Standardisation of South Indian Breakfast Foods with Coconut Flour

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A good breakfast provides the nutrients that people need to start their day off right. India has a vast range of breakfast dishes with traditional fare varying widely by region. In Kerala the breakfast items include dosa, idly, appam, idiyappam, puttu, pathiri, uppuma, poori, chappathi, adai, naipathiri, chatty pathiri, uthappam, palappam, kozhakatta and in Tamil Nadu, the breakfast items include idly with sambar / chutney, or dosa with sambar, or puttu with sugar, or uppma and vada served on a banana leaf.

Introduction

Breakfast is the first meal of the day and the most important one. Food served for breakfast vary widely in different cultures around the world. It often includes carbohydrate such as wheat, rice, millets, breads, side dishes, a fruit, a milk based beverage or stimulants like coffee or tea. A good breakfast provides the nutrients that people need to start their day off right (Pollitt, 1995). India has a vast range of breakfast dishes with traditional fare varying widely by region. In Kerala the breakfast items include dosa, idly, appam, idiyappam, puttu, pathiri, uppuma, poori, chappathi, adai, naipathiri, chatty pathiri, uthappam, palappam, kozhakatta and in Tamil Nadu, the breakfast items include iddly with sambar / chutney, or dosa with sambar, or puttu with sugar, or uppma and vada served on a banana leaf. The accompaniments may vary depending on the likes and dislikes of individuals. In the present study coconut flour is being incorporated in different breakfast foods. Coconut flour is selected for incorporation because of its high fibre and protein content and almost all the fat is removed from the coconut flour. The most common type of flours used in cooking are whole wheat flour, refined wheat flour, rice flour, ragi flour, corn flour, soya flour, bengal gram dhal flour etc, However, coconut flour is a novel flour. Therefore addition of coconut flour in various recipes will help in not only altering the culinary properties but also add value to the recipes in terms of nutrition and health.

Objectives

- To formulate and evaluate recipes of different breakfast foods with coconut flour.
- To calculate the nutrient composition of the standardized recipes.

Methodology

Five Indian breakfast foods namely Idly, Idiyappam, Puttu, Kolukattai and Appam were formulated using coconut flour. In all these products the major cereal was substituted with coconut flour in different proportions. A control sample of the breakfast foods was also prepared for comparison. The

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recipes were organloeptically evaluated on a 5 point Hedonic scale by a panel of 10 trained judges. For standardization the ingredients in the recipes were measured accurately and the method of mixing the ingredients, soaking, grinding, boiling, steaming, frying were all timed using a timer and prepared in the same manner thrice on consecutive days and organoleptically evaluated. The nutrients were calculated using Nutritive value of Indian foods Gopalan *et al* (2004).

Results and Discussion

Organoleptic Scores of Idly

The mean scores of organoleptic evaluation for idly prepared with varying levels of coconut flour are given in Table I and shown in Figure 1.

From the above table, it is seen that idly made with 10 percent of coconut flour had got the maximum scores in all the criteria compared to the idly made with 20 and 30 percent of incorporation. However, the scores in all the criteria were less when compared to that of standard, thus showing that incorporation of coconut flour even at 10 percent level had a deleterious effect on the quality of idly.

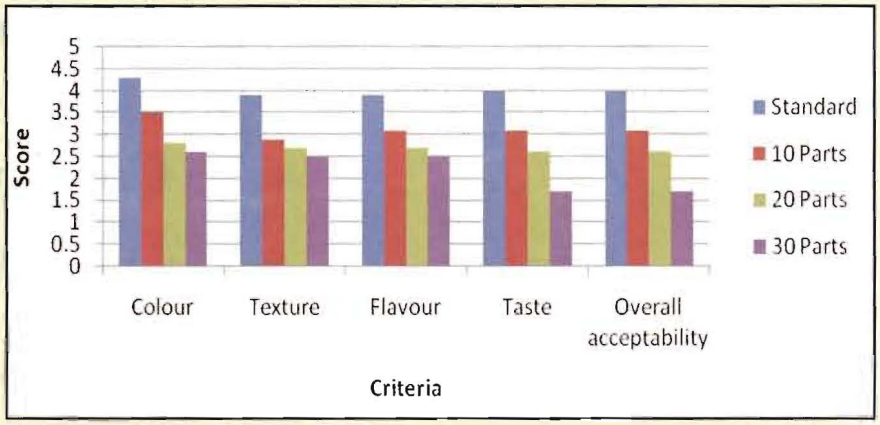


Figure- 1 Mean scores obtained for Idly

The mean scores obtained by idlies made with 20 and 30 percent coconut flour incorporation were less. The high fibre content of coconut flour has interfered with the organoleptic properties of idly. The characteristic softness was not seen in the coconut flour incorporated iddlies. The time required for cooking was also more for iddlies made with 30 parts of coconut flour, as the amount of rice flour was less.

A study was carried out (Veena *et al.*, 2003) to study the incorporation of barnyard millet in most common cereal based traditional foods like idly, roti and chakli. Cooked millet was acceptable for appearance and taste.

Organoleptic Score of Idiyappam

The mean scores of organoleptic evaluation for idiyappam prepared with varying levels of coconut flour are given in Table II.

From the table it is seen that, same scores was obtained for overall acceptability by 10 percent and 20 percent incorporated idiyappam. Scores obtained for taste and flavour were also the same for both. Idiyappam with 30 percent incorporation was not prepared because the fibre content in the dough did not allow the product to be extruded through the idiyappam machine. According to Shelke (2005) when replacing carbohydrates with fibre or protein,

Table –I. Mean organoleptic scores of Idly

S.No	Sample	Mean Scores				
		Colour	Texture	Flavour	Taste	Over all acceptability
1.	Standard	4.3±0.483	3.9±0.316	3.9±0.316	4.0±0.66	4.0±0.66
2.	10 Parts	3.5±0.850	2.9±0.316	3.1±0.316	3.1±0.316	3.1±0.316
3.	20 Parts	2.38±0.920	2.7±0.483	2.7±0.949	2.6±0.730	2.6±0.730
4.	30 Parts	2.6±0.699	2.5±0.527	2.5±0.527	1.7±0. 48	1.7±0.48

Table - II Mean Organoleptic Scores of Idiyappam

S.No	Sample	Mean Scores				
		Colour	Texture	Flavour	Taste	Overall Acceptability
1.	Standard	5±0	4.6±0.516	4.8±0.422	4.7±0.483	4.7±0.483
2.	10 parts	4.4±0.516	4.4±0.516	4.2±0.422	4.1±0.316	4.1±0.316
3.	20 parts	4±0	4.2±0.422	4.2±0.422	4.1±0.316	4.1±0.316

it is important to map the affinities of these ingredients for water, so as to avoid interference with mixing and machinability. The appearance of 10 and 20 percent was affected because of the high fibre content of coconut flour. From the appearance, the product did not look like idiyappam instead they were broken pieces. The mean score obtained for idiyappam are shown in Figure 2.

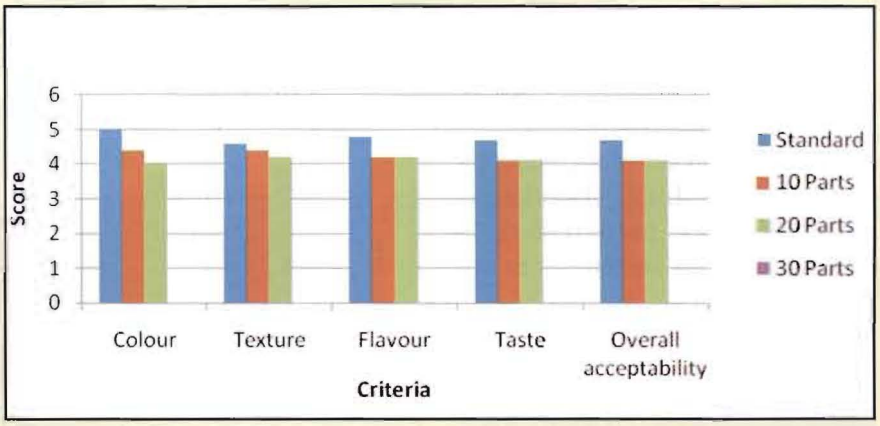


Figure- 2 Mean scores obtained for Idiyappam

Noodles was prepared from composite flour of various combinations of millet flour blend, whole wheat flour and soya flour and evaluated the influence of millet flour blend in physical, functional, nutritional, cooking and organoleptic characteristics and invivo glycemic reponse. The cooking time of developed noodles from composite flour was significantly higher than the cooking time of branded noodles. The mean overall organoleptic score of developed noodle from composite flour was in the range of highly acceptable criteria. By all means, 20 percent level of millet flour blend incorporation was found to be acceptable. The mean glycemic index load of developed noodles from standard composite flour and 20 percent millet flour blend incorporated noodle was significantly lower than the branded noodle (Vijayakumar *et al.*, 2010).

Organoleptic Scores of Puttu

The mean scores of organoleptic evaluation for puttu prepared with varying levels of coconut flour are given in Table III and shown in Figure 3.

Puttu made with 10 percent of coconut flour had got the maximum scores in all the criteria (except flavour) when compared to the 20 parts of incorporation of coconut flour. Twenty parts of incorporation of coconut flour had got the maximum scores for flavour, because coconut flour by itself imparts flavour to the product. Overall acceptability was same for both the standard and 10 parts of incorporated puttu. Incorporating coconut flour at 10 percent level improved taste however it was not so at 20 and 30 percent level of incorporation. When coconut was added in little amounts there was no significant difference in the overall acceptability of the product.

Commercial cassava flour was composited with flours from wheat, maize and sorghum and finger millet at between 0 and 50 percent. The composite flours were used to prepare three Kenyan traditional foods mandazi, ugali and uji, respectively. The acceptability of these foods to Kenyans was evaluated to taste panel procedures up to 50 percent. Cassava flour can be incorporated in to mandazi and ujis without appreciably changing their acceptability, but much lower levels were tolerable in ugali (Jasper *et al.*, 1989).

Table - III. Mean Organoleptic Scores of Puttu

S.No	Sample	Mean Scores				
		Colour	Texture	Flavour	Taste	Overall Acceptability
1.	Standard	4.7±0.483	4.6±0.516	4.6±0.516	4.4±0.516	4.3±0.483
2.	10 parts	4.1±0.316	4.1±0.316	3.7±0.483	4.3±0.483	4.3±0.483
3.	20 parts	3.7±0.483	4.1±0.316	3.8±0.422	3.8±0.422	3.5±0.527
4.	30 parts	3.7±0.483	3.9±0.316	3.3±0.483	3.4±0.516	2.7±0.483

Kolukattai: Organoleptic Scores of Kolukattai

The mean scores of organoleptic evaluation for kolukattai (Kozhukkatta) prepared with varying levels of coconut flour are given in Table IV.

Kolukattai made with 10 percent of coconut flour had got the maximum scores for overall acceptability when compared to the standard. This is mainly because of the flavour imparted to the product by coconut flour. Twenty and 30 parts of coconut flour incorporated kolukattai had got the maximum scores for texture when compared to the standard, as the increase in fibre content of coconut flour has helped in making it firmer.

The mean organoleptic scores obtained for kolukattai are shown in Figure 4.

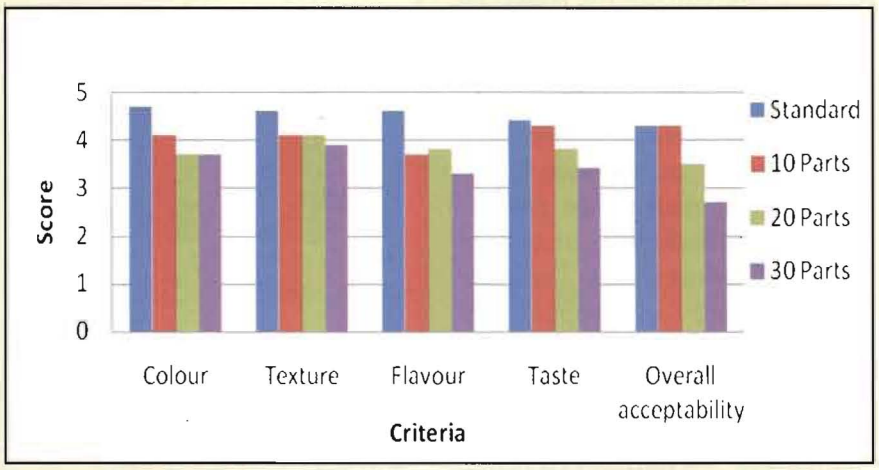


Figure- 3 Mean scores obtained for Puttu

Appam : Organoleptic Scores of Appam

The mean scores of organoleptic evaluation for appam prepared with varying levels of coconut flour are given in Table V and shown in Figure 5.

Appam made with 10 parts of coconut flour had got the maximum scores for all the criteria when compared with 20 and 30 parts incorporation (standard had got the maximum). Appam made with 10 and 20 parts of coconut flour had got the same score for flavour. Appam

Table - IV Mean organoleptic scores of Kolukattai

S.No	Sample	Mean Scores				
		Colour	Texture	Flavour	Taste	Overall Acceptability
1.	Standard	5±0	4±0	4.9±0.316	4.1±0.316	4±0
2.	10 parts	4±0	4.3±0.483	4.9±0.316	5±0	5±0
3.	20 parts	3±0	5±0	4.4±0.516	4.8±0.422	4.8±0.422
4.	30 parts	2.7±0.483	5±0	4.1±0.316	4.1±0.316	4±0

made with 30 parts of coconut flour had got least scores in all the criteria.

Chanapamokkhot and Thongngam (2007) have attributed the role of starch- lipid, particularly lipid complexed with amylase could affect the swelling and pasting properties of starch and flour, the same reason can also be attributed to the above results.

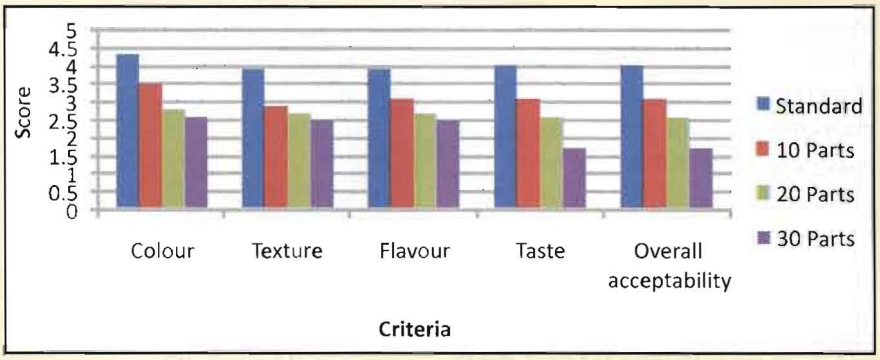


Figure- 4 Mean scores obtained for Kolukattai

Table -V Mean organoleptic scores of Appam

S.No	Sample	Mean Scores				
		Colour	Texture	Flavour	Taste	Overall Acceptability
1.	Standard	5±0	4.6±0.516	4.8±0.422	4.7±0.483	4.7±0.483
2.	10 parts	4.4±0.516	4.4±0.516	4.2±0.422	4.1±0.316	4.1±0.316
3.	20 parts	4±0	4.2±0.422	4.2±0.422	3.1±0.316	3.2±0.422
4.	30 parts	3.7±0.483	3.6±0.516	3.1±0.316	2.5±0.527	2.5±0.527

A study result showed that the addition of taro flour to wheat flour at a ratio of 10:90 produced acceptable bread and also the functionality of the flour was not affected. Incorporation of taro flour to wheat would therefore be an effective method of cost reduction of bread and other allied products in Nigeria (Emmanuel, et al., 2010).

ANOVA comparing mean scores of all the recipe has shown that varying levels of coconut flour significantly affected the overall acceptability of the product.

Results of Standardised Recipes

A standardized recipe is one that "has been, tried, adapted, and retried several times for use by a given food service operation and has been found to produce the same good results and yield every time when the exact procedures are used with the same type of equipment and the same quantity and quality of ingredients (USDA). The recipes which were considered for standardisation were only those which had 10 percent of incorporation of coconut flour (except idiyappam). This is because only they were the most acceptable.

The organoleptic scores of the five selected recipes for standardization (prepared thrice) show that they were almost equal in all the criteria. This shows that the dishes were prepared in the same

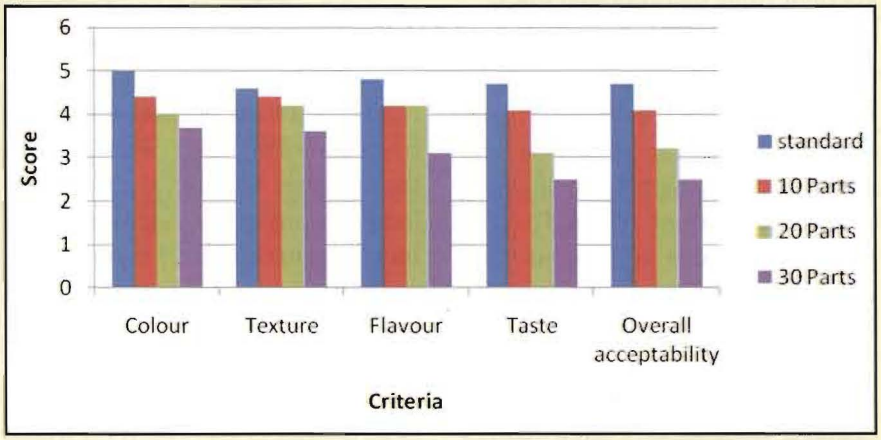
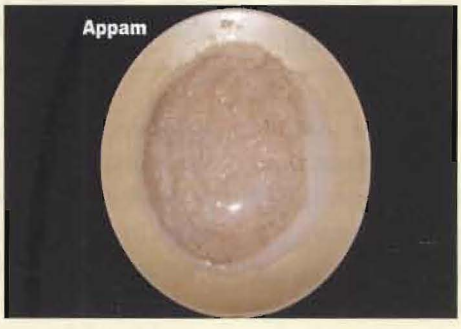


Figure- 5 Mean scores obtained for Appam

manner all the three times. Since these recipes were kept for organoleptic evaluation as a single dish, the panel of judges could not make out any difference with the original recipe. They were of the opinion that these dishes were the same as the standard ones.

Consumers are keen to have new foods for their palate, yet they want it to taste like the original and the best. Since the observed values in all the above tables were lesser than the critical value, it is inferred that preparing idly, idiyappam, puttu, kolukattai and appam thrice in the same way did not affect the criteria. This shows that when we quantify and measure the ingredients accurately and also cook the food for the same amount of time, there will be no change in the organoleptic scores and the quality of the product can be maintained. Organoleptic scores of standardised recipes are given in Table-VI



The Nutrient Content of the Recipes

Table VII shows the comparison of nutrients of the standard recipes compared with the standardised coconut flour incorporated ones.

The protein and fibre content of all the five coconut flour incorporated recipes were higher. One fourth of the recipe in idly contains dhal which has resulted in a protein content of 14.4g. The protein content of appam and idiyappam was the least (8.6g and 9.2g respectively), which is because only rice flour was used in the recipe. The fibre content of all the coconut flour incorporated recipes was much higher than the standard ones as evident from the table, the difference being more than 4 gram percent. Fibre has enormous beneficial effects in the body. Therefore consumption of breakfast foods in which coconut flour has been incorporated will have a tremendous beneficial effect and help in combating diseases in the most organic (natural) manner. The carbohydrate content of all the coconut flour incorporated recipes was lower than the standard. This will automatically reduce the calorie contribution of these recipes, which is a boon to obese people. The fat content of all the coconut flour incorporated recipes was lower than the standard, except in idiyappam in which it was the same. Therefore the foods with coconut flour will help in diabetes mellitus, obesity, constipation, colon cancer and cardiovascular diseases.

From the above results, it can be concluded that coconut flour is possible to be incorporated only up to 10 percent level (except idiyappam). This confirms the replacement of standard flour with such novel flours or combination of flours to be very difficult especially

Table-VI Organoleptic scores of standardised recipes

Criteria	Mean Score														
	Iddly			Idiyappam			Uppuma			Kolukatti			Adai		
	No of times			No of times			No of times			No of times			No of times		
	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
Colour	4 ± 0	4 ± 0	4 ± 0	4.2 ± 0.422	4.2 ± 0.422	4.2 ± 0.422	4.1 ± 0.316	4.1 ± 0.316	4.1 ± 0.316	3.8 ± 0.632	3.8 ± 0.632	3.8 ± 0.632	4.8 ± 0.949	4.8 ± 0.949	4.6 ± 0.516
Texture	4 ± 0	4 ± 0	3.9 ± 0.316	4 ± 0	4 ± 0	4 ± 0	3.9 ± 0.316	3.9 ± 0.316	3.9 ± 0.316	4.3 ± 0.483	4.3 ± 0.483	4.3 ± 0.483	4.2 ± 0.422	4.2 ± 0.422	4.2 ± 0.422
Flavour	4.8 ± 0.422	4.8 ± 0.422	4.8 ± 0.422	4.5 ± 0.527	4.5 ± 0.527	4.5 ± 0.527	4.1 ± 0.316	4.1 ± 0.316	4.1 ± 0.316	4 ± 0	4 ± 0	4 ± 0	4.6 ± 0.516	4.6 ± 0.516	4.6 ± 0.516
Taste	4.6 ± 0.516	4.3 ± 0.483	4.6 ± 0.516	4.5 ± 0.527	4.6 ± 0.516	4.4 ± 0.516	4.1 ± 0.316	4.1 ± 0.316	4.1 ± 0.316	4 ± 0	4 ± 0	3.8 ± 0.632	4.5 ± 0.527	4.5 ± 0.527	4.5 ± 0.527

in such common and frequently consumed breakfast foods. The palate of the consumer is accustomed to the appearance, texture, flavour, tatse of food products made from original composition of ingredients. When such new food formulations are made they tend to tone down or reduce the acceptability of the product.

More recipes prepared with coconut flour can be standardised and be made in to a recipe book and published. This will help in contributing to the health of the society and also have commercial value by way of royalty to the author.

Recommendations

- Breakfast foods of other States of India can be prepared in the same manner.
- Coconut flour can be incorporated in snack foods and organoleptically evaluated.
- The glycemic load and glycemic response of the coconut flour incorporated breakfast foods can be found out.

Bibliography

1. Channapamokhot and Thongngam, 2007, The Chemical and Physico Chemical Properties of Sorghum Starch and Flour, Kasetsart j.(Nat. Sci), 41, Pp; 343-349
2. Emmanuel C.A, Osuchukwu and

Table-VII The comparison of nutrients of the standard recipes

S.No	Recipes	Nutrient Content							
		Standard				Most Acceptable			
		CHO (g)	Protein (g)	Fat (g)	Fibre (g)	CHO (g)	Protein (g)	Fat (g)	Fibre (g)
1	Idly	94.8	12.9	0.9	0.57	90	14.4	0.7	4.8
2	Idiyappam	84.5	7.8	6.5	1	76.8	9.2	6.5	5.2
3	Uppma	62.2	13.0	12.6	2.6	58.4	14	12.4	6.7
4	Kolukattai	85.3	8.1	6.4	1.4	80.6	9.5	6.3	5.7
5	Appam	79.5	7.12	0.57	0.34	74.7	8.6	0.5	4.6

Oshiele. L, 2010, Functional and Sensory Properties of Wheat and Tar Flour Composite bread, *African Journal of Food Science*, Vol 4 (5) Pp; 248-253.

3. Jasper K, Immungi, Christine A. Onyango, 1989, Incorporation of Cassava flour in to some Kanyan Traditional Foods, *Ecology of Food and Nutrition*, Vol, 23, Pp; 125-129.
4. Karasceviour, 2010, Tropical Traditions Coconut Flour Review and Give away.
5. Katungwe. P, Mulwafu. A and Mwangwela A.M, 2007, Utilisation of Flour Millled from Micronised Cow peas in maize Based Traditional Malawcan Snacks.
6. Pollit, E and Mathews,R, 1998, Breakfast and Cognition an Integrative Summary, *American Journal of Clinical Nutrition*, 67(supp 1) 804s - 813.
7. Shelke, 2005, Healthful Flour Alternatives, *Journal of the Science of Food and Agriculture*, Vol, 85, Pp 2094 - 2104.
8. USDA- A Tool Kit for Healthy School Meal: Recipes and Training Materials
9. Veena.B, Bharathi.V, Chimmadramak Naik and Usha Malagi , 2004, Development of Banyard Millet Based Traditional Foods, Karnataka, *Journal of Agricultural Science* 17 (3), Pp; 522-527.
10. Vijaykumar. T, Jemima Beryl Mohankumar, Srinivasan. T, 2010, Quality Evaluation of Noodles from Millet Flour Blend Incorporated Composite Flour, Electronic *Journal of Environmental Agricultural and Food Chemistry*, Vol 9(3), Pp; 479-492.