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Development And Quality Evaluation Of Pineapple Pomace And Wheat Bran Fortified Biscuits

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Abstract

The Pineapple pomace and wheat bran fortified biscuits. The waste utilization of Pineapple pomace and wheat bran was the most important aspect of this study. Studies were conducted on incorporation of Pineapple pomace powder (***Ananas cosomus***) and wheat bran fortified biscuit. These used Pineapple pomace and wheat bran as 05, 10 and 15 % level to prepare Pineapple pomace and wheat bran were analyzed for physical analysis diameter, thickness, spared ratio, volume and density (6.2, 0.7, 10,21.12,0.6) respectively chemical analysis protein, fat, moisture, ash, fiber (8.38, 16.82, 2.69, 3.60, 1.81 g/100g) respectively On the basis of overall sensory attributes, colour of sample 100:10% has better appearance as compare to 100:05% and 100:15%. Flavour, Aroma, Taste, After Taste and Overall Acceptability of sample 100:10% has got higher score than sample 100:05% and 100:15% because of dark browning colour of Pineapple pomace and wheat bran fortified biscuits. After chemical analysis it was found that sample 100:15% had high percentage of protein and other nutrients it was concluded that Pineapple pomace and wheat bran can be substituted up to 05 to 10% in wheat flour to prepare Pineapple pomace without adversely affecting quality attributes.

Keywords: *Fortification, Pineapple pomace, Quality evaluation, Wheat bran, Waste utilization*

I. INTRODUCTION

Bakery products have become more popular in India since the earlier times. Among the different bakery products, biscuits constitute the most popular group. Biscuits were first invented as a food. They could be kept for a long time because they are a dry food product. Biscuits are chemically leavened bakery products containing high percentage of fat and sugar **Nelson's Navy (1980).**

Bran is one of the richest sources of dietary fiber. It is the outer husk of wheat, rice, and other cereal grains. At one time most bran was thrown out wheat grains were milled. Until the 1960'swhen scientist published several repos which stated that bran other types of fiber could prevent heart attacks, intestinal disorders, and cancer of the breast, colon, prostate and uterus. Wheat bran when used properly in a high-fiber diet can help prevent intestinal disorders, also because it helps to prevent constipation bran may also benefit people suffering from hemorrhoids.

Pineapple ***(Ananas comosus),*** fruit is good source of carotene (vit. A) and ascorbic acid (vit. C) And is fairly rich in vitamin B and B12, it is also contain carbohydrate, protein, fat, fiber, calcium and iron. Pomace or marc is solid remains of grapes, olives or other fruit after pressing for juice or oil. It contains the skin pulp, seeds, and stems of the fruit. Pineapple pomace is a primary by-product of the pineapple juice industry. It has been estimated that about 25 per cent of the fresh fruit is lost as pomace **Wang and Thomas (1989).**

After extraction of juice from pineapple pomace is obtained, this is west material having good nutritive value. This pineapple pomace rich in dietary fiber it is also contain calcium, phosphorus and iron **Tivari and Pandey (2007).**

II. MATERIALS AND METHODS

Pineapple pomace powder, low calorie sugar, wheat

flour, wheat bran, water, edible oil, baking powder and packaging materials were procured from the local market of Allahabad, India. Tray dryer were used for drying of pineapple pomace powder. Drying was carried out at 70 to 100 °C for 3 hours. To remove moisture from pineapple pomace up to desired moisture content to obtain uniform dry pomace. Sieving process with 40, 60 mesh sizes used to sieve the end product. Baking oven was used for baking the prepared fortified biscuit, baking were carried out at 165° C for 25-30 minutes. Four different sample ratio (05, 10 and 15%). Pineapple pomace powder and wheat bran fortified biscuits was packed and sealed in Low density polyethylene (LDPE).

Preparation of Pineapple pomace powder and wheat bran fortified biscuits:

Biscuit were prepared by the standard method given by ***Sambhal Metz*** for the preparation of Biscuit. Pineapple pomace powder and wheat bran percentage were 05, 10 and 15% as given Table 1.

Table 1. Standardized incorporated ratio in biscuit by using wheat flour, wheat bran and pomace powder in different samples.

Sr.No	Wheat flour (%)	Pineapple Pomace powder (%)	Wheat bran (%)
T_0	100	00	00
T_1	90	05	05
T_2	80	10	10
T_3	70	15	15

T_0 (100% commercial straight grade flour) acts as control, Biscuits with 0% Pineapple pomace powder and wheat bran.
T_1 = Biscuits with 05: 05% Pineapple pomace powder and wheat bran.
T_2 = Biscuits with 10: 10% Pineapple pomace powder and wheat bran.
T_3 = Biscuits with 15: 15% Pineapple pomace powder and wheat bran.

A. Analysis of Pineapple pomace powder and wheat bran fortified biscuits.

Physical analysis:
Pineapple pomace powder and wheat bran fortified Biscuits were analyzed for width, thickness, spread factor, volume and density by following the respective procedures **(AACC, 2000)**

Diameter (D): Six biscuits were placed horizontally (edge to edge) and rotated at 90° angle for reading. Measured by vernier caliper.
Thickness (T): biscuits thickness was measured with a vernier caliper in triplicate. Means were recorded. Six cookies were measured one-by-one.
Spread ratio (SF): It was calculated according to the following formula.

$$SF = D / T$$

Volume (V): It was calculated according to the following formula.

$$V = D^2 X \pi X T / 4$$

Density (D): It was calculated according to the following formula.

$$D = Mass / Volume$$

Chemical Analysis:

Moisture: Estimation of moisture hot air oven method at 105^0 c for hrs **(By AOAC, 1995).**
Ash: By using muffle furnace method up to constant weigh. Ignite in a muffle furnace at 550+/- 25^0c for 4 hrs **(By Ranganna, 1986).**
Fat: Extracting the sample in a Soxhlet apparatus for 6-8 h using petroleum ether. The solvent is evaporated and the residue is weighed **(By Ranganna, 1986).**
Protein: The estimation of nitrogen is done by kjeldahl method where in the protein content is obtained by multiplying the nitrogen value with 6.25 **(By Ranganna, 1986).**
Fiber: Fiber is loss on ignition of dried residue remaining after sequential digestion of sample with 1.25% H_2SO_4 (0.255 ± 0.005) and 1.25% NaOH (0.313 ± 0.005N) solution specific conditions.
Sensory evaluation: Evaluate the products for acceptability based on its flavour, texture, appearance, amount of bitterness and overall acceptability using nine-point hedonic scale (1 = dislike extremely to 9 = like extremely; **Meilgaard et al., 1999**).
Shelf life analysis: The Pineapple pomace and wheat bran fortified biscuit samples were packed in LDPE packaging material under ambient temperature for 4 months has evaluated.
Statistical analysis: Analyzed by two-way analysis of variance (ANOVA) and analysis is carried using Microsoft Excel.

The samples were analyzed for moisture content by using standard method **(AOAC, 1995)** and ash, protein and fat content were analyzed by using **(Ranganna, 1986).** After preparing biscuits were evaluated for colour, flavour, aroma, taste, after taste and overall acceptability using 9-

point Hedonic scale (**Meilgaard *et al.,* 2007**) by a panel of 5 judges comprising professor and postgraduate student of the Food Process Engineering and technology Allahabad. Data obtained from physico-chemical analysis were subjected in terms of average scores for different attributes and analyzed statistically. The data pertaining to different sensory attributes for biscuits from two baking temperature were analyzed with the help of factorial completely randomized design (FCRD) to find out the effect of temperature on Pineapple Pomace and Wheat bran fortified biscuits. Analysis of variance' (ANOVA) technique, two way classification, and critical difference were performed **Steel *et al.* (1997**).

III. RESULTS AND DISCUSSION

A. Physical analysis of Pineapple pomace powder and wheat bran fortified biscuit.

The physical characteristics of biscuits prepared replacing wheat flour with 0 to 15 percent Pineapple pomace and wheat bran are presented in Table 3.1. The amount of water used for making dough was increased with increasing level of Pineapple pomace powder and wheat bran in the formulation. The Diameter of Pineapple pomace powder and wheat bran fortified biscuits sample T_0, T_1, T_2 and T_3 were 5.8, 5.9, 6, and 6.2 respectively Diameter was increased with the level of Pineapple pomace powder and wheat bran fortified biscuit. The Thickness of the biscuits sample T_0, T_1, T_2 and T_3 were 0.6, 0.6, 0.6, and 0.7 respectively observed on the thickness of biscuit sample T_3 was lightly change. Thickness was found maximum (0.7) of Pineapple pomace powder and wheat bran fortified biscuit. The spread ratio of the biscuits sample T_0, T_1 ,T_2 and T_3 were 9.6, 9.8, 10 and 8.8 respectively T_3 was decreased significantly with increasing level but T_0, T_1 and T_2 sample increased with increasing level of Pineapple pomace powder and wheat bran fortified biscuit. The Volume of Pineapple pomace powder and wheat bran fortified biscuits sample T_0, T_1, T_2 and T_3 were 15.84, 16.39, 16.95, and 21.12 respectively Volume was increased with the level of Pineapple pomace powder and wheat bran fortified biscuit. The Density of Pineapple pomace powder and wheat bran fortified biscuits sample T_0, T_1, T_2 and T_3 were 0.6, 0.5, 0.5, and 0.4 respectively Density was decreased significantly with the level of Pineapple pomace powder and wheat bran fortified biscuit as shown in Table 3.1 Likewise (**Sudha *et al.,* 2007**); also found the same result.

B. Chemical analysis of Pineapple pomace powder and wheat bran fortified biscuit.

Chemical analysis of Pineapple pomace and wheat bran fortified biscuits was calculated on the basis of moisture, ash, fat, protein and fiber content **(Kamaliya 2001).**

During present investigation it was observed that the present weight of moisture ,fat and protein content of different treatments (T_0, T_1, T_2, and T_3) were not increase or decrease than the content of fiber, ash, which were found in different percent weight in different treatment. This is due to present study in the formulation is based on 90:05:05 percent, 80:10:10, and 70:15:15 percent Pineapple Pomace ,wheat bran and wheat flour composition of biscuits is presented in Table 3.2 baking time 30 min and temperature was 165^0C .The moisture content of Pineapple pomace and wheat bran fortified biscuits sample T_0, T_1 ,T_2 and T_3 were 1.40, 1.56, 1.75, and 1.81 respectively higher than those control biscuits **(Shadi et al. 2010)**.Which was due to the addition of Pineapple pomace and wheat bran in 05, 10, and 15 per-cent proportions in sample T_1, T_2, and T_3 respectively. The protein content of Pineapple pomace and wheat bran fortified biscuits sample T_0, T_1 ,T_2 and T_3 were 7, 7.53, 7.96 and 8.38 respectively higher than those control biscuits **(Loponen et al. 2004).**Which was due to the addition of Pineapple pomace and wheat bran in 05, 10, and 15 percent proportions in sample T_1, T_2, and T_3 respectively. The fat content of Pineapple pomace and wheat bran fortified biscuits sample T_0, T_1, T_2 and T_3 were 16.21, 16.74, 16.78 and 16.82 respectively decreased with increase in the Pineapple pomace and wheat bran fortified biscuits and decrease in the wheat flour. The data presented in Table 3.2 indicates that the fiber content of control sample, sample T_1, T_2, and T_3 was 1.35, 2.34, 2.5, 2.69 respectively hence the sample T_2 and T_3 having maximum amount of fiber which provide the more fiber content as compared to control sample **Boskov et al (2002**). The ash content of Pineapple pomace and wheat bran fortified biscuits sample T_0, T_1, T_2 and T_3 were 1.74, 2.23, 2.76 and 3.60 respectively more than the control biscuits **Clarke et al. (2003)** and this was attributed to higher ash content of Pineapple pomace and wheat bran. Pineapple pomace and wheat bran fortified biscuits also contains higher amount of calcium, phosphorus and iron as shown in Table 3.2 Likewise **Sharif *et al (1990)*** also found the same result.

C. Sensory Analysis of Pineapple pomace and wheat bran fortified biscuits

Physical analysis of Pineapple pomace and wheat bran fortified biscuits was calculated on the basis of colour, flavour, texture, taste and overall acceptability. **(Meilgaard *et al.,* 2007 and Katina 2005)** Sensory analysis of Pineapple pomace and wheat bran fortified biscuits sample T_1, T_2, T_3, and control was carried out on the basis of Colour, Flavour, Texture, taste and Overall acceptability with the help of sensory evaluator.(**Hammes 1998**).

Sensory evaluation of Pineapple pomace and wheat bran fortified biscuits prelist that the score of control biscuits was high i.e. 8, as compared to experimental biscuits shown in Table 3.3. Among the Pineapple pomace and wheat bran fortified biscuits the sample T_2 recorded the highest score in which 8 percent Pineapple pomace and wheat bran was added. The overall acceptability of biscuits, the texture of Pineapple pomace and wheat bran fortified biscuits was significantly affected by increased level of Pineapple pomace and wheat bran **(Thiele and Cercha 2002 and Hansen 1996).**

A. Table 3.1 Physical Analysis of Pineapple pomace powder and wheat bran fortified biscuits.

Sample	Diameter	Thickness	Spread ratio	Volume	Density
T_0	5.8	0.6	9.6	15.84	0.6
T_1	5.9	0.6	9.8	16.39	0.5
T_2	6	0.6	10	16.95	0.5
T_3	6.2	0.7	8.8	21.12	0.4

B. Table 3.2 Chemical Analysis of Pineapple pomace powder and wheat bran fortified biscuit.

Sample	Protein g/100g	Fat g/100g	Fiber g/100 g	Ash g/100 g	Moisture g/100g
T_0	7	16.21	1.35	1.74	1.40
T_1	7.53	16.74	2.34	2.23	1.56
T_2	7.96	16.78	2.5	2.76	1.75
T_3	8.38	16.82	2.69	3.60	1.81

C. Table 3.3 Sensory Analysis of Pineapple pomace and wheat bran fortified biscuits

Sample	Colour	Flavor	Texture	Taste	Appearance	Overall Acceptability
T_0	7	8	6	7	7	7
T_1	7	8	7	8	7	7.5
T_2	8	8	7	8	8	8
T_3	7	7	8	8	8	7

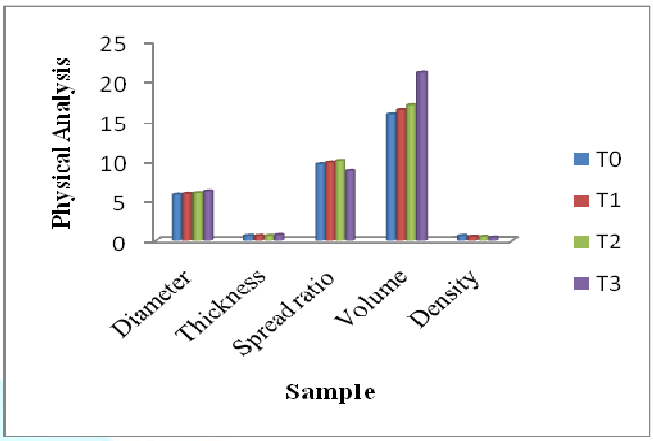

Fig.1 Physical Analysis of Pineapple pomace powder and wheat bran fortified biscuits.

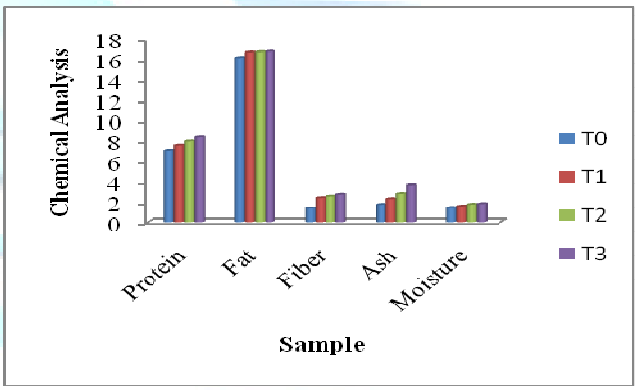

Fig 2.Chemical Analysis of Pineapple pomace powder and wheat bran fortified biscuit.

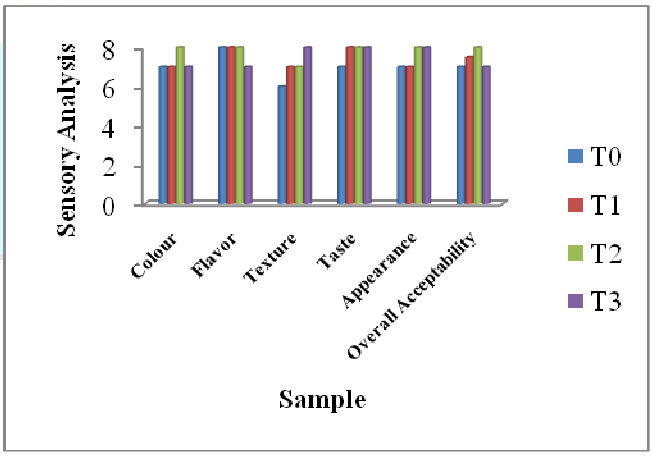

Fig. 3 Sensory Evaluation of Pineapple pomace and wheat bran fortified biscuit.

IV. CONCLUSION

Pineapple pomace and wheat bran fortified biscuit were prepared and the various physico-chemical properties and sensory properties were studies. Sample was prepared from 5 g pineapple pomace and 5 g and wheat bran, 10 g pineapple pomace and 10 g wheat bran and 15 g pineapple pomace and 15 g wheat bran. Analysis was done with respect to physico-chemical sensory and physical properties. Result showed that the sample prepared from 15g pineapple pomace and 15g wheat bran showed the best result in terms of physico-chemical parameters (Fat, Protein, Ash, Moisture, fiber). The sample prepared from 10g pineapple pomace and 10g wheat bran had the best sensory parameters. In terms of physical parameters the samples prepared from 15g pineapple pomace and 15g wheat bran showed highest values. Shelf life studies showed that the sample prepared from 10g pomace along with 10g wheat bran showed better result in terms of sensory and physico- chemical parameters for a storage period of 40 days in LDPE.

APPENDIX

Table 1 ANOVA Physical analysis of Pineapple pomace and wheat bran fortified biscuits

Source variation	df	SSE	MSS	Variation	F-tab
Treatment	3	808.617	269.539	3.39489	
Columns	4	2.65162	0.662905	0.008349	3.4903
Error	12	952.746	79.3955		
Total	19	1764.015			

Table 2 ANOVA Chemical Analysis of Pineapple pomace and wheat bran fortified biscuits

Source Variation	df	SSE	MSS	Variation ratio	F-tab
Treatment	3	634.7297	211.5766	3.246777	
Columns	4	9.661895	2.415474	0.037067	3.4903
Error	12	781.9811	65.16509		
Total	19	1426.373			

Table 3 ANOVA Sensory Analysis of Pineapple pomace and wheat bran fortified biscuits

Source Variation	df	SSE	MSS	Variation ratio	F-tab
Treatment	3	1.7	0.566667	0.006107	
Columns	4	1.75	0.4375	0.004715	3.4903
Error	12	1113.55	92.79583		
Total	19	1117			

analysed by standard methods **AOAC (1995) and Ranganana (1986).** The data was analysed using single factor ANOVA in MSEXCEL **(Microsoft office, 2007)** After preparing biscuits were evaluated for colour, flavour, aroma, taste, after taste and overall acceptability using 9-point Hedonic scale (**Meilgaard *et al.*, 2007**).

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