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Quality characteristics of biscuits produced from composite flour of wheat, maize and sesame seed

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Abstract
The study was conducted development and quality characteristics of biscuit produced from composite flour of wheat flour, maize flour and sesame seed and the changes in physic chemical, sensory characteristics. Biscuit were prepared from blends of different levels of wheat flour, maize flour and sesame seed ie. T_1 (70:20:10), T_2 (65:20:15) T_3 (60:20:20) respectively. Flour treatment combination were used in the study and replicated five times. The product were analyzed for organoleptic attributes like (Flavour and taste, Body and texture, Colour and appearance, and Overall acceptability) by trained panelised using 9-point hedonic Scale, physic chemical characteristics (Moisture, Fat, Total Solids, Ash, Carbohydrates, Protein) and Microbiological Standard plates count ,Yeast and Mould and Coliform. The treatment T_3 (60:20:20) was found best for biscuit making in comparison to other treatment in oganoleptic characteristics. Thus as far, product judged by organoleptic evaluation value in concern, the treatment can be rated is $T_3 > T_2 > T_1$

Keywords: Biscuit Chemical, Maize Flour, Sesame Seed, Sensory, Wheat Flour

Introduction

Biscuits are nutritive snacks produced from unpalatable dough that is transformed into appetizing product through the application of heat in an oven (Kure et al., 1998) [7]. They are ready-to-eat, convenient and inexpensive food product, containing digestive and dietary principles of vital importance (Kulkarni, 1997) [6]. The principal ingredients are flour, fat, sugar and water; while other ingredients include milk, salt, flouring agent and aerating agent (Wade, 1988) [10].

Biscuits are a rich source of fat and carbohydrate, hence are energy giving food and they are also a good source of protein and minerals (Kure et al., 1998) [7].

Biscuits represent a fast growing segment of food because of consumer demands for convenient and nutritious food products. The consumers demand has increased for the quality food products with taste, safety, convenience and nutrition (Lubna Masoodi *et al.*, 2012) [8].

Biscuit is a processed convenience food ever produced. It is one of the few universal staples, which is complete in it and requires no additional preparation. Thus, for many, biscuit becomes an important source of high molecular carbohydrates, vegetable proteins and some vitamins and minerals (Ahmad and Ahmed, 2014) [3].

Biscuit have relatively high energy density compared with other baked goods. Another type of biscuit is cracker. It is thin dry biscuit, probably named because of the familiar cracking noise it makes when eaten. Humans have consumed bakery product for hundreds of years. Among the different bakery products, biscuit consists the most popular group. Biscuits are confectionery dried to very low moisture content (Fayemi, 1981) [4].

The unique bread making properties of wheat flour are due to its gluten protein that, when hydrates, forms strong, cohesive douse that retains gas and produces a light, aerated baked product (Hoseney, 1998) [5].

Wheat flour constitutes the basic ingredients for biscuit production because of its gluten protein, which are not present in the flour of other cereals. Wheat flour is a powder made from the grinding of wheat used for human consumption. More wheat flour is produced than any other flour. Wheat varieties are called soft or weak if gluten content is low and are called hard or strong if they have high gluten content.

Maize (Zea mays) a major source of carbohydrates, protein vitamin B, vitamin A (Yellow maize) and minerals. Corn starch (maize flour) is a major ingredient in home cooking and in many industrialized food products. Corn contain vitamin B-complex such as B1 (thiamine), B2 (niacin), B3 (riboflavin), B5 (pantothenic acid) and B6 that makes it commendable for hair,

skin, digestion, heart and brain. It contains vitamin C, A and K together with large amount of betacarotene and fair amount of selenium that helps to improve thyroid gland and play important role in proper functioning of immune system. Maize is highly rich in carbohydrates. Many people would prefer maize to other energy foods to supply with energy. Being a starchy food, it releases energy slowly in the blood stream ensuring that you stay energized whole day. It is a potent antioxidant that guards body from harming by free radicals responsible for cellular damage and/or cancer. It has the potential to alleviate pain and possess analgesic activity as well (Nayer, M.N. 1970) [9].

Sesame seeds are an excellent source of copper, a very good source of manganese, and a good source of magnesium, copper, vitamin E, thiamine, calcium, phosphorus, iron, zinc, molybdenum, phytosterols and selenium. By weight, about half the seed is fat—mostly unsaturated. An ounce (3 tablespoons) has about 160 calories, 14 grams of fat, 5 grams of protein, and 4 grams of fiber. Sesame seeds are beneficial for lowering cholesterol, for reducing blood pressure.

Material and Methods

The experimental work was carried out in the research laboratory of department of Dairy, Technology, Warner college of Dairy Technology, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad. Wheat flour, maize flour and sesame seed were obtained from the local market of Allahabad city. Mixed cereal flour based biscuit prepared by Wheat flour, maize flour and sesame seed and butter, skim milk powder and sugar. There were total four combinations. Each was prepared in five replications. The different treatment combinations used in the experimental are as follows

T_0 = wheat flour 80%+ maize flour 20%

T_1= wheat flour 70%+ maize flour 20%+10%sesame seed

T_2= wheat flour 65%+ maize flour 20%+15%sesame seed

T_3= wheat flour 60%+ maize flour 20%+20%sesame seed

For the preparation of mixed flour biscuit, added wheat flour, maize flour and sesame seed and sesame seed and addition of butter 20 %and addition of sugar 40 % and addition of baking powder 2% then mixed properly and addition of skim milk powder 3% and addition of 20 ml.water in flour mix then kneadling and prepration of dough and on wooden board with rolling pin cutting then preheating oven (160^0c for 20 min) before baking cooling at room temperature (27-30^0c) then packed and until used.

Physico-chemical analysis

Determination of total solids

The total solids content was estimated by the standard gravimetric method as described in IS;SP;18(part xi),1981 (Model 60 E/N, England).

Determination of moisture

Moisture content of the cheese was estimated gravimetrically using Marnier test. A representative sample (2–3gm) was weighed into a total solids dish with acid washed sand, glass rod and dried at 105ºC for 2 to 3 hours to a constant weight the percent moisture was calculated as follows Percentage moisture = loss in weight X100/weight of sample Determination of fat Percentage of product sample was estimated by Soxhlet method by AOAC.1991 method

Carbohydrates (by difference method)

The per cent carbohydrates were calculated by subtracting the sum of moisture, protein, fat, and ash content in per- cent from 100.

Determination of Protein

Percentage of the product sample was estimated by Kjeldahl method by AOAC, 1984 method.

Determination of Ash

Percentage of product sample was estimated by Muffle Furnace method as given in SP: 18 (PART-11)- 1981.

The results obtained from the analysis are present in this chapter under the following heading Physico chemical characteristics Microbial characteristics Organoleptic characteristics The mean values of organoleptic characteristics and physic chemical characteristics analysis data were presented in the table 1, table 2 and table 3.

Sensory Characteristics of Biscuit

The organoleptic characteristics of biscuit were determined using a taste panel consisting member drawn from the Teachers/ staff of the School of Food and Dairy Technology. The panelists were asked to evaluate the various samples for different sensory attributes namely colour of crust, colour of crumb, texture, flavor and overall acceptability. Following 9 point Hedonic scale was used for sensory evaluation of bread.

Statistical Analysis

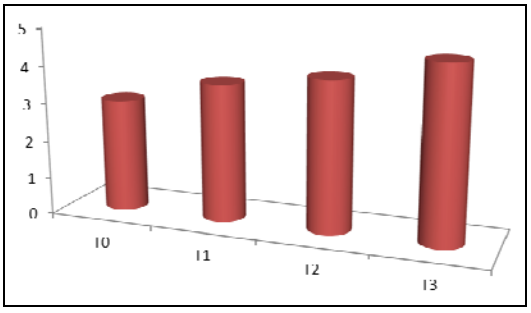
All determinations were replicated five times; mean values and standard deviation were reported. Analysis of variance (ANOVA) was performed. When the difference in ANOVA among the scores of samples was significant, pair comparison of samples were analyzed using studentised range test.

Results and Discussions

Physico-Chemical Characteristics

Percentage Moisture in Biscuit

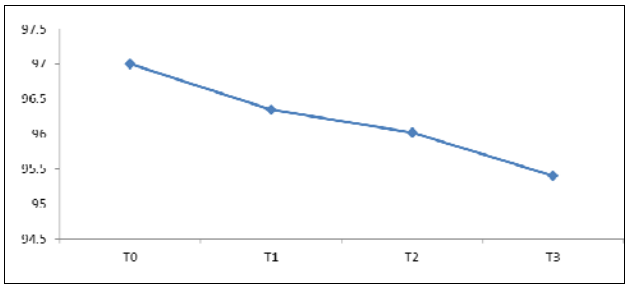
The data regarding moisture present in biscuit sample to different treatment are presented in table Average score of moisture % in control and experimental biscuit samples T_O, T_1, T_2, T_3 which were 3.00, 3.65, 3.98 and 4.60 respectively.



Moisture percent in control and experimental biscuit.

Percentage Total Solids in Biscuit

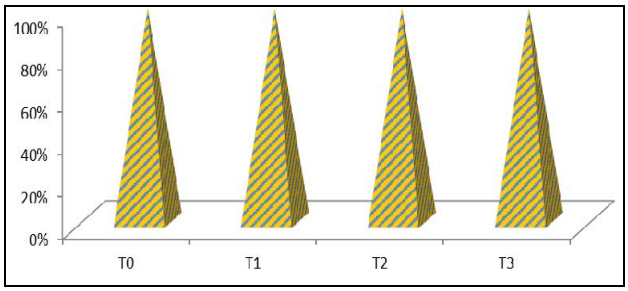
The data regarding total solids present in biscuit sample to different treatment are presented in table 1. Total solids present in control and experimental biscuit samples T_O, T_1, T_2, and T_3 which were 97.00, 96.35, 96.02, and 96.40 respectively.



Total solids percent in control and experimental biscuit.

Percentage Ash in Biscuit

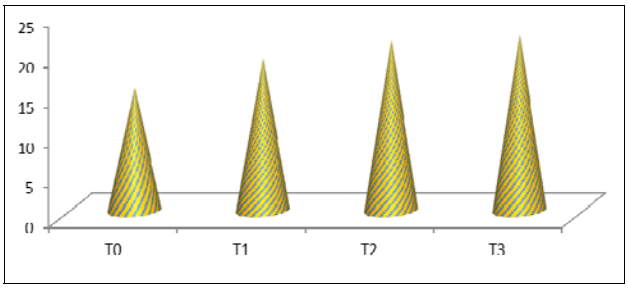
The data regarding total solids present in biscuit sample to different treatment are presented in table 1. Ash present in control and experimental biscuit samples T_O, T_1, T_2, and T_3 which were 1.76, 2.04, 2.29, and 2.53 respectively.



Ash percent in control and experimental biscuit.

Percentage Fat in Biscuit

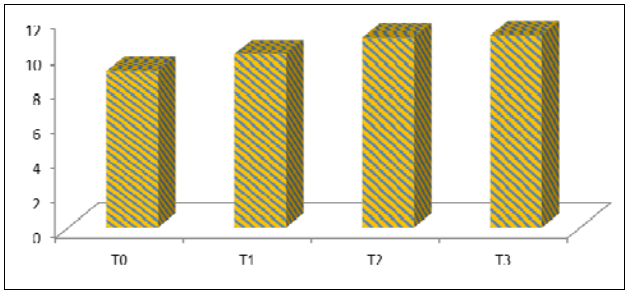
The data regarding total solids present in biscuit sample to different treatment are presented in table 1. fat % in control and experimental biscuit samples T_O, T_1, T_2, and T_3 which were 15.34, 19, 21.28, and 21.99 respectively.



Fat Percent in Control and Experimental Biscuit.

Percentage Protein in Biscuit

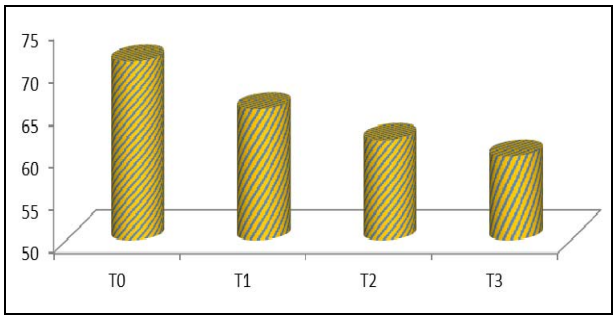
The data regarding protein present in biscuit sample to different treatment are presented in table 1. Protein present in control and experimental biscuit samples T_O, T_1, T_2, and T_3which were 9.01, 9.99, 10.94, and 11.07 respectively.



Protein percent in control and experimental biscuit.

Percentage Carbohydrate in Biscuit

The data regarding carbohydrate present in biscuit sample to different treatment are presented in table 1.carbohydrate % in control and experimental biscuit samples T_O, T_1, T_2, and T_3 which were 70.89, 65.33, 61.71, and 59.81 respectively.



Carbohydrate percent in control and experimental biscuit.

Table 1: Average data of chemical analysis of different treatments

Parameters	Treatments (Mean) value				
	T_0	T_1	T_2	T_3	C.D. Value
1. Chemical analysis (in percent))					
Carbohydrate	70.89	65.33	61.71	59.81	0.591
Protein	9.01	9.99	10.94	11.07	0.074
Fat	15.34	19.00	21.28	21.99	0.329
Ash	1.76	2.04	2.29	2.53	0.125
Total solids	97.00	96.35	96.02	95.40	0.618
Moisture	3.00	3.65	3.98	4.60	0.328

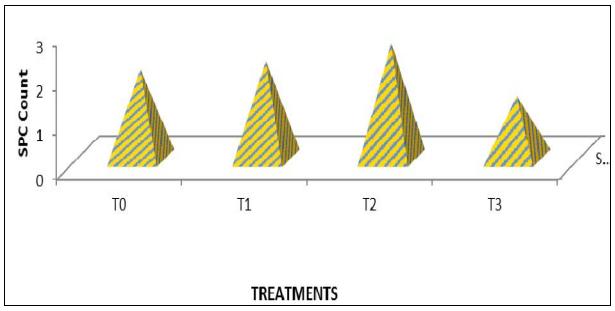
Microbiological Analysis of Different Treatments

Coliform Count in Biscuit –

Mean values of coliform for biscuit at was NIL. There was significant difference between among the treatments. None of the samples of the biscuit shows the presence of coliform. The entire sample, at all the stage, was coliform free, which indicates proper hygienic condition was maintained during the preparation and storage of the product.

SPC count in Biscuit –

The SPC (*10^3cfu/gm) was highest score in T_3 (4.60) followed by T_2 (3.98) T_1 (3.65), T_0(3.00). There was significant difference between among the treatments.



Standard plate count percent in control and experimental biscuit.

Yeast and Mould count in Biscuit

Mean values of Yeast and mould for biscuit at was NIL. There was significant difference between among the treatments None of the samples of the biscuit shows the presence of yeast and mould. The entire sample, at all the stage, was yeast and mould, which indicates proper hygienic condition were maintained during the preparation and storage of the product.

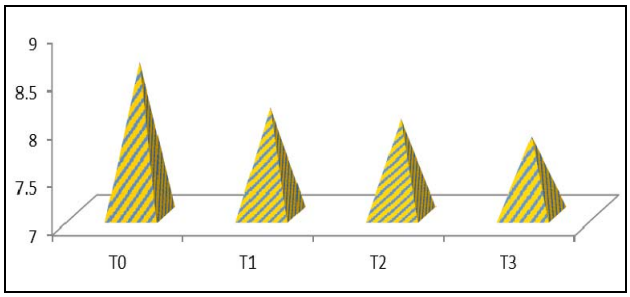
Table 2: Average data of microbiological analysis of different treatments

Coliform (* 10^1 /gm)	NIL	NIL	NIL	NIL	NIL
SPC (* 10^3 cfu/gm)	2.00	2.20	2.60	1.40	0.857
Yeast and Mould (* 10^2/gm)	NIL	NIL	NIL	NIL	NIL

Organoleptic Analysis of Different Treatments

Body and texture in Biscuit

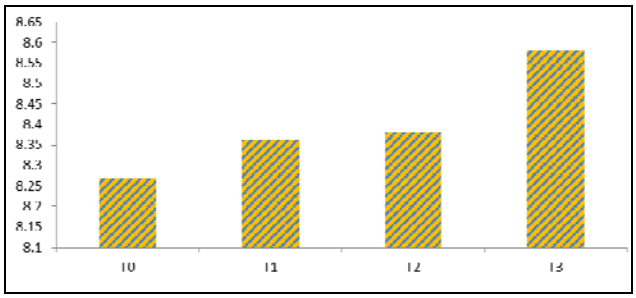
Average score of body and texture in control and experimental biscuit samples T_O, T_1, T_2, T_3 which were 8.60, 8.12, 8.00 and 7.82 respectively.



Body and texture of control and experimental biscuit.

Flavour and taste in Biscuit

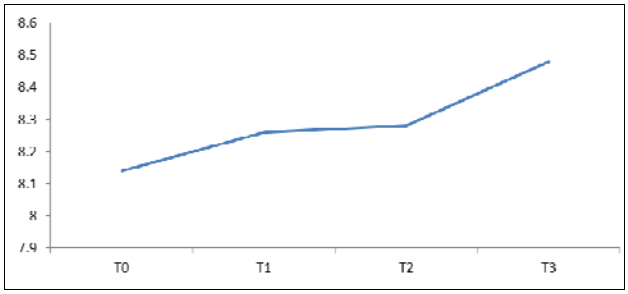
Average score of Flavour and Taste in control and experimental biscuit samples T_O, T_1, T_2, T_3 which were 8.27, 8.36, 8.38 and 8.58 respectively



Flavour and taste of control and experimental biscuit.

Colour and appearance in biscuit

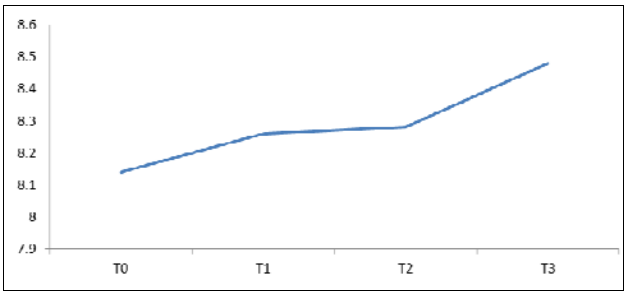
Average score of colour and appearance in control and experimental biscuit samples T_O, T_1, T_2, T_3 which were 8.14, 8.26, 8.28 and 8.48 respectively



Colour and appearance in control and experimental biscuit.

Overall acceptability of biscuit

Average score of overall Acceptability of control and experimental biscuit samples T_O, T_1, T_2, T_3 which were 8.00, 7.82, 8.12 and 8.60 respectively



Overall acceptability of control and experimental biscuit

Table 3: Average data of organoleptic analysis of different treatments

Organoleptic score (9 point hedonic Scale)					
Body and texture	8.60	8.12	8.00	7.82	0.440
Flavour and taste	8.27	8.36	8.38	8.58	0.211
Colour and appearance	8.14	8.26	8.28	8.48	0.248
Overall acceptability	8.00	7.82	8.12	8.60	0.433

Body of Product

Conclusion

Biscuit is very popular product commonly consumed to its own and also suitable for used in particular cereal based baked food. Biscuits are an important baked product in human diet and are usually eaten with tea and are also weaning food for infants.

Wheat flour as a common source of fiber and protein also good source of calcium, iron and other minerals like selenium and maize is as major source of starch. Corn starch (maize flour) corn contains vitamin B complex Such as B1 (thiamine), B2 (niacin), B3 (riboflavin), B5 (pantothenic acid) and B6 that makes it commendable for hair, skin, digestion, heart and brain. Maize contain vitamin C, A and K. Sesame seed are an excellent source of copper, a good source of manganese and a good source of magnesium, vitamin E, Thiamine, calcium, phosphorous, iron, zinc, molybdenum, phytosterols and selenium can be utilized to develop more value added products hence making its more economical and affordable for the developing countries without compromising the nutritional quality.

From the present investigation it is concluded that the biscuit prepared by wheat flour, maize flour and different level of sesame seed containing 60% wheat flour, 20% maize flour and 20% sesame seed. T3 was the best in organoleptic characteristics. T3 show significant difference in organoleptic characteristics (colour and appearance, body and texture, flavor and taste and overall acceptability) T3 was found to be more acceptable in term of sensory quality.

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