



# A Study on Physical, Chemical, Cooking Quality and Colour Analysis of New Product Development of Noodles Incorporated with Agathi Leaves [*Sesbania Grandiflora*]

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**Abstract:** Incorporate the Agathi leaves were analysis to assess the suitability for the production of noodles. Its make healthy and nutrient rich. It can be good quality has a colour, taste, texture, and softness. The physical and chemical properties of agathi noodles such as moisture, ash, iron, phosphate, length, breadth, and thickness. The microbial and cooking quality are analysis and given a result and discussion such as cooked weight, cooking of noodles, swelling index, bacterial count and fungi count. The nutrients are been analyses and given the value and its chart in results and discussion. They find out the natural pigment of the value given in the results and discussion. The sensory evaluation are done by the SD and mean calculation. The cost calculation are be used for the 100g of noodles. Noodles packaging is did not affected the environmental conditions. Labelling of noodles contains nutritional facts, preparation method, storage, warning, and attractive. Thus it is concluded that noodles made from Agathi leaves are acceptable to the consumer as they are obtained maximum score followed. Therefore, this study indicated that good quality of noodles could be prepared from Agathi leaves.

**Key point:** Agathi leaves, physical properties, iron, calcium.

## I- INTRODUCTION:

*Sesbania grandiflora*, referred to as vegetable humming bird or august leaves small loosely branching tree. It is tree which grows during a hot humid climate and thus the tree is usually native to India, Philippines, Malaysia, Indonesia and also widely grown in Mexico, South West USA .The tree survives under full exposure to sunshine and is extremely sensitive (Ramasubramania and Haranadha, 2019).

*Sesbania grandiflora* is a multipurpose tree with edible flowers and is a source of one of the medicinal products. *S. grandiflora* has unique medicinal properties and used as a herbal drug for its antibiotic, anthelmintic and anti-tumor properties (Neethu S. Kumar and Dhanyaraj F.S., 2016)

*Sesbania grandiflora* (L.) Pers. is a soft-wooded tree belonging to the family Leguminosae (Duke, J.K. and K.K. Wain 1981) Leaves are considered to be excellent sources of vitamin C and calcium, the later is utilized to the same extent as the calcium in milk, the utilization factors being 0.74% iodine content of the leaves is reported to be 2.3 g/100g. Pectin present in the leaves (1.5%) is of medium jelly quality. The saponins present in the leaves on hydrolysis gave an acid. Besides saponin, the leaves contain an aliphatic alcohol. (Devadatta and appanna 1954)

The leaves are traditionally used to treat nasal catarrh, nyctalopia and cephalgia. Studies show that, *S. grandiflora* possess antioxidant, antiuroithiatic, anticonvulsive, anti-arthritis, anti-inflammatory, antihelminthic, anti-bacterial and anxiolytic activity. (GomasePv, 2012 China R 2012, Rajagopal PL2016., et.al)

## II - Objectives:

- To analysis the Physical and chemical properties of developed product.
- To find out the Cooking quality analysis of agathi noodles.
- To describe the Colour analysis of accepted variation.
- To analysis of Nutrient analysis in agathi noodles.
- To find out the Microbial count and shelf life.
- To make a Packaging and labeling for our developed product.
- To analysis the Cost for our product.

### III - METHODOLOGY:

#### 3.1 SELECTION OF AGATHI LEAVES FOR THE STUDY:

*Sesbania grandiflora* commonly called agathi is a nutrient rich green leafy vegetable. Agathi leaves consumption rate among the people was very less and availability was also found to be market. It's not a seasonal food. It had a more health benefits. It's easily available in urban area and rural area. Agathi is a low cost food in local market. This ingredients get fresh and good quality.

#### 3.2 SELECTION OF RECEIPES FROM AGATHI LEAVES INCORPORATION:

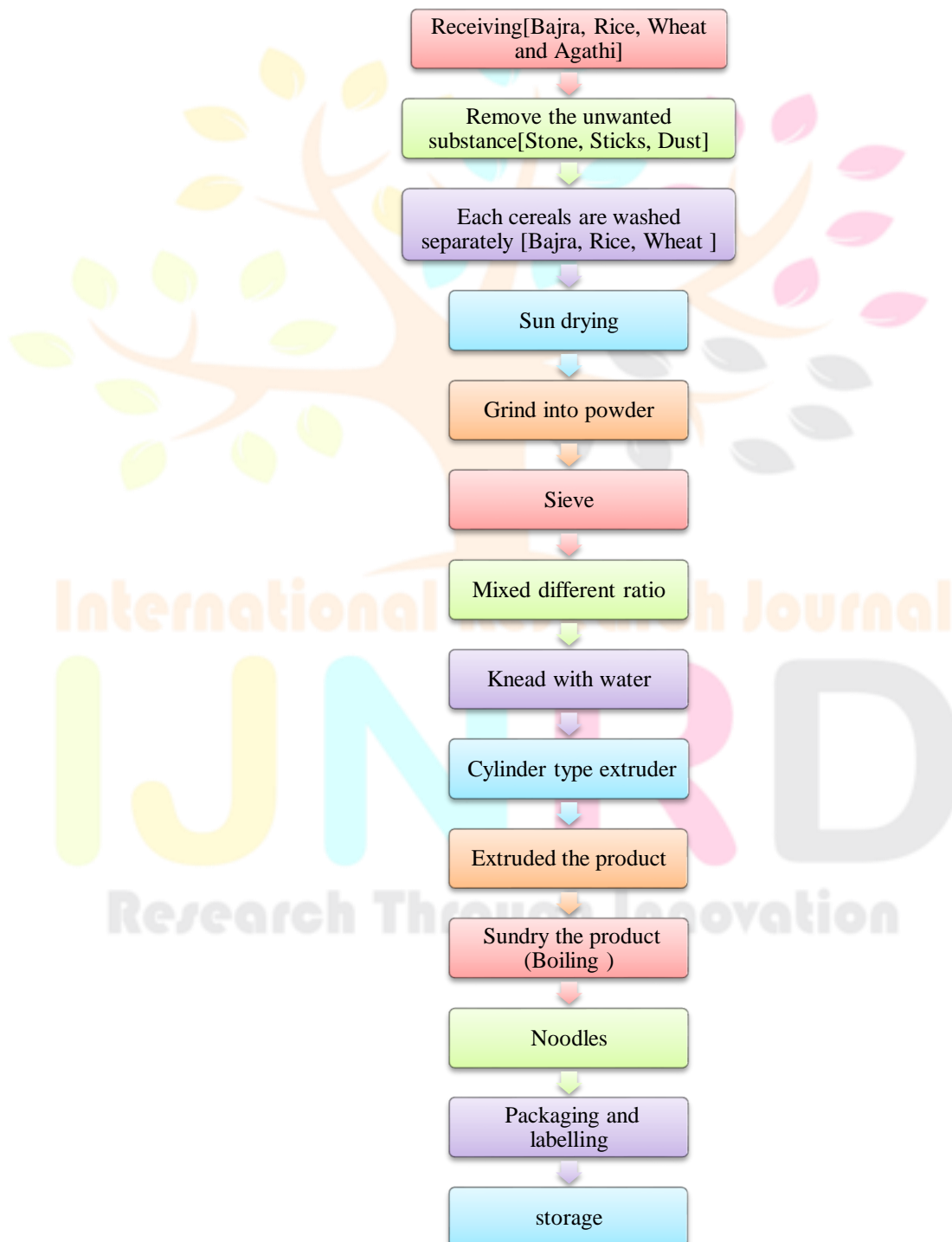
Agathi is incorporated in the recipes with different shapes, for the study. The recipes are noodles. It is a trending and convenient so, incorporation of agathi done in noodles. It attracts for children and adolescents easily. Today's children and adolescent doesn't like to eat greens. Most of the adolescent like fast food. The benefits of greens will also be now available in our favorite food too. The fast food is making developed healthy food preparation.

#### 3.3 COLLECTION OF INGREDIENTS:

The ingredients were collected from the local market. This ingredient also available in low cost. Agathi, Wheat, Bajra, Rice and Refined wheat flour

#### 3.4 PROCESSING OF PRODUCT:

##### NOODLES PROCESSING



### 3.5 PHYSICAL PROPERTIES:

The three principle of dimension such as Length [L] is measured in [cm], Breadth [B] is measured in [mm] and Thickness [T] is measured in [mm] of the prepared noodles measured using a vernier caliper with an accuracy of mm [adobowale *etal*; 2013].

### 3.6 CHEMICAL PROPERTIES:

To analysis the chemical properties for noodles such as moisture, ash, and phosphate [FSSAI] they are analyzed.

### 3.7 COOKING QUALITY ANALYSIS:

#### 3.7.1 Cooking of Noodles:

Take 100 gm of noodles adds 75ml of water and boiled at 100 °c for 5 minutes, till it gets soft and cooked.

#### 3.7.2 Cooking Weight:

$$C_w = \frac{W_C - W_D}{W_d} \times 100$$

Cooked weight -  $C_w$   
Weight of cooked noodles -  $W_C$   
Weight of dried noodles -  $W_D$

#### 3.7.3 Swelling Index:

Swelling index of noodles was determined by method proposed by [mestres 1988], a known weight [5g] of noodles was cooked in a glass beaker with 20 times. It's quality of boiling water 100 ml for 10 minutes over a water bath maintained at 100 °c after cooking the water was strained out and the cooked was dried to remove surface moisture using filter paper and the cooked sample.

$$SI = \frac{W_2 - W_1}{W_1} \times 100$$

### 3.8 COLOUR ANALYSIS:

The color of the dried noodles sheet and the optimally cooked noodles sample were measured with a chroma-meter [Minolta, taka, japan] equipped with a 9 D65 illuminate using the CIE  $L^* a^* b^*$  system.

The  $L^* a^* b^*$  reading were obtained directly from the instrumented and provided measures of lightness, redness and yellowness, respectively. All measurement was performed in triplicate.

### 3.9 STANDARDIZATION AND DEVELOPMENT OF PRODUCT:

The standardization was done using the point hedonic scale the rating scale contains 9 points. Four different variations was [ $S_1, S_2, S_3,$ ] done for the prepared product, and each variations was evaluated, each mixture was provided evaluated separately. The healthy individuals was taken as statistically for evaluate. The given score for all variations are calculated

**Table – 3.1**  
**Proportions of agathi noodles**

S.NO	INGREDIENTS	QUANTITY(g)
1.	Wheat flour	50
2.	Bajra flour	10
3.	Rice flour	20
4.	Refined wheat flour	10

**Table – 3.2**  
**Proportions of basic ingredients used for the preparation of Noodles**

Ingredients (g)	Control	V-1	V-2	V-3
Wheat flour	60	50	40	30
Bajra flour	10	10	10	10
Rice flour	20	20	20	20
Refined wheat flour	10	10	10	10
Agathi flour	-	10	20	30

### 3.10 SENSORY EVALUATION:

To assessing the consumer acceptability of the popularized products as score card with 7 criteria for quality attributes like appearance, flavor, texture, colour, taste, odour and overall acceptability was evaluated. The scores obtained through the sensory evaluation of the variation is compared with control sample.

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



### Variations Agathi noodle

#### 3.11 NUTRIENT ANALYSIS:

The nutrient content of the developed products per 100g were calculated by AOAC method such as energy, protein, fat, CHO, fiber, iron and calcium.

#### 3.12 MICROBIAL ANALYSIS:

Microbial properties such as fungi and bacteria were analyzed in all samples.

#### 3.14 SHELF LIFE:

Agathi noodles is a non-perishable product. It is not easily affected by microbial growth. The storage capacity of agathi noodles and pasta is 2 months.

#### 3.15 PACKAGING AND LABELLING:

Paper box is used for packaging. It doesn't affect the environment. This packaging style is foldable in nature hence it consumer less space and can be easily term use of the paper box which means less waste. Polyethylene packaging also used in this product.

#### 3.16 COST CALCULATION:

The production cost is an important parameter for the assessment of acceptability of new products of the consumer market. The cost involved in the development of noodles was calculated based on the raw material at the time of purchase, and the production cost.

#### 3.17 STATISTICAL ANALYSIS:

The final data was completed and analyzed using the following statistical methods.

I-Mean

II- Standard Deviation

### IV - RESULT AND DISCUSSION:

#### 4.1 PHYSICAL PROPERTIES OF ACCEPTED VARIATION OF AGATHI NOODLES:

Table - 4.1  
Physical Properties of Agathi Noodles

Properties	Agathi Noodles
Length	15.1 cm
Breadth	$0.35 \times 10^{-2}$ mm
Thickness	$5.40 \times 10^{-3}$ mm

#### 4.2 CHEMICAL PROPERTIES OF ACCEPTED VARIATION OF AGATHI NOODLES:

The Agathi noodles treated process line tasted through moisture, ash, iron, phosphate content were inferred and the result are interpreted in (table 4.2)

Table - 4.2  
Chemical properties of agathi noodles

Chemical properties	Agathi Noodles %
Moisture	6.84
Ash	1.56
Phosphate	0.56

#### 4.3 COOKING QUALITY ANALYSIS OF ACCEPTED VARIATION OF AGATHI NOODLE:

#### 4.3.1 Cooking Weight of Accepted Variation of Agathi Noodles:

**Table4.3**  
Cooked Weight of Agathi Noodles

Food stuff	Raw food	Cooked food
Agathi Noodles	100g	250g

The noodles raw weight is 100g after cooking the weight 250g.

#### 4.3.2 Swelling Index of Accepted Variation of Agathi Noodles:

**Table – 4.4**  
Swelling Index of Agathi Noodle

Sample	Reading 1	Reading 2	Reading 3	Final Result
Agathi Noodles	94.04	94.98	94.01	<b>94.01</b>

#### 4.4 COLOUR ANALYSIS OF ACCEPTED VARIATION OF AGATHI NOODLES:

##### 4.4.1 Colour Analysis of Accepted Variation of Agathi Noodles:

**Table 4.5**  
Colour Analysis of Agathi Noodles

Sample Condition	Coordinates	Reading 1	Reading 2	Reading 3	Average
Agathi noodles	L*	42.54	41.60	40.36	<b>41.4</b>
	a*	- 0.94	- 1.02	- 0.88	<b>- 0.95</b>
	b*	14.63	13.86	13.88	<b>14.5</b>

$\Delta L^*$  ( $L^*$  sample minus  $L^*$  standard) = difference in lightness and darkness (+ = lighter, - = darker)

$\Delta a^*$  ( $a^*$  sample minus  $a^*$  standard) = difference in red and green (+ = redder, - = greener)

$\Delta b^*$  ( $b^*$  sample minus  $b^*$  standard) = difference in yellow and blue (+ = yellower, - = bluer)

Colour range in food product (noodles and pasta) can be known based on the value  $L^*$ ,  $a^*$ ,  $b^*$ . The  $L^*$  value donates the brightness level of noodles and pasta. The  $a^*$  value donates the greenness or redness white. The  $b^*$  value represent the yellow or blue colour.

The result of noodles colour range is  $L^*$  value is produce positive range 41.4, it's give a light colour.  $a^*$  value is donates a negative result - 0.95 produce a green colour .  $b^*$  value range is produce a positive 14.5 result produce yellow colour.

#### 4.5 SENSORY EVALUATION OF ACCEPTED VARIATION OF AGATHI NOODLES:

They mostly used scale for measuring food acceptability is the 9- point of hedonic scale. This scale was used for evaluating the sensory properties of the noodles. Noodles were evaluated with respect to different sensory parameters namely appearance, flavour, texture, colour, taste, odour, and overall acceptability. Three variations of the noodles were developed by incorporating various proportion of agathi powder.

**TABLE – 4.6**  
Sensory Table for Agathi Noodles

Characteristics	Control	Variation - I	Variation- II	Variation- III
Appearance	7.3 ± 0.485	8.2 ± 0.421	7.3 ± 0.875	4.9±1.100
Flavor	7.1 ± 0.875	8.1 ± 0.737	7.1 ± 0.875	5.1± 1.105
Texture	7.4 ± 0.516	8.3 ± 0.674	6.9 ± 0.567	5.0 ± 1.699
Colour	7.0 ± 0.942	8.2 ± 0.634	6.6 ± 0.843	4.3 ± 0.948
Taste	7.2 ± 0.788	8.1 ± 0.737	5.9 ± 0.875	3.3 ± 1.637
Odour	7.3 ± 0.483	8.1 ± 0.737	6.5 ± 1.080	3.5 ± 1.900
Overall acceptability	7.7 ± 0.674	8.4 ± 0.516	7.5 ± 0.527	5.6 ± 1.267

Sensory evaluation of the developed noodles prepared with 1,2,3 different variation incorporation of agathi powder in control is present in table - 4.9. In the sensory evaluation, sample V-1 got maximum score as compare to the control, V-2 & V-3 score were absorbed to be lowest for all the sensory value with an overall acceptability of  $8.4 \pm 0.699$  suggesting that the V-1 was highly acceptable by the panel member. The sensory analysis of agathi incorporate noodles showed that the best quality noodles with respect to sensorial parameter were obtained when the formulation 10 g of agathi powder within control. Hence the further analysis were done for V-1 with has 10% incorporation of control.

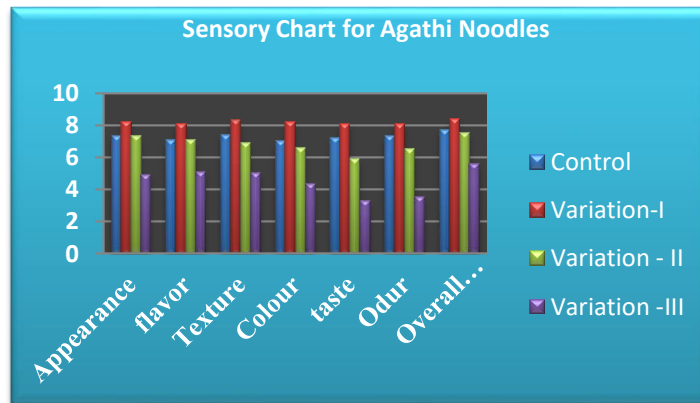


Fig – 4.1 Sensory Chart for Agathi Noodles

**4.6 NUTRIENT ANALYSIS OF ACCEPTED VARIATION:**

From the result of sensory evaluation it was observed that 10g of agathi powder incorporated noodles (variation – 1) was highly acceptable and hence the nutrient analysis for variation -1 was done.

**Table – 4.7**  
**Nutritive Value of Agathi Noodles**

Nutrients	Control	Agathi Noodles %
Energy	174kcal	317kcal
Protein	4.76g	12.84g
Fat	1.39g	7.1g
Carbohydrate	36.54g	71.66g
Iron	-	2.5mg
Fiber	0.27g	6.7g
Calcium	13.3mg	56mg

The nutrient analysis of the agathi noodles is comparatively higher than controle. The calcium , fiber and iron value is more then controle, Because the agathi is incorporated. The oil is added in this processing so the fate value of agathi noodles is grater than control . agathi noodles is given a high level of energy and protein.

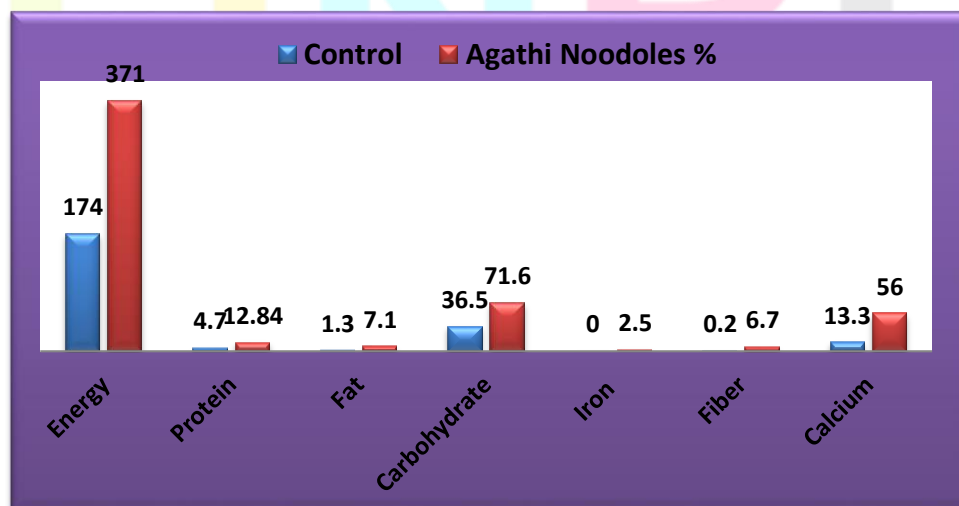


Fig-4.2 Nutritive Value Chart for Agathi Noodles

#### 4.7 MICROBIAL ANALYSIS OF ACCEPTED VARIATION:

##### 4.7.1 Bacterial Load of Accepted Variation of Agathi Noodles:

The microbial load (bacteria) of agathi noodles tested through dilution 10<sup>-6</sup> and 10<sup>-7</sup> were determined and the results are presented in table (4.8).

**Table – 4.8**  
**Microbial Load (Bacteria) in Agathi Noodles**

Type of Food	Time	Dilution	Number of Colony	Total Plate count(TPC)
Agathi Noodles	Initial (1 <sup>st</sup> Day)	10 <sup>-6</sup>	04	04x10 <sup>-6</sup>
		10 <sup>-7</sup>	02	02x10 <sup>-7</sup>
	Final (7 <sup>th</sup> Day)	10 <sup>-6</sup>	06	06x10 <sup>-6</sup>
		10 <sup>-7</sup>	05	05x10 <sup>-7</sup>

##### 4.7.2 Fungi Load of Accepted Variation of Agathi Noodles:

The microbial load (fungi) of agathi noodles sample tested through dilution 10<sup>-3</sup> and 10<sup>-4</sup> were determined and the results are presented in table (4.9).

**Table – 4.9**  
**Microbial Load (Fungi) in Agathi Noodles**

Type of Food	Time	Dilution	Number of Colony	Total Plate count(TPC)
Agathi Noodles	Initial (1 <sup>st</sup> Day)	10 <sup>-3</sup>	Nil	Nil
		10 <sup>-4</sup>	Nil	Nil
	Final (7 <sup>th</sup> Day)	10 <sup>-3</sup>	Nil	Nil
		10 <sup>-4</sup>	Nil	Nil

#### 4.8 PACKAGING AND LABELLING:



**Plate 4.1**  
**Packaging**



**Plate 4.2**  
**labelling of frontside**





**Plate 4.3**  
**labelling of backside**

#### 4.9 SHELF LIFE OF ACCEPTED VARIATION OF AGATHI NOODLES:

Agathi noodles can be judged by the eye, example- colour, size, shape, uniformity an defect is the importance in food selection. Agathi noodles was stored from the 2.2.2023 to 10.4.2023 days .The selected noodles is stored in different packaging

paper and polyethylene at room temperature. Paper packaging is good in all aspect like colour, texture, and aroma. But polyethylene is given a poor result for aroma.

**Table – 4.10**  
**Shelf Life of Agathi Noodles**

Shelf life of agathi noodles & pasta Per week	Shelf life of agathi noodles & pasta per month
2 week 	2 month 

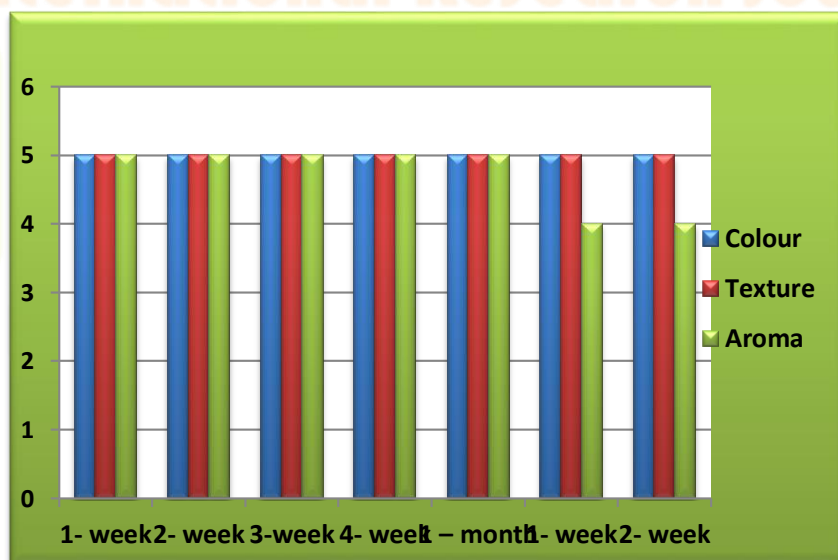
**4.9.1 Storage of paper packaging:**

**Table – 4.11**  
**Table for Paper Packaging Storage**

S. No	Colour	Texture	Aroma	Duration
1.	5	5	5	1- week
2.	5	5	5	2- week
3.	5	5	5	3-week
4.	5	5	5	4- week
5.	5	5	5	1 – month
6.	5	5	4	1- week
7.	5	5	4	2- week

Excellent – 5      Good- 3      Very good -4      Fair -2      Poor -1

The paper packaging storage of agathi noodles not be produce any changes in colour, texture and aroma. This packaging is given a good result of shelf life.



**Fig 4.3**  
**Shelf Life of Accepted Variation of Agathi Noodles in Paper Packaging**

**4.9.2 Storage of polyethylene packaging:**

**Table - 4.12**  
**Table of Polyethylene Storage**



s. no	Colour	Texture	Aroma	Duration
1.	5	5	5	1- week
2.	5	5	2	2- week
3.	5	5	1	3-week
4.	5	5	1	4- week
5.	5	5	1	1 – month
6.	5	5	1	1- week
7.	5	5	1	2- week

Excellent – 5      Very good -4      Good-3      Fair -2      Poor – 1

This polyethylene packaging storage of agathi noodles produce change in aroma. The polyethylene is contaminated with agathi noodles so this packaging is change the natural aroma of the product.

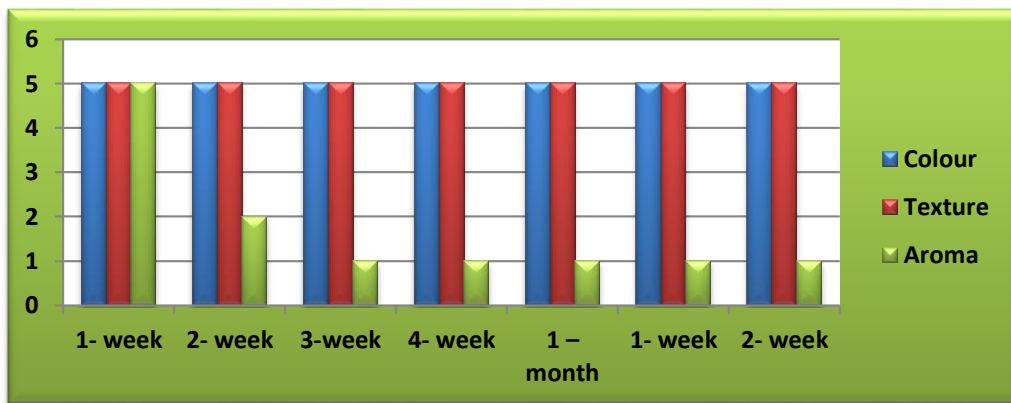


Fig 4.4

Shelf Life of Accepted Variation of Agathi Noodles in Polyethylene Packaging

#### 4.10 COST CALCULATION OF ACCEPTED VARIATION OF NOODLES:

Table – 4.13  
Cost Calculation of Agathi Incorporate Noodles

INGREDIENTS	QUANTITY 100g	PRIZE
Wheat	50g	2.96
Rice	20g	0.84
Refined wheat flour	10g	0.52
Bajra	10g	0.46
Agathi	10g	0.23
<b>Total</b>	=	<b>5Rs</b>

The cost calculation of the product of 100g of each developed agathi noodles revealed that the total each product cost (100g) was 5 Rs. It was evident that the prepared noodles were more economical and affordable when compared with commercial noodles available in the market.

#### Profit calculation:

$$\begin{aligned}
 &= \frac{\text{cost of product} \times 60}{100} \\
 &= \frac{5 \times 60}{100} \\
 \text{Profit} &= 3 \\
 &= \text{Profit} + \text{cost of product} \\
 &= 3 + 5 \\
 &= 8
 \end{aligned}$$

Therefore the cost of the each Agathi noodles for 100g is Rs/- 8

## V - CONCLUSION:

The physical properties are analysis. The swelling index of Agathi noodles is 94.01 so the cooked weight is given high level. Colour analysis of agathi noodles is provide light green colour. Variation – I selected in sensory evaluation this have a 10 gram of agathi powder incorporated in noodles. The Agathi noodles provide a 317Kcal, 12.8 g of protein , 7.1 g of fat 71.6 g of carbohydrate, and 56 g of calcium. Paper packaging is give a good shelf life.

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