

## DEVELOPMENT AND SENSORY EVALUATION OF VERMICELLI WITH COMPARATIVE FORTIFICATION OF ROASTED AND GERMINATED FLAXSEED FLOUR

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### **Abstract**

The value of whole wheat flour, roasted flaxseed flour, and germinated flaxseed flour in the formulated vermicelli was used in samples  $V_0$ : Control- (100g:0g:0g), WF: RF: RFF,  $V_1$ : WF: RFF (100g:0.5g),  $V_2$ : WF: RFF (100g:10g),  $V_3$ : WF: GFF (100g:0.5g) and  $V_4$ : WF: GFF (100g:10) respectively. The products were subjected to standard sensory analysis and accordingly, variant  $V_3$  was found to be the most preferred concerning Appearance and color, flavor and aroma, taste, texture, and overall acceptability.

Keywords: wheat flour, roasted flaxseed flour, germinated flaxseed flour, and vermicelli.

### **1. INTRODUCTION**

Traditional foods are expressions of culture, history, and lifestyle. Vermicelli is a traditional product prepared by using whole or refined wheat flour and semolina is also used. The hard dough is prepared with semolina also added, cold extruded, and dried in the sun. Due to the reason of wheat flour being deficient in lysine, one of the essential amino acids, the protein quality remains poor hence supplementation is necessary (Naik, 2004).

It is a value-added convenient/processed food that can be a solution to the problem of supplementary feeding and undernutrition In India,

especially for those people who live in rural areas, and under these economic conditions they cannot afford readymade market-processed high-priced food. Roasting and germination of grains are traditional and village-level processing technologies. They improve the acceptability, flavor, and texture of food, destroy anti-nutritional factors and increase the shelf-life of food. Germination or Malting improves vitamin C, the availability of phosphorus, tryptophan, and other nutritional properties. The germination or malting, also elaborates the amylase results in the lowering of viscosity and thinning down of starch slurry which reduces the bulk of the final product (Manay and Sadakshara swamy, 2000).

### **2. METHODOLOGY OF VERMICELLI**

#### **2.1 Optimization for Preparation of Vermicelli:**

$V_0$ : Control- (100g:0g:0g) viz., WF: RF: RFF

$V_1$ : WF: RFF (100g:0.5g) viz., (100g Wheat flour: 05g Roasted flaxseed flour)

$V_2$ : WF: RFF (100g:10g) viz., (100g Wheat flour: 10g Roasted flaxseed flour)

**V<sub>3</sub>:** WF: GFF (100g:0.5g) viz., (100g Wheat flour:05g Germinated flaxseed flour)  
**V<sub>4</sub>:** WF: GFF (100g:10 viz., (100g Wheat flour: 10g Germinated flaxseed flour)

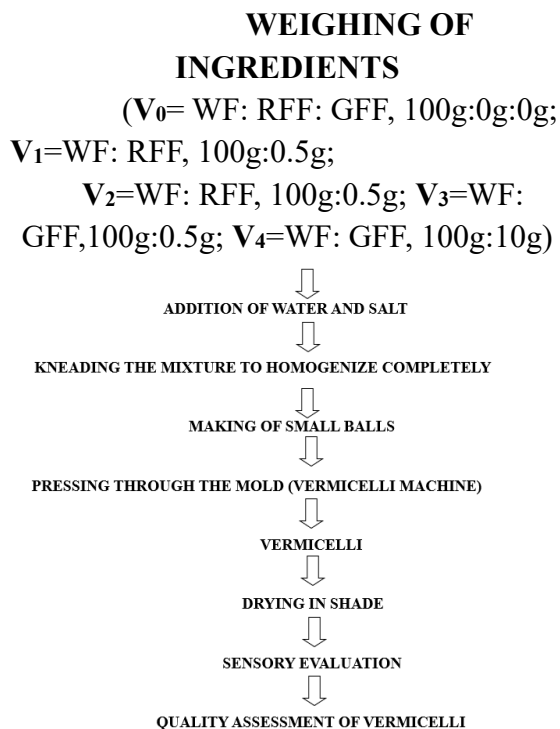


**Fig. no. 2.1 Roasted and Germinated flaxseed flour added to vermicelli**

### 2.2 Method of Preparation of Vermicelli

The wheat flour roasted flaxseed flour and germinated flaxseed flour were mixed in the above proportion and they were extruded in the local vermicelli.

### VERMICELLI FLOW CHART



**Fig. No. 2.1 Preparation of Vermicelli**

### 3. SENSORY EVALUATIONS OF VERMICELLI

The control vermicelli and roasted and germinated flaxseed flour added vermicelli were evaluated for sensory quality by a semi-trained panel of ten members using nine points Hedonic scale and the Sensory score card method as given by Amerine, *et. al.* (1965). Finally, the most acceptable Vermicelli was selected based on mean sensory scores for attributes- appearance and color, flavor and aroma, taste, texture, and overall acceptability.

### 4. RESULT AND DISCUSSION

#### 4.1 Sensory evaluation of Roasted and germinated flaxseed flour added vermicelli

##### 4.1.1 Color and Appearance

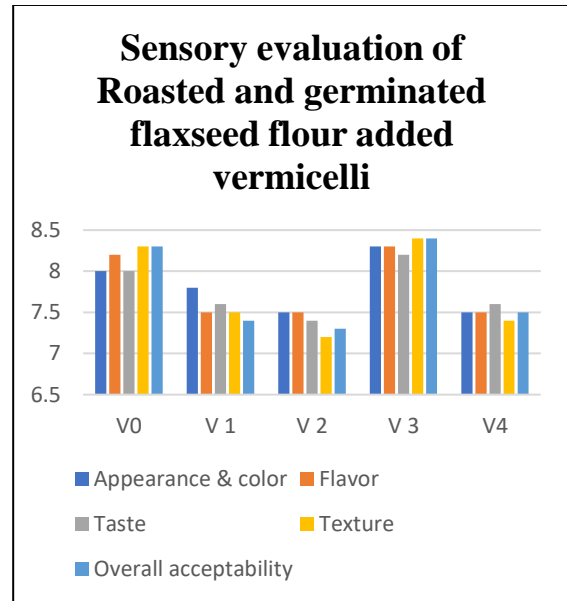
Appearance and Color were important criteria for deciding the quality of the product, which in term determines its acceptability. The appearance and color score for cooked *vermicelli* as influenced by different levels of roasted and germinated flaxseed flour have been depicted in (table 4.22). The sensory score for the appearance and color of *vermicelli* ranged from 7.5 to 8.3 (Table 4.22). The maximum appearance and color score of 8.3 was given to the product made with 5g germinated flaxseed flour and wheat flour in combination V<sub>3</sub>, while minimum score 7.5 was obtained from wheat flour and 10g roasted flaxseed flour in combination V<sub>2</sub> & V<sub>4</sub> followed by other proportion such as control sample and fortified with 5g roasted flaxseed flour sample V<sub>0</sub> and V<sub>1</sub> obtained appearance and color 8.0 and 7.8 respectively. As the roasted and germinated flaxseed flour level increased in *vermicelli*

dough appearance and colour were darker. Present results are in agreement with **Baskaran, et. al., (2011)** analyzing the color attributes of noodles supplemented with skim milk powder. Similarly, **Bashir, et. al., (2012)** reported that the color of pasta fortified with chickpea flour and defatted soy flour ranges from 7.4 to 8.40.

**Table No 4.1 Sensory evaluation of Roasted and germinated flaxseed flour added vermicelli**

Treatments	Appearance & color	Flavor	Taste	Texture	Overall acceptability
V <sub>0</sub>	8.0	8.2	8.0	8.3	8.3
V <sub>1</sub>	7.8	7.5	7.6	7.5	7.4
V <sub>2</sub>	7.5	7.5	7.4	7.2	7.3
V <sub>3</sub>	8.3	8.3	8.2	8.4	8.4
V <sub>4</sub>	7.5	7.5	7.6	7.4	7.5
SE±	<b>0.49</b>	<b>0.55</b>	<b>0.54</b>	<b>0.55</b>	<b>0.55</b>
CD at 5%	<b>1.53</b>	<b>1.72</b>	<b>1.67</b>	<b>1.71</b>	<b>0.72</b>

\*Each value is an average of three determinations



#### 4.1.2. Flavor

The flavor was an important criterion for deciding the quality of the product, which determines its acceptability. The flavor score for cooked *vermicelli* as influenced by different levels of roasted and germinated flaxseed flour has been depicted in (table 4.22). The sensory score for the flavor of *vermicelli* ranged from 7.5 to 8.3 (Table 4.22). The maximum flavor score of 8.3 was given to the product made with 5g germinated flaxseed flour and wheat flour with a combination of V<sub>3</sub>, while a minimum score of 7.5 was obtained from wheat flour and 5g roasted flaxseed flour, 10g roasted flaxseed flour, and 10g germinated flaxseed flour in combination V<sub>1</sub>, V<sub>2</sub> & V<sub>4</sub> followed by other proportion such as control sample obtained 8.0 respectively. All treatments were significantly different. As the flour character showed some similarity between each treatment and secured the par score for them, but flavors distinctly differentiate from each other and secured statistically different scores between them. The present results obtained are in agreement with **Baskaran et al. (2011)** also analyzed

increasing flavor attributes of noodles supplemented with skim milk powder and **Agarwal et al. (2013)** revealed the flavor of the formulation SVM2 score highest (8.00) of fortified *vermicelli* prepared from barnyard millet and defatted soy flour.

#### 4.1.3. taste

Taste was an important criterion for deciding the quality of the product which determines its acceptability. The taste score for cooked *vermicelli* as influenced by different levels of roasted and germinated flaxseed flour has been depicted in (table 4.22). The sensory score for the taste of *vermicelli* ranged from 7.4 to 8.2 (Table 4.22). The maximum taste score of 8.2 was given to the product made with 5g germinated flaxseed flour and wheat flour in combination V<sub>3</sub>, minimum taste score of 7.4 was obtained from wheat flour and 10g roasted flaxseed flour sample V<sub>2</sub> followed by other proportion such as control sample and fortified samples with 5g roasted flaxseed flour, and 10g germinated flaxseed flour sample V<sub>0</sub>, V<sub>1</sub> and V<sub>4</sub> obtained 8.0, 7.6 and 7.6 respectively. The present results are similar to **Baskaran et al. (2011)** analyzed sensory attributes of noodles supplemented with skim milk powder. He reported a decreasing taste score. **Kumar and Trivedi (2011)** reported that the score for a taste of pasta was 8.

#### 4.1.4 Texture

The texture was an important criterion for deciding the quality of the product, which determines its acceptability. The texture score for cooked *vermicelli* as influenced by different levels of roasted and germinated flaxseed flour has been depicted in (table 4.22). The sensory score for the texture of *vermicelli* ranged from 7.2 to 8.4

(Table 4.22). The maximum texture score of 8.4 was given to the product made with 5g germinated flaxseed flour and wheat flour in combination with V<sub>3</sub>, while the minimum texture score of 7.2 was obtained from wheat flour and 10g roasted flaxseed flour sample V<sub>2</sub> followed by other proportion such as control sample and fortified samples with 5g roasted flaxseed flour, and 10g germinated flaxseed flour sample V<sub>0</sub>, V<sub>1</sub>, and V<sub>4</sub> obtained 8.3, 7.5 and 7.4 respectively. The present results are similar to **Baskaran et al. (2011)** analysed sensory attributes of noodles supplemented with skim milk powder. He reported a decreasing taste score. **Kumar and Trivedi (2011)** reported that the score for the texture of the pasta was 8.

#### 4.1.5 Overall acceptability

Overall acceptability was an important criterion for deciding the quality of the product, which determines its acceptability. The overall acceptability score for cooked *vermicelli* as influenced by different levels of roasted and germinated flaxseed flour has been depicted in (table 4.22). The sensory score for the overall acceptability of *vermicelli* ranged from 7.3 to 8.4 (Table 4.22). The maximum overall acceptability score of 8.4 was given to the product made with 5g germinated flaxseed flour and wheat flour in combination with V<sub>3</sub>, while the minimum overall acceptability score of 7.3 was obtained from wheat flour and 10g roasted flaxseed flour sample V<sub>2</sub> followed by other proportion such as control sample and fortified samples with 10g germinated flaxseed flour and 5g roasted flaxseed flour sample V<sub>0</sub>, V<sub>4</sub>, and V<sub>1</sub> and obtained 8.3, 7.5 and 7.4 respectively. These results were comparable with the findings of **Sood et al. (2009)** also reported the overall

acceptability score ranged between 8.42 to 8.16; **Bashir *et al.* (2012)** score ranged between 3.5 and 8.2 and **Agarwal *et al* (2004)** reported that the overall acceptability score 8.30.

**5. CONCLUSION:** Sensory evaluation showed that vermicelli prepared by incorporating the germinated flaxseed flour 5g/100g had the maximum overall acceptability than Vermicelli prepared by the addition of roasted flaxseed flour 5g/100g, 10g/100g, and germinated flaxseed flour 10g/100g respectively.

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