer where, Tamil Nadu, Kerala, Andhra Pradesh and Karnataka is said to produce 90 per cent of the coconut production. Coconut products are used in daily life by different classes of people. Papaya, Carica papaya (C. papaya) L., is one of the major fruit crops cultivated in tropical and sub-tropical zones. Sprouted coconuts contain around 66% carbohydrates, around 64% of which are soluble sugars. They contain considerable minerals (particularly potassium, manganese, calcium, phosphorus, and magnesium). Sprouted coconutsare an excellent source of vitamin C to strengthen the immune system. Papaya seeds provide around 558 calories of energy. They are rich in proteins, fat and fiber. They also containvitamins and minerals like iron, calcium, magnesium, phosphorus, zinc, etc. The study was proposed to develop coconut sprout and papaya seed incorporated with chocolate which include coconut sprout, papaya seed, coco powder, milk and milk powder, butter, sugar, almond, cashewnut, cardamom. The coconut sprout and papaya seed incorporated with chocolate in different level of incorporation in the present study. The results of the present study emphasized to improve energy and protein quality.

KEYWORDS: Protein quality, coconut sprout, papaya seed, value added, energy.

INTRODUCTION

Confectionery is the art (Merriam-2021) of making confections, which are food items that are rich in sugar and carbohydrates. Exact definitions are difficult (Davidson et al., 2014). In general, however, confectionery is divided into two broad and somewhat overlapping categories: bakers' confections and sugar confections.

Coconut (Cocosnucifera L.) belonging to Arecaceae is well known for all its utilities. India is the 3rd largest coconut producer where, Tamil Nadu, Kerala, Andhra Pradesh and Karnataka is said to produce 90 per cent of the coconut production. Coconut products are used indaily life by different classes of people. These are some of the prominent sources for the development of medicines and industrial products. Coconut and its products are used as folk medicine and therefore, the coconut palm in Indian classics is known as 'Kalpavriksha'. (DebMandal M et al., 2011). Consumption of healthy food is highly essential to prevent various diseases. Formation ofsprouts occurs from the seeds during sprouting. The sprouts are well known for its excellent source of essential nutrients like proteins, vitamins and minerals.

Carica papaya belongs to the family Caricaceae. It is originated from Central America, and is now grown in all tropical countries and many subtropical regions of the world. It lives for about 5–10 years, and normally grows with a single un branched trunk. The leaves are palmately-lobed, up to 75 cm across, on long, hollow petioles. The blades are divided into fiveto nine main segments, bearing prominent yellowish ribs and veins (Morton, 1987).

Papaya is a powerhouse of nutrients and is available throughout the year. It is a rich source of three powerful antioxidant vitamin C, vitamin A and vitamin E. The minerals, magnesium and potassium, vitamin B, pantothenic acid and foliate, fiber. In addition to all this, it contains a digestive enzyme-papain that effectively treats causes of trauma, allergies andsports injuries.

NEED OF THE STUDY.

- To formulate coconut sprout chocolate incorporated with papaya seed
- To calculate the yield of coconut sprout chocolate incorporated with papaya seed
- To determine the sensory characteristics of coconut sprout chocolate incorporated with papaya seed
- To estimate the nutritive value of coconut sprout chocolate incorporated with papaya seed
- To determine the microbial content of the formulated coconut sprout chocolate incorporatedwith papaya seed.

- To test the storage stability of the formulated coconut sprout chocolate incorporated with papaya seed
- To calculate the cost of the coconut sprout chocolate incorporated with papaya seed.

RESEARCH METHODOLOGY

3.1 PROCUREMENT OF RAW MATERIALS:

All raw materials are procured from general market and nearby home cultivation .Itis of good quality and healthy organic raw material such as butter, sugar, milk, almond,nuts, cardamom, milk powder are procured from general market. Cocoa powder and milk powder, butter, coconut sprout are stored in refrigeration to avoid spoilage. The following ingredients were used to develop chocolate incorporated with papaya seed and coconut sprout.

Step-1(outer covering / Papaya seed coating of chocolate)

- Papaya seed
- Cocoa powder
- Sugar
- Butter
- Milk powder

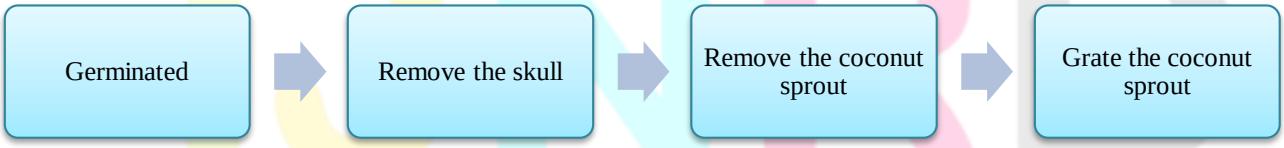
Step-2 (filling /coconut sprout stuffing)

- Coconut sprout
- Milk
- Sugar
- Cardamom
- Almond
- Nuts

3.2 PROCESSING OF RAW MATERIALS:

Papaya seed processing:

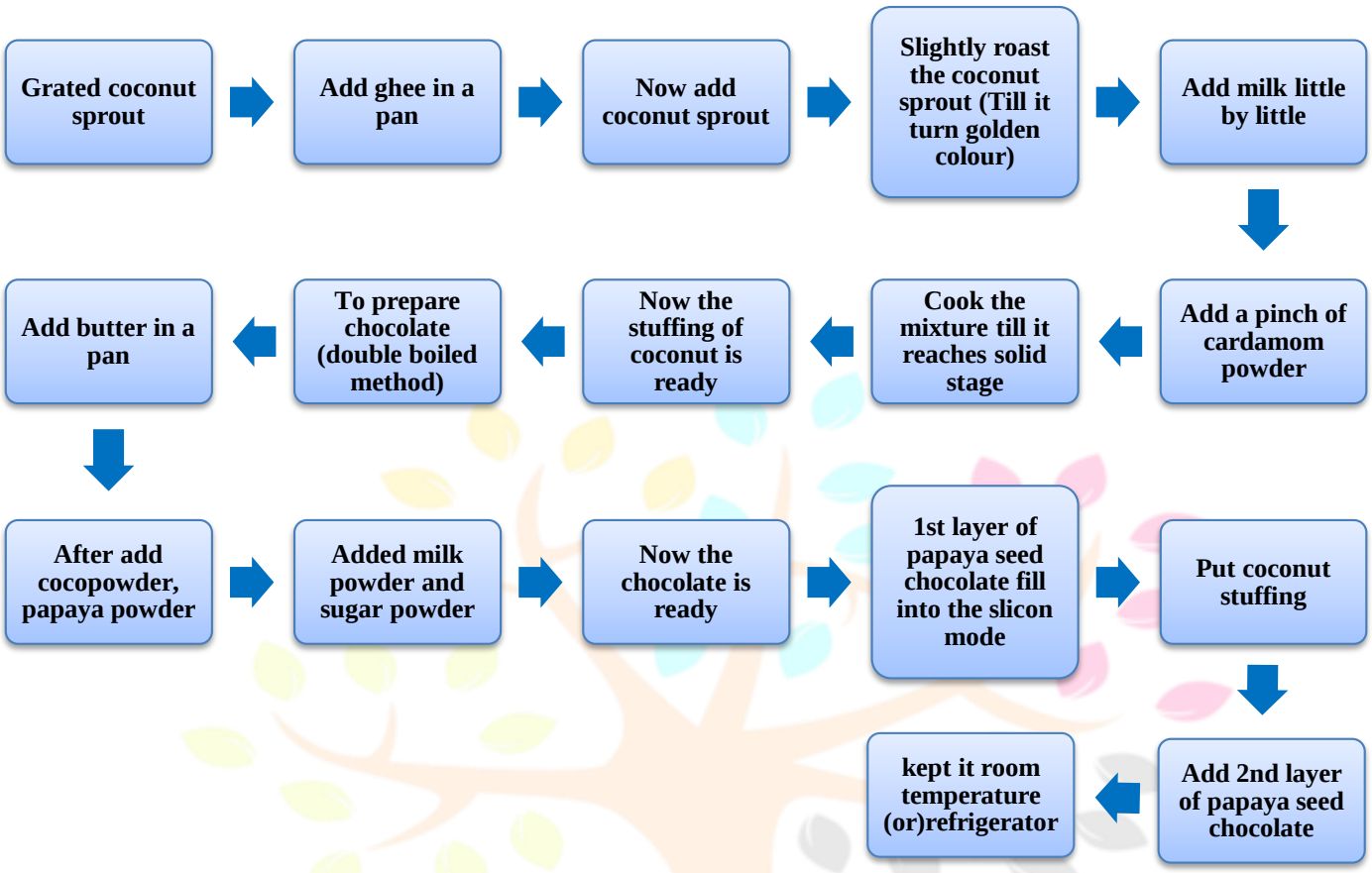
Coconut sprouts processing:



3.3 PRODUCT DEVELOPMENT:

3.3.1 STANDARIZATION & DEVELOPMENT OF COCONUT SPROUT CHOCOLATE INCORPORATED WITH PAPAYA SEED

Development of product:



Standardization:

S.NO	INGREDIENTS	VARIATION-1	VARIATION-2	VARIATION-3	VARIATOIN-4
1.	Coconut sprout	65	75	85	95
2.	Papaya seed	25	20	15	10
3.	Cocoa powder	25	20	15	10
4.	Sugar	50	50	50	50
5.	Milk	20	20	20	20
6.	milk powder	10	10	10	10
7.	Ghee	5	5	5	5
8.	Butter	30	30	30	30
9.	Almond	10	10	10	10
10.	Nuts	10	10	10	10
11.	Cardamom	As required			
	Total	**250**	**250**	**250**	**250**

3.3.2 ORGANOLEPTIC EVALUATION:

When the quality of a coconut sprout chocolate incorporated with papaya seed is assessed by means of human sensory organs, the evaluation is said to be sensory or subjective or organoleptic. Every time food is eaten a judgment is made.

Sensory quality is a combination of different senses of perception coming into play inchoosing and eating a coconut

sprout incorporated papaya seed chocolate. Appearance, flavor and mouth feel decide the acceptance of the coconut sprout incorporated papaya seed chocolate variations (V1, V2, V3, V4).

Like extremely	9
Like very much	8
Like moderately	7
Like slightly	6
Neither like(or)dislike	5
Dislike slightly	4
Dislike moderately	3
Dislike very much	2
Dislike extremely	1

Based on sensory analysis, the most acceptable samples among the formulated coconut sprout chocolate, experimental sample variation 4 (coconut sprout 95g, papaya seed 10g, coco powder 10g) were considered as best and were used for further study and analysis.

3.4 HACCP- PRODUCT DESCRIPTION:

The coconut sprout chocolate incorporated with papaya seed to make a complete description of food product-including all ingredients, processing methods, packaging material etc.

Ingredients used by formulated product such as coconut sprout, papaya seed, coco powder, milk and milk powder, butter, ghee, almond, nuts, sugar, cardamom. Packaging material were used by wrapped in aluminum foil (in direct contact with the chocolate). The team also describes the cost analysis & yield calculation for formulated product.

3.4.1 Intended use

Coconut sprout chocolate is good for underweight people, females and children's.For both men and women, consuming chocolate possess L – arginine, an amino acid which can be effective natural sex enhancer. It works by promoting the amount of blood flow and nitric oxide to your sexual organs and also increases sensation desire and satisfaction.

Consuming this will be good for heart disease cancer and lower blood pressure. Chocolate is especially rich in energy, protein, carbohydrate and anti-oxidant. All of these compounds help protect your cells from inflammation, improve your and cardio vascular health.

3.4.2 Hazard analysis

S:no	Ingredients	Types of hazards	Hazards	Corrective action
1.	Coco powder	Physical hazard	Dust, wood and plant materials	sieve
2.	Papaya	Physical hazard (or) adulterance	Stone, stick, otherpepper seeds.	Remove other particles either bysieving with largemesh size orseparating manually/ mechanically.
3.	Coconutsprout	Physical hazards	Coconut shell	Remove coconut shell.

3.5 PHYSICAL AND CHEMICAL PROPERTIES:

The formulated development about the physical properties of foods includes the significant efforts in measuring properties include: ash, moisture, Ph, length, breadth, thickness. A chemical property describes how ingredients behave during preparation and cooking, how they affect the finished food product in terms of how it looks, tastes, and feels. Chemica properties include: solid fat, melting temperature.

3.6 NUTRIENT ANALYSIS:

Nutrient analysis refers to the process of determining the nutritional content of the food and food nutritional content of the food and food products. The process can beperformed through a variety of nutrient's analysis such as carbohydrate, protein analysis method by Lowry's method, fat analysis method by sox let method.

The formulated product can also be evaluated for the amount of iron, energy, ash, moisture, phosphorus, fiber, calcium, magnesium, PH, length, breadth, thickness, solid fat present in the formulated product.

3.7 MICROBIAL ANALYSIS

The microbial analysis is the qualitative and quantitative analysis of the formulated product. The coconut sprout chocolate incorporated with papaya seed were analyzed for themicrobial growth and total bacterial Count from initial to end stage of the study period (10 to 12day) at room temperature which were then subjected to microbial analysis usingstandard procedure.

3.8 PACKAGING AND LABELING:

Chocolate bars are typically wrapped in one of two ways: aluminum foil (in direct contact with the chocolate) and a decorative paper sleeve that fits over the whole bar, or PET films, serves as both primary and secondary packaging. The mark or label must contain the reserved description of the product.

3.9 STATISTICAL ANALYSIS:

The analyses of data obtained for each variation were statistically calculated as mean & standard deviation and student's t-test analysis and the level of significance for the developed product.

IV. RESULTS AND DISCUSSION

4.1SENSORY ANALYSIS OF THE DEVELOPMENT OF COCONUT SPROUTCHOCOLATE INCORPORATED WITH PAPAYA SEED

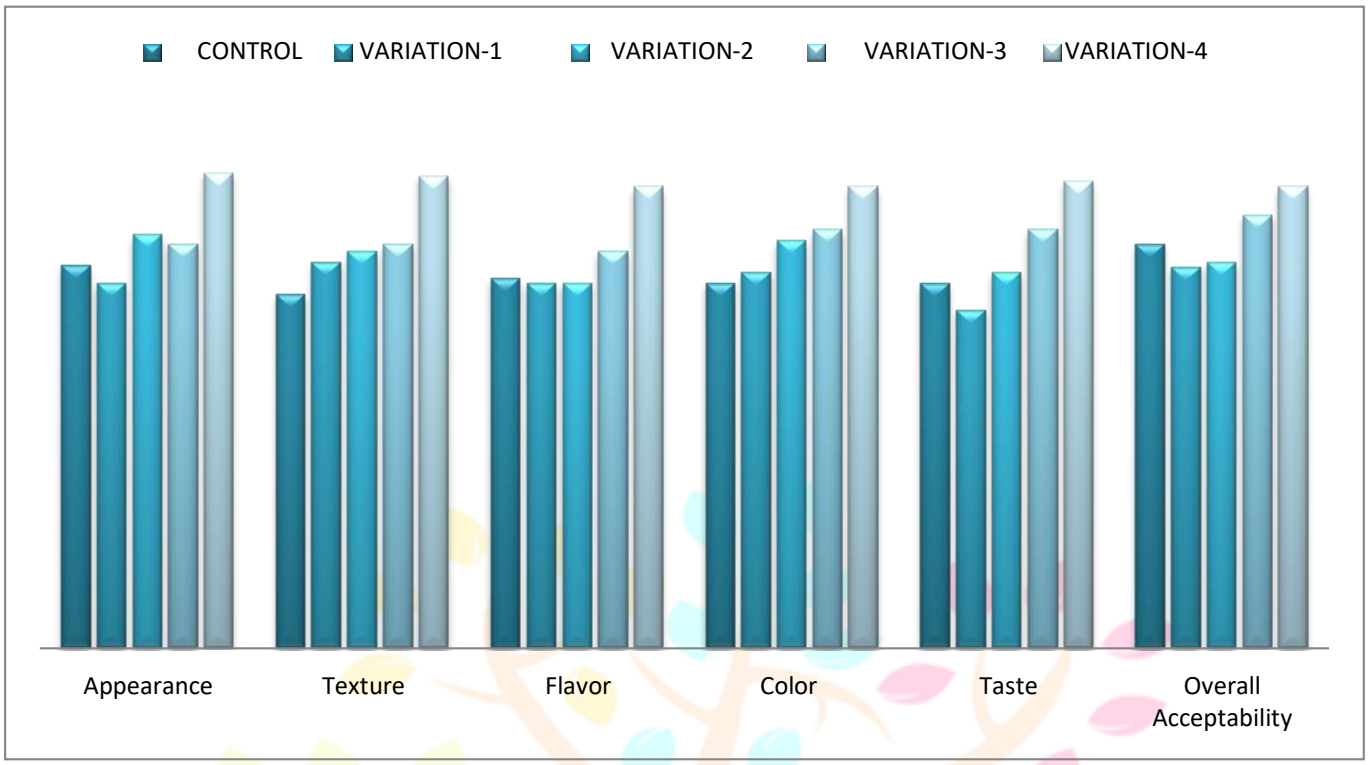
The commercial control and developed coconut sprout chocolate incorporated with papaya seed was organoleptically evaluated by twenty five panelists. The product was evaluated based on the preferences for Appearance, Texture, Flavor, Color, Taste, Overall acceptability using 9- point hedonic scale. The mean organoleptic scores of the formulated coconut sprout chocolate incorporated with papaya seed.

4.1.1 MEAN SENSORY SCORE OF DEVELOPMENT AND ORGANOLEPTIC EVALUATION OF COCONUT SPROUT CHOCOLATE INCORPORATED WITH PAPAYA SEED

MEAN SENSORY SCORE

CRITERIA	CONTROL	V1	V2	V3	V4
APPEARANCE	7.13±0.83	6.8±1.59	7.7±0.96	7.53±0.91	8.86±0.35
TEXTURE	6.6±0.73	7.2±1.42	7.4±0.98	7.53±0.83	8.8±0.41
FLAVOR	6.9±0.79	6.8±1.26	6.8±1.08	7.4±0.82	8.6±0.50
COLOR	6.8±0.83	7±1.30	7.6±1.29	7.8±0.94	8.6±0.50
TASTE	6.8±0.91	6.3±1.29	7±0.92	7.8±0.80	8.7±0.59

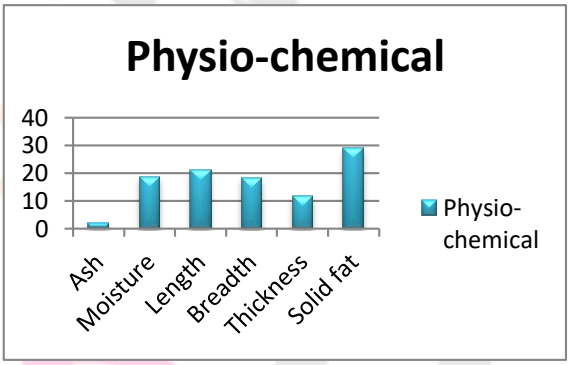
OVERALL ACCEPTABILITY	7.53±0.63	7.1±1.40	7.2±0.08	8.06±0.79	8.6±0.50



4.2 PHYSIO-CHEMICAL ANALYSIS OF THE DEVELOPMENT OF COCONUT SPROUT CHOCOLATE INCORPORATED WITH PAPAYA SEED

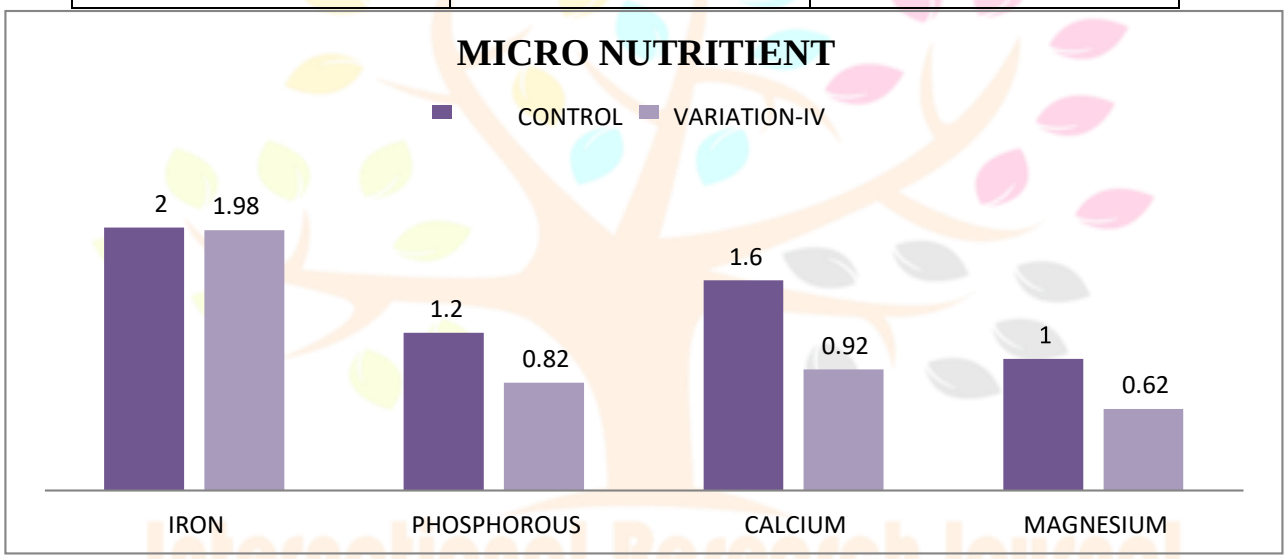
The physic-chemical properties such as Ash, Moisture, Length, Breadth, Thickness, Solid fat were carried out using standard procedure for the developed coconut sproutchocolate incorporated with papaya seed.

Physio-chemical	Gram (g)
Ash	2.14
Moisture	18.74
Length	21
Breadth	18.3
Thickness	11.7
Solid fat	29.0



4.3 NUTRIENT ANALYSIS OF THE DEVELOPED COCONUT SPROUTCHOCOLATE INCORPORATED WITH PAPAYA SEED:

CRITERIA	CONTROL	VARIATION-IV
Energy	458.84kcal	461.53kcal
Carbohydrate	39.21g	40.15g
Protein	8.98g	9.96g
Fat	29.72g	29.0g
Fibre	5.3g	7.91g
Iron	2mg	1.98mg
Phosphorous	1.2mg	0.82mg
Calcium	1.6mg	0.92mg
Magnesium	1mg	0.62mg



4.4 MICROBIAL ANALYSIS FOR THE DEVELOPMENT OF COCONUT SPROUTCHOCOLATE INCORPORATED WITH PAPAYA SEED

Total microbial content of the developed coconut sprout chocolate incorporated with papaya seed. Microbial spoilage is the major part which destroys the food product. Bacteria are the main cause of spoilage. The total bacterial count is given below.

Microbial Load (Bacteria)

Type of Food	Time	Dilution	Total Plate count(TPC)
Chocolate	Initial (1^{st} Day)	10^{-6}	$09x10^{-6}$
			$06x10^{-7}$
	Final (7^{th} Day)	10^{-6}	$14x10^{-6}$
		10^{-7}	$11x10^{-7}$

Microbial Load (Fungi)

Type of Food	Time	Dilution	Total Plate count(TPC)
Chocolate	Initial (1^{st} Day)	10^{-3}	Nil
		10^{-4}	Nil
	Final (7^{th} Day)	10^{-3}	Nil
		10^{-4}	Nil

4.4.1 STORAGE STABILITY:

The formulated coconut sprout chocolate was packed to wrap in aluminum foil packaging and placed in refrigeration for shelf life. The coconut sprout chocolate can also be stored in room temperature.

4.5 YIELD CALCULATION:

Coconut sprout chocolate incorporatedwith papaya seed	**Control**	**Variation-4**
Weight of final product	220	230
Weight of raw materials	250g	250g
Yield%	88%	92%

From the table it is shown that the yield of control sample is 88% and the yield of variation- IV coconut sprout, papaya seed, and cocoa powder) is 92%.

4.6 ***COST CALCULATION:***

Cost analysis of the developed coconut sprout chocolate incorporated with papaya seed. Cost calculation is done to find the cost of the selected product that may help during the selling of the product. It may also done to identify the profit or loss. Calculated by the standard price of the ingredients procured from the local market.

s.no	**Ingredients**	**Quantity**	**Price of the ingredients**	**Quantity of Ingredients used**	**Price for quantity used**
1.	Coconut Sprout	1NO'S	20 rs	95g	20rs
2.	Papaya seed	500g	2250rs	15g	45rs
3.	Cocoa Powder	100g	90rs	10g	9rs
4.	Sugar	1kg	45rs	50g	2.25rs
5.	Milk	500ml	25rs	20ml	1rs
6.	Milk Powder	10g	5rs	10g	5rs
7.	Ghee	10ml	10rs	5ml	5rs
8.	Butter	100g	70s	35g	21rs
9.	Almond	50g	60rs	10g	12rs
10.	Nuts	50g	60rs	10g	12rs
11.	Cardamom	As required			
			Total :	250g	=132.25rs

Cost calculation

Overall cost (100g) = Rs: 132.25

Cost of the product = TOTAL COST +10 %(OVERHEAD COST)

= 132.25+13.2

= 145.45

Cost of the product for 100g = 145.45÷250×100g100g =Rs.58

Therefore, the cost of the coconut sprout chocolate incorporated with papaya seed for 100g is Rs.60

The cost of each raw material was calculated using the standard price list from where the raw materials were purchased. The cost was calculated according to the quality of raw materials used for the production quantity and by calculating the yield of the product.

CONCLUSION:

From the findings of this study it was concluded that the variation IV was selected amongthe control and the other variations. The developed coconut sprout chocolate incorporated withpapaya seed was good terms of nutrient composition such as Energy, Carbohydrates, Protein, Fat, Fibre, Iron, Phosphorous, Calcium and Magnesium. It was also present in the developed product which helps in several health benefits such as immunity and energy booster, treats bleeding disorders, good for digestion, low in calories, treats urinary tract disorders.

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