International Journal of Food Science and Nutrition
ISSN: 2455-4898, Impact Factor: RJIF 5.14
www.foodsciencejournal.com
Volume 1; Issue 5; September 2016; Page No. 37-40

Organoleptic evaluation of value added gluten free biscuits

[1] Yadav Tanuja, [2] Mishra Sunita

[1] M.Sc. Department of Food Science and Technology, School for Home Sciences, BBAU Lucknow, Uttar Pradesh, India
[2] Dean & Head, Department of Food Science and Technology, School for Home Sciences, BBAU Lucknow, Uttar Pradesh, India

Abstract
Lifelong gluten-free diet is essential for patients having celiac disease. Since wheat flour contains gluten, it is necessary to replace wheat flour with other types of gluten-free flours. In this study Gluten free biscuits was produced from blends of soybean, rice and corn flour at different ratio sample T_1 – WF(500g), T_2 – RF:SF:CF (15:40,45), and T_3– RF:SF:CF (20:45:35),T_4- RF: SF:CF(25:50:25) and incorporated with Aniseeds, Almonds, Dates and walnuts respectively. The purpose of the study was to develop gluten-free biscuit targeting a good sensory acceptance and quality parameter. The experiment has been carried out in research laboratory of Food Science and Technology, School for Home Sciences, Babasaheb Bhimrao Ambedkar University, Lucknow. From the sensory evaluation result, it was observed that though the 100% wheat flour was not accepted by panelist. With these results sample T_3– RF: SF: CF (20:45:35) had the best acceptability than other three samples.

Keywords: Gluten free diet, celiac disease, Soybean, Corn, Rice, Sensory acceptance

1. Introduction
Biscuits are commonly made from refined wheat flour which contains gluten protein. Gluten is complex mixture of glutelins and gliadins (prolamines). Gliadins, contribute essentially to the viscosity of the dough, and glutenins, which are responsible for dough elasticity (Simona Man et.al.2014) [1]. These peptides are responsible for celiac disease and gluten allergy. Due to the presence of multiple proline and glutamine residues, making them resistant to gastrointestinal digestion. Ingestion of these proteins leads to the inflammation, atrophy, and hyperplasia of the small-intestinal crypts of the celiac patient. This condition leads to the deficiency of minerals like iron, vitamins, carbohydrate and sometimes protein and fat.
Rice is a popular, non-allergic, gluten free source of carbohydrate, vitamins, and minerals with little fat. Rice is a distinctive crop due to its colorless, soft taste, low sodium levels, easy edible carbohydrates and hypoallergenic properties (Muna Ilowefah (2014) [3]. Rice (*Oryza sativa*) is a cereal foodstuff which forms an indispensable part of diet, due to significant biological value and digestibility. (Gujral & Rosell, 2004) [2].
The soybean is one of the richest and cheapest sources of plant protein that can be used to improve the diet of millions of people. Dry soybean contain 36% protein, 19% oil, 35% carbohydrate (17% of which dietary fiber), 5% minerals and several other components including vitamin (Ajay K. Dixit *et al.* 2011) [5]. The soy protein is highly digestible (92–100%) and contains all the essential amino acids except methionine which is relatively low but good source of lysine. Soy protein can also help to reduce fat, increase protein content and improve overall baking properties of baked goods, such as breads, crackers, doughnuts, cakes, pies, muffins.
Corn is richest source of carbohydrate and also contain protein, fat, some important minerals and vitamins. Corn flour composed of the endosperm portion of the kernel and usually has a starch content of 75-87% and a protein content of 6-8% (Shukla and Cheryan, 2001). The major component of the corn kernel is starch and starch is responsible for the mechanical properties of the dough and consequently plays an important role as a determinant of the food product quality. (Prakash Bhattacharyya *et al.* 2013) [4].
Dates (Phoenix dactylifera) are highly rich in nutrients. It provides fiber, carbohydrates, minerals and vitamins. It is also having a certain medicinal properties. Because of its high nutritional value and its long life the date palm has been known as the 'tree of life'. (Sultana Parvin *et al.* 2015) [6]. Anemia is a disease which is also frequently associated with celiac disease, due to poor iron absorption, or a reduction in the consumption of products which are fortified with iron.
The almond (*Prunus amygdalus*) is an effective health building food, both for the body and the mind; it is also a valuable food remedy for several common ailments Almonds are a useful food remedy for anaemia, as they contain copper, iron and vitamins. (Hari Jagannadha rao *et al.* 2012) [7]. Walnut also reduces the risk of heart-attack, as it helps blood run more easily in the vein. (Seyit Mehmet *et al.* 2011).
The aim of the present work is to replace wheat flour in biscuit by soybean, corn and rice flour and is enriched with dates, walnuts and almonds in order to develop gluten-free biscuit targeting a good sensory acceptance and quality parameters.

2. Methodology
2.1 Materials
The experiment has been carried out in research laboratory of Food Science and Technology, School for Home Sciences, Babasaheb Bhimrao Ambedkar University, Lucknow. Raw samples raw rice, dried corn, soybean, almonds, dates, walnuts, baking powder, sugar, unsalted butter and salt were purchased from local market of Lucknow area. Raw sample of the rice, soybeans, corn cleaned to remove the sand, dirt and unwanted particles. The flour was obtained by grinding them in flour mill.

2.2 Preparation of gluten free biscuits
The basic ingredients used were gluten free flours (500 g), sugar (166 g), shortening (333g), baking powder (5.0 g), salt (2 g), and water as required. Sugar and shortening were mixed thoroughly in a bowl for 2 min at speed three using a mixer. The dry

ingredients were weighed and mixed with sugar and shortening for 3 min at speed 3 to get cookie dough. The dough was rolled thinly on a sheeting board to a uniform thickness (6.0 mm) and cut out using steel biscuit cutters. The cut-out biscuit dough pieces were baked on greased pans at preheated 180 °C for 12-15 min in a baking oven and then were allowed to cool at room temperature (25±2ºC) for 8-10 min. All biscuits were stored in air-tight containers until evaluation.

Table 1. Design of dough preparation for the samples (T_1-T_4)

Ingredients	Controlt$_1$ G (%)	Sample T_2	Sample T_3	Sample T_4
Wheat flour	500 g (100%)	-	-	-
Rice flour	-	75g (15%)	100g (20%)	125g (25%)
Soybean flour	-	200g (40%)	225g (45%)	250g (50%)
Corn flour	-	225g (45%)	175g (35%)	125g (25%)
Almond	-	20gm		
Walnuts	-	-		20g
Dates	-	-	20g	
Aniseeds	20 g	-		
Sugar	166 g	166 g	166 g	166 g
Unsalted butter	333 g	333 g	333 g	333 g
Baking powder	5g	5g	5g	5g
Salt	1g	1 g	1g	1g

2.3 Sensory analysis of gluten-free biscuits

Sensory evaluation is an analytical method in which the human senses serve as a measurement tool to determine the quality and/or to describe the condition of a food product. It is a scientific discipline that analyses and measures human responses to the composition of food and drink, e.g. appearance, touch, odor, texture, temperature and taste. Gluten free biscuit samples were analyzed for sensory characteristics. Sensory quality characteristics were evaluated by a panel of 5 untrained members using a 9-point Hedonic scale. The biscuits were evaluated for their color & appearance, body & texture, taste & flavor and overall acceptability.

3. Results and Discussion

Sensory evaluation for gluten-free biscuits

Sensory characteristics of blended biscuits were determined on 9 Point Hedonic Scale. The results of the sensory evaluation judged by five panellists indicated that there were significant differences among blends for all attributes, as shown in following Tables. Overall acceptability was calculated considering the average of all the organoleptic parameters.

3.1 Parameter 1, Flavour and taste

Table 2: Individual markings for flavour & taste

	T_1	T_2	T_3	T_4
Member 1	7	9	9	8
Member 2	6	8	9	8
Member 3	6	7	9	8
Member 4	7	8	9	7
Member 5	8	9	9	8
Total	34	41	45	39

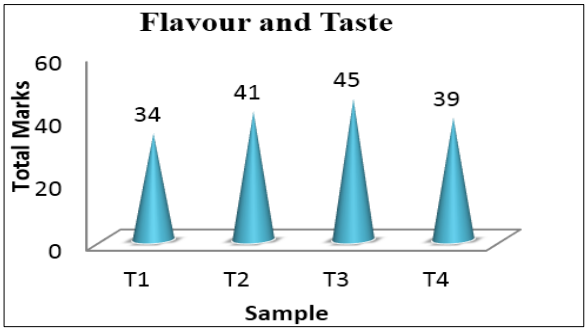

Fig 1: Graphical representation of scores for flavor and taste

The above mentioned score represents individual markings by members on the basis of flavour and taste the minimum average scored is 34 by T_1 (control) while maximum is of T_3 (RF: SF: CF: 20: 45: 35 in percentage) with an average of 45.

3.2 Parameter 2, Body and Texture

Table 3: Individual marking for Body and Texture

	T_1	T_2	T_3	T_4
Member 1	8	7	9	8
Member 2	7	8	9	8
Member 3	7	8	8	8
Member 4	7	9	9	8
Member 5	7	8	9	8
Total	36	40	44	39

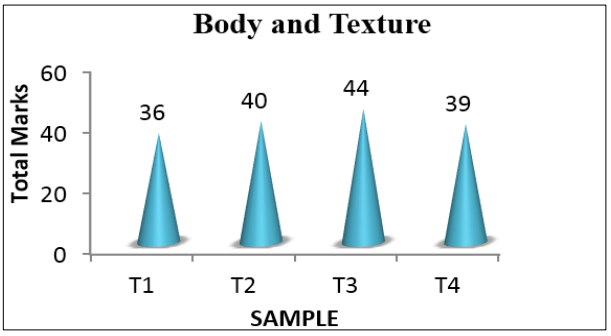

Fig 2: Graphical representation of scores for body and texture

The above mentioned score represents individual markings by members on the basis of body and texture the minimum average scored is 36 by T_1 (control) while maximum is of T_3 (RF: SF: CF: 20: 45: 35 in percentage) with an average of 44.

3.3 Parameter. Colour and Appearance

Table 4: Individual marking for Colour and Appearance

	T_1	T_2	T_3	T_4
Member 1	7	9	9	7
Member 2	7	9	8	9
Member 3	7	8	9	8
Member 4	7	9	9	7
Member 5	7	9	9	9
Total	35	44	44	40

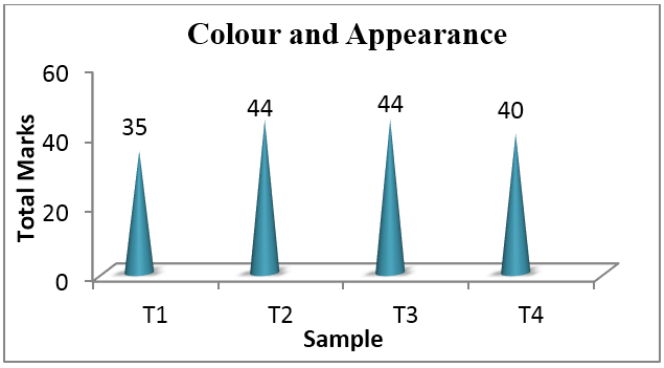

Fig 3: Graphical representation of scores for color and appearance

The above mentioned score represents individual markings by members on the basis of colour and appearance. The minimum average scored is 35 by T_1 while maximum is of T_2 (RF: SF: CF: 15: 40: 45 in percentage), T_3 (RF: SF: CF: 20:45:35) with an average of 44.

3.4 Parameter 4. Overall Acceptability

Table 4: Individual marking for overall acceptability

	T_1	T_2	T_3	T_4
Member 1	7	9	9	8
Member 2	7	8	9	8
Member 3	7	8	9	8
Member 4	7	8	9	7
Member 5	7	9	9	8
Total	35	42	45	39

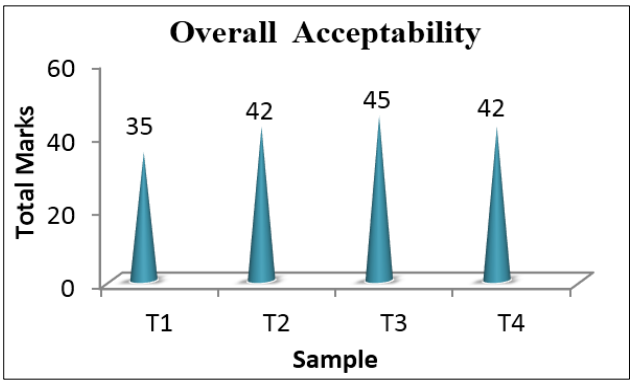

Fig 4: Graphical representation of scores for overall acceptability

The above mentioned score represents individual markings by members on the basis of overall acceptability the minimum average scored is 35 by T_1 (control) while maximum is of T_3 (RF: SF: CF: 20: 45:35 in percentage) with an average of 45.

3.5 Parameter 5.Overall Calculation

Table 4: Individual marking for overall calculation

	A1	A2	A3	A4
P1	34	41	45	39
P2	36	40	44	39
P3	35	44	44	40
P4	35	42	45	39
Overall	140	167	178	157
Average	35	41.75	45.5	39.25
S.D.	±1.47	±1.61	±1.68	±1.56

The respective table which is drawn above shows the overall calculations of average marks given by each panellist in each parameter, with calculated average values & S.D. of each sample on the basis of each parameter.

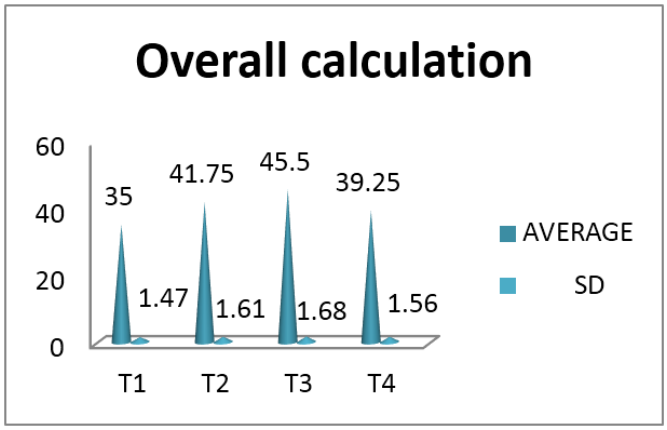

Fig 5: Graphical representation of scores for overall calculation

Where - T1, T2, T3 and T4 was coded samples prepared
P= Parameter (P1= Flavor and Taste, P2= Body and Texture, P3= Color and Appearance and P4= Overall Acceptability)
S.D. = Standard Deviation (SD reflex the fluctuation in the marks given by different Members and for different parameter)
T_3 (RF: SF: CF: 20: 45: 35 in percentage) scored maximum with highest average and SD which indicate its highest acceptability among the four prepared experimental samples.

4. Conclusion

Gluten free flour blends can be used to prepare biscuit with good organoleptic properties for people suffering from gluten allergy. In all prepared gluten free biscuits T_3 (RF: SF: CF: 20: 45: 35 in percentage) had good overall acceptance.

5. Acknowledgment

I feel indeed my privilege to work under the talented and inspiring guidance, and untiring supervision Prof. Sunita Mishra, Dean and Head, Department of Food Sciences & Technology School for Home Sciences for her kind suggestions and encouragement during the entire course of my study period.

6. Reference

1. Simona Man, Adriana Păucean, Sevastiţa Muste, Anamaria Pop. Studies on the formulation and quality characteristics of gluten free muffins. Journal of Agroalimentary Processes and Technologies. 2014; 20(2):122-127.
2. Gujral HS, Rosell CM. Improvement of the bread making quality of rice flour 494 by glucose oxidase. Food Research International. 2004; 37:75-81.
3. Muna Ilowefah, Chiemela Chinma, Jamilah Bakar, Hasanah M. Ghazali, Kharidah Muhammad, Mohammad Makeri. Fermented Brown Rice Flour as Functional Food Ingredient. 2014; 3:149-159.
4. Prakash Bhattacharyya, Uma Ghosh, Hiranmay Gangopadhyay, Utpal Raychaudhuri. Effects of thermal treatments and germination on physico-chemical properties of corn flour. African Journal of Food Science Research. 2013; 1(1):010-014.
5. Ajay K. Dixit. Soybean constituents and their function benefits. Opportunity, challenge and scope of natural

products in medical chemistry. 2011, 367-383.
6. Sultana Parvin, Dilruba Easmin, Afzal Sheikh, Mrityunjoy Biswas, *et al.* Nutritional Analysis of Date Fruits (Phoenix dactylifera L.) in Perspective of Bangladesh. American Journal of Life Sciences. 2015; 3(4):274-278.
7. Hari Jagannadha rao, Lakshmi. Therapeutic Applications of Almonds *Prunus amygdalus* L), Journal of Clinical and Diagnostic Research. 2012; 6(1):130-135.
8. Şen SM. Walnut, cultivation, nutritional value, folhlore (4th Ed.) (in Turkish). ICC publication, Ankara, Turkey. 2011, 200.
9. Shukla R, Cheryan M. Zein. The industrial protein from corn. Industrial Crops and Products. 2011; 13:171-192.