Shelf stability studies of optimized pineapple pomace powder enriched bread

Darshini J R1 and Deepa Terdal2

1.MSc Scholar, Department of PHM, COH, University of Horticultural Sciences, Bagalkot, Karnataka, India

2.Assistant Professor, Department of PHM, COH, University of Horticultural Sciences, Bagalkot, Karnataka, India

MSc Scholar, Department of PHM, COH, University of Horticultural Sciences, Bagalkot, Karnataka, India

Abstract

Functional foods have become a reality that can complete the nutritional needs of a specific segment of the population. Cereals products have been traditionally the election foodstuff for enrichment campaigns however the food matrix and processing can have a significant influence on the bioactivity of the key compounds. The pineapple is part of the bromeliaceae family. The cultivated types belong to the genus *Ananas*, which covers several species, the most familiar of which, exploited for commercial purposes is *Ananas comosus*. In the present investigation the pineapple pomace enriched breads of treatment T_1, T_2, T_3 and T_4 are packed in low density polyethylene covers and stored for 15 days. Among these breads of treatments T_2 showed best results. It showed less changer during storage period. Microbial load was also low compared to other treatments. It also found to be superior nutritionally and in sensory attributes. Therefore, T_2 treatment of pineapple pomace enriched breads was considered as best compared other treatments after 15 days of storage.

Index terms: Pineapple, Low density polyethylene, Sensory attributes and Pineapple pomace enriched breads

Introduction

Bread is a good source of functional food as it is a staple and affordable food product eaten daily and consumed all over the world. The manufacturing process is relatively cheap, well known and it is not difficult to implement. All grains and millets are the ideal base for a wholesome diet. All variants of grains and millets are low cost, nutritious and locally available food stuff (Teradal *et al*., 2017). Also, these can be enriched with fibre is big challenge now a days. Generally, bread has good taste allowing a great possibility of variations that ensure a broad acceptance by the consumer. The pineapple is part of the bromeliaceae family. The cultivated types belong to the genus *Ananas*, which covers several species, the most familiar of which, exploited for commercial purposes is *Ananas comosus*. Pineapple is an important fruit which can be eaten fresh or eaten in a processed form. This delightful tropical fruit is high in enzyme bromelain and antioxidant vitamin C, both of which play a major role in the body's healing process. Bakery products provide best structure by which functionality can be provided to the customers in a suitable food. Most of bakery products are used as a source for incorporation of different nutritionally rich ingredients for their diversification (Hooda and Jood 2005; Sudha *et al.*, 2007). This approach not only promotes development of diversified and nutrient rich bakery

products but also reduces over exploitation and excessive use of wheat for making bakery products. Therefore, the present study was undertaken to study the shelf stability of developed pineapple pomace enriched bread.

Materials and methods:

Moisture (%)

Moisture was determined by using moisture balance. Two gram of biscuit was placed in the sample dish and dried in the electric moisture balance until it automatically showed moisture in percentage. The instrument indicates the end point of measurement by a beep and gives the constant value for moisture.

Water activity (a_w)

Water activity of bread was measured by using water activity meter. Water activity of bread was measured by using water activity meter. Water activity of bread was measured by placing piece of bread in the sample chamber. The observation was directly read in the instrument after it was stabilised

Crude fibre (%)

Crude fiber estimation was done by using Fibra plus-FES-6 instrument and the procedure is explained

Texture analysis (N)

Texture measurements in this study were obtained using TA-XT-plus Texture Analyzer (Stable Micro Systems, London, England) as used by Park and Baik (2004). The procedure is explained

Table 1: Effect of storage from 0th to 15th days (under ambient condition) on Moisture and Water activity of pineapple pomace powder enriched bread

Treatments	Moisture (%)			Water activity(a_w)		
	0th day	7th day	15th day	0th day	7th day	15th day
T_1	23.56	19.96	19.02	0.80	0.80	0.78
T_2	24.85	18.42	11.02	0.83	0.79	0.75
T_3	26.58	21.00	11.23	0.86	0.82	0.75
T_4	26.68	22.49	11.83	0.86	0.84	0.78
Mean	**25.42**	**20.47**	**13.28**	**0.84**	**0.81**	**0.76**
SEm±	0.33	0.38	0.23	0.005	0.003	0.006
CD at 1 %	1.37	1.58	0.97	0.011	0.011	0.018

Common ingredients: Sugar (5g), Shortenings (50g), Yeast (5g), salt (2g)

T_1 :100% APF

T_2 : 90% APF +5% PPP + 5% DSF

T_3 : 87.5 APF +7.5% PPP + 5% DSF

T_4 :85 .0% APF +10% PPP + 5% DSF

APF: All purpose flour
PPP: Pineapple pomace powder
DSF: Defatted soya flour

Moisture (%)

The data on moisture content of nutritional enriched bread incorporating pineapple pomace powder as influenced by LDPE packaging material of different treatments and storage period under ambient condition is presented in Table 1. The data indicated that, there were significant differences among storage periods up to 15 days of storage. It is evident from the mean value for moisture content that it is decreased with the progress of storage period. At 15th day after storage, least moisture content of pineapple pomace enriched bread observed in T_2 (11.02 %). The data on water activity of nutritional enriched bread incorporating pineapple pomace powder as influenced by low density polyethylene packaging material of different treatments and storage period under ambient condition is presented in Table 1 At 7th day after storage, the data revealed that the least water activity content of pineapple pomace enriched bread observed in T_2 (0.79). The moisture and water activity of crumb containing different levels of fibre decreased during storage because of moisture loss. In fact, moisture changes contribute to staling through evaporation and water redistribution. This statement is supported by Borchani *et al*. (2015).

However, the increase in moisture content of cookies containing pomegranate seed powder and defatted soybean flour might be due to increased absorption of water by crude fiber present in pomegranate seed powder. The high water-holding capacity of fiber present in the pomegranate seed is due to more hydroxyl groups of cellulose in the fiber able to bind with free water molecule through hydrogen bonding and thus results in greater water-holding capacity (Harish *et al*, 2022).

Table 2: Effect of storage from 0th to 15th days (under ambient condition) on texture of pineapple pomace enriched bread

Treatments	Texture (N)		
	0th day	**7th day**	**15th day**
T_1	0.14	0.22	0.30
T_2	0.17	0.31	0.37
T_3	0.19	0.33	0.41
T_4	0.20	0.35	0.44
Mean	**0.17**	**0.30**	**0.38**
SEm±	0.02	0.003	0.012
CD at 1 %	0.02	0.01	0.04

Common ingredients: Sugar (5g), Shortenings (50g), Yeast (5g), salt (2g)

T_1 :100% APF

T_2 : 90% APF +5% PPP + 5% DSF

T_3 : 87.5 APF +7.5% PPP + 5% DSF

T_4 :85 .0% APF +10% PPP + 5% DSF

APF: All purpose flour
PPP: Pineapple pomace powder
DSF: Defatted soya flour

The data on texture of nutritional enriched bread incorporating pineapple pomace powder as influenced by low density polyethylene packaging material of different treatments and storage period under ambient condition is presented in Table 2. It is evident from the mean value for texture that it is increased with the progress of storage period. At initial stage of storage, the maximum texture (0.20 N) was recorded in T_4 (85% APF +10% PPP + 5% DSF) and it found to be on par with T_3 (0.19 N). The minimum texture (0.14 N) was recorded in the treatment T_1 (100% APF). At 15th day after storage, the maximum texture was recorded in T_4 (0.44 N) and it is found to be on par with T_3 (0.41 N). The minimum texture was recorded in the treatment T_1 (0.30N)**.** The rapid increase of the crumb firmness can be attributed to the amylopectin recrystallization, the formation of complexes between starch and proteins, the water redistribution among the bread constituents and other phenomena that easily occur in this baked product during storage. This statement is supported by (Borchani *et al*., 2015).

Conclusion : The composition of T_5 [82.5% all-purpose flour (APF) +12.5% pineapple pomace powder (PPP) + 5% defatted soya flour (DSF) was found to be best during the storage period of 15 days.

References

Sudha, M. L., Baskaran, V. and Leelavathi, K., 2007, Apple pomace as a source of dietary fiber and polyphenols and its effect on the rheological characteristics and cake making. Food chemistry., 104(2): 686-692.

Hooda, S., Jood, S. 2005. Organoleptic and nutritional evaluation of wheat biscuits supplemented with untreated and treated fenugreek flour. Food Chemistry.

Harish T, Bhuvaneshwari G, Jagadeesh S.L. & Deepa Terdal (2022) Development of Cookies Incorporated with Pomegranate Seed Powder and Defatted Soybean Flour, International Journal of Fruit Science, 22:1, 504-513.

Teradal D, Joshi N, Aladakatti RH. Therapeutic evaluation of grain based functional food formulation in a geriatric animal model. J Food Sci Technol. 2017 Aug;54(9):2789-2796. doi: 10.1007/s13197-017-2715-4.

Borchani, C., Blecker, C., Attia, H., Masmoudi, M. and Besbes, S., 2015, Effect of date flesh fibre concentrate addition on bread texture. Turkish Journal of Science &Technology., 10 (2): 17-22.