DEVELOPMENT AND QUALITY EVALUATION OF JACKFRUIT SEED AND SOY FLOUR NOODLES

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ABSTRACT

Study was conducted to develop Jackfruit Seed and soy flour noodle. Different levels of refined wheat flour, jackfruit seed flour and soy flour were added in the ratio of 100:00:00, 90:5:5, 80:10:10, 70:15:15, 60:20:20, 70:10:20 and 70:20:10 for the development of noodles and its quality was analyzed. The results of study indicated that samples of jackfruit and soy flour had added noodles, for all addition levels contained more protein, fat, fibre and ash as compared to control sample. The noodles developed with addition of jackfruit and soy flour noodle had desirable organoleptic properties as indicated by the taste panel studies. However, based on sensory analysis noodles with (T1) 90:5:5 refined wheat flour; jackfruit seed flour and soy flour were found more acceptable than other levels and optimum for incorporation in refined wheat flour noodles for development of enriched noodles. Noodles was packed in LDPE and stored at room temperature. The storage studies were conducted at the interval of 0-60 days. Protein, fat, crude fibre, was decreased during storage period.

Key words: Jackfruit seed flour, Soy flour, Noodles, Refined wheat flour, Sensory analysis.

1. INTRODUCTION

Noodle is a staple food made from unleavened dough which is stretched, extruded, or rolled flat and cut into one of a variety of shapes by using extrusion technology and usually cooked in boiling water, sometimes with cooking oil or salt added. Noodles are widely consumed throughout the world and their global consumption is second only to bread (Jayasena et al., 2008).

Jackfruit (Artocarpus heterophyllus Lam.) a member of the family Moraceae is the largest tree-borne fruit in the world. India is the second biggest producer of the fruit in the world and is considered as the motherland of jackfruit. The jackfruit is native to parts of South and Southeast Asia and is believed to have originated in the rainforests of Western Ghats of India and is cultivated throughout the low lands in South and Southeast Asia. Major jackfruit producing countries are Bangladesh, India, Myanmar, Nepal, Thailand, Vietnam, China, the Philippines, Indonesia, Malaysia and Sri Lanka. There are 100-500 seeds in a single fruit (Sidhu, 2012). The jackfruit seeds are high protein, fibre and carbohydrate contents (Ocloo et al., 2010). The seeds are also marketed in canned as in boiled form like the beans, in brine and in tomato sauce (Morton, 1987). Jackfruit seed contains lignans, isoflavones, saponins, all phytonutrients and their health benefits are wide-ranging from anticancer to antihypertensive, antiaging, antioxidant, antiulcer, and so on (Omale and Friday 2010). Seeds contain two lectins namely jacalin and artocarpin. Jacalin has been proved to be useful for the evaluation of the immune status of patients infected with human immunodeficiency virus 1 (Haq, 2006).

Soybean (Glycine max) contains all the three macro nutrients required for good nutrition complete protein (40%), carbohydrate (18%), fat (18%) and moisture (9%) as well as vitamins and minerals (5%), including calcium, folic acid and iron (National Soybean Research Laboratory, 2008; Singh et al., 2009) Besides its nutritional value, soybean also possesses various medicinal properties due to the presence of isoflavones (Verma et al., 2014) Consumption of soybeans product is useful for bone health, brain functionality, body immunology reduced the risk of cancer, decreased risk factors for cardiovascular disease, and reduced chances of other chronic illnesses (Badger et al., 2002; Fabiyi, 2006; Jooyandeh, 2011). Traditional noodles are claimed to lack other essential nutritional components such as dietary fiber, vitamins and minerals, which are lost during wheat flour refinement (Choo and Aziz, 2010).

Therefore a study was designed to utilize low cost jackfruit seed and soy flour to develop a value added fortified noodles and to determine its nutrient composition.

2. MATERIALS AND METHODS
The experimental studies were carried out in Food Processing laboratories at Sam Higginbottom Institute of Agriculture Technology and Sciences, Allahabad.

2.1 RAW MATERIALS

Refined wheat flour, jackfruit seed, soybean, salt were purchased from local market of Allahabad.

PREPARATION OF JACKFRUIT SEED FLOUR

The jackfruit seeds were cleaned manually and white arils (seed coat) were manually peeled off. Seeds were ly pealed, soaked in 3 per cent sodium hydroxide solution for 3-5 minutes to remove the thin brown spermoderm which covered the cotyledons. The spermoderm layer was removed by rubbing the seeds within the hands and washing thoroughly under running water. The seeds were sliced into thin chips separately and tray dried at 50 to 60°C to constant moisture (<13%). The dried chips were powdered in a grinder, passed through 80-100 mesh sieves and stored in air tight containers for further use.

PREPARATION OF SOY FLOUR

Soybean grains were thoroughly cleaned to remove the dust and other foreign materials. The clean grains were soaked in water for 4-6 hours and then autoclaved for 5 minutes in a pressure cooker. They were removed and dried directly in the sun for 3-4 days till the material was completely dried having 6-8% moisture content. Soybean was then ground to make fine flour and sieved through 80-100 mesh sieves. The flour samples obtained were kept in airtight container before use.

2.2 TREATMENTS

Table -1: Formulation of Control Noodle and Noodle Supplemented with Jackfruit seed Soy Flour Noodle.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Refined wheat flour</th>
<th>Jackfruit seed flour</th>
<th>Soya flour</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>T1</td>
<td>90</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>T2</td>
<td>80</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>T3</td>
<td>70</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>T4</td>
<td>60</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>T5</td>
<td>70</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>T6</td>
<td>70</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>

2.3 Noodle preparation

Noodles were prepared in the laboratory. The jackfruit seed and soy flour noodles were prepared by mixing the ingredients were dry mixed and kneaded with water into dough. The dough was covered with wet muslin cloth and kept at 28 to 30°C for 30 minutes for seasoning. Then dough was passed through extruder and product was kept in tray dryer at 60°C for 2-3 hr. then Cooold to room temperature, packaged in LDPE bag and product is for further study.

2.4 CHEMICAL ANALYSIS

The chemical analysis of the different samples was determined. These analyses included the contents of moisture, protein, fat, crude fiber, ash using AOAC (1990) methods. The total carbohydrate was determined by the difference that is by subtracting the measured moisture, protein, fat crude fibre and ash content from 100 (Gayas et al., 2012).

2.5 SENSORY EVALUATION

The dried and cooked noodles were kept for organoleptic evaluation. The ingredients and method for preparation of cooked noodles by taking 100g of dried noodles for each treatment were boiled in 2 tea spoonful of noodle masala, 2 tea spoonful of refined oil, a pinch of salt and chili powder were added to the water for preparation.

Quality attributes of prepared noodles were evaluated by a panel 10 semi trained judges including teachers and post graduate students of department of food process engg., SHIATS University Allahabad.

The organoleptic characters viz., colour and appearance, texture, taste and overall acceptability of dried jackfruit and soy flour noodles, were evaluated on nine point hedonic scale. Where 9 = extremely like and 1 = extremely dislike.

2.6 STATISTICAL ANALYSIS

Data obtained from sensory analysis were subjected in terms of average scores for different attributes and analyzed statistically by one-way analysis of variance (ANOVA) and analysis is carried out by using Microsoft Excel.

3. RESULTS AND DISCUSSION

The data illustrated in the table 2 shows the average sensory scores for different parameters in control and treated sample of jackfruit seed and soy flour noodles, clearly indicates that treatments T1 (7.54) had the highest score followed by T6 (7.52), T2 (7.2), T3 (7.06), T4 (6.86), T5 6.74, T0 6.6. The calculated value of F is greater than the tabulated value of F at 5% probability level. Therefore, it can be concluded that there was significant difference between treatments regarding the overall acceptability of jackfruit seed soy flour noodles. Thus, the flavour, appearance and overall acceptability increased as the amount of 5 percent of jackfruit seed flour and 5 percent of soy flour increased.

The moisture, protein, fat, ash, crude fibre content were determined for the control noodles (100% refined wheat flour) and the noodles supplemented with different levels of jackfruit seed flour and soy flour as indicated in chart -2 to chart -8. Fortification of noodle resulted in increased protein, fat, ash and crude fibre content, while as carbohydrate content was decreased, as compared to control.
It could be noticed that supplementation of noodles with jackfruit seed flour and soy flour associated with the increasing protein, fat, fibre, ash content. This increase in protein, fat, fibre and ash content due to relative increase of Jackfruit seed flour and soy flour in the noodle. The storage studies were conducted at the interval of 0-60 days. During storage protein percentage was decreased day by day due to proteolysis. Similarly Fat content was decreased during storage due to oxidation of fat as shown in chart-4.

A storage study revealed that Crude fibre percentage was decreased due to hydration of fibre due to moisture gain chart -7 and chart- 2. Jackfruit seed and soy flour noodle has shown significant changes during the storage studies from 0 day to 60 days.

**Chart -1:** Sensory Evaluation of jackfruit seed and soy flour noodles.

**Table -2:** Effect of incorporation Jackfruit seed and soy flour on organoleptic characteristic Noodles.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Taste</th>
<th>Colour</th>
<th>Flavour</th>
<th>Appearance</th>
<th>Texture</th>
<th>Overall Acceptability</th>
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</thead>
<tbody>
<tr>
<td>T0</td>
<td>7.6</td>
<td>7.5</td>
<td>7.7</td>
<td>7.5</td>
<td>7.3</td>
<td>7.52</td>
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<tr>
<td>T1</td>
<td>7.5</td>
<td>7.6</td>
<td>7.6</td>
<td>7.5</td>
<td>7.5</td>
<td>7.54</td>
</tr>
<tr>
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<td>7.1</td>
<td>7.3</td>
<td>7.4</td>
<td>7.4</td>
<td>6.8</td>
<td>7.2</td>
</tr>
<tr>
<td>T3</td>
<td>7.0</td>
<td>7.2</td>
<td>7.1</td>
<td>7.3</td>
<td>6.7</td>
<td>7.06</td>
</tr>
<tr>
<td>T4</td>
<td>6.9</td>
<td>7.1</td>
<td>6.9</td>
<td>6.8</td>
<td>6.6</td>
<td>6.86</td>
</tr>
<tr>
<td>T5</td>
<td>6.7</td>
<td>7.1</td>
<td>6.6</td>
<td>6.8</td>
<td>6.5</td>
<td>6.74</td>
</tr>
<tr>
<td>T6</td>
<td>6.7</td>
<td>6.8</td>
<td>6.5</td>
<td>6.7</td>
<td>6.6</td>
<td>6.66</td>
</tr>
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<td>NS</td>
<td>S</td>
<td>S</td>
<td>NS</td>
<td>S</td>
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<tr>
<td>CD</td>
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<td>1.002</td>
<td>0.8545</td>
<td>-</td>
<td>0.79736</td>
</tr>
</tbody>
</table>

**Chart -2:** Moisture content (%) of jackfruit seed and soy flour noodles packed in LDPE during 60 days of ambient storage.

**Chart -3:** Protein content (%) of jackfruit seed and soy flour noodles packed in LDPE during 60 days of ambient storage.

**Chart -4:** Fat content (%) of jackfruit seed and soy flour noodles packed in LDPE during 60 days of ambient storage.

**Chart -6:** Ash content (%) of jackfruit seed and soy flour noodles packed in LDPE during 60 days of ambient storage.
Chart -7: Crude fibre content (%) of jackfruit seed and soy flour noodles packed in LDPE during 60 days of ambient storage.

Chart -8: Carbohydrate content (%) of jackfruit seed and soy flour noodles packed in LDPE during 60 days of ambient storage.

4. CONCLUSION

On the basis of sensory evaluation best sample was obtained sample T₃ (100:5:5) compare to control sample T₀ (100). Nutritional value of sample T₃ was found protein, crude fibre and fat 12.56(%), 0.70(%), and 2.20(%) respectively increase but carbohydrate contained decrease 81.06 to 77.08 (%). Jackfruit seed and soy flour noodle has shown significant changes during the storage studies from 0 day to 60 days.

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