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Development of Biscuits by Incorporation of Pineapple Pomace as Value Addition

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Abstract
Pineapple has a great utility for healthy life of human beings. Pomace content in pineapple has rich in dietary fibre, and it is also contain calcium and iron. Pomace content for the preparation of the biscuits is added in three proportions is 10%, 15%, and 20%. For the preparation of the biscuits wheat flour, pineapple pomace flour, butter, sugar, salt and baking powder were used for the preparation of biscuits. Ajwain leaf powder and cardamom powder added for the preparation of the biscuits increase the flavor of the biscuits. Ajwain leaf powder is added to the biscuits in different proportions. Ajwain leaf has a rich source of thymol content and it has a antifungal and anti-microbial property. The product was baked and served for the sensory evaluation on the basis of 9-point hedonic scale. The product was tested for physic-chemical and microbial analysis. And also study the shelf life of the biscuits about three months. The addition of pine apple pomace had adverse effect on colour of biscuit however the texture score decreased with the increase in the level of pineapple pomace powder. Results obtained showed that the weight and thickness of the biscuits increased whereas the diameter an spread ratio decreased with the increase in pineapple pomace flour blend. The hardness of the biscuits increased with increased with increase in the level of incorporation of pineapple pomace powder. Finally it was concluded that biscuits with 10% pineapple pomace powder were found to be most acceptable due to attractive appearance, better taste and flavor.

Keywords: wheat flour, pineapple pomace, biscuits, fibre, sensory evaluation

1. Introduction
Bakery products have become more popular in India since the earlier times. Among the different bakery products, biscuits constitute the most popular group. Pineapple (*Ananascomosus.L*) belongs to the family Bromeliaceae, is one of the most important commercial fruit crops in the world. It is known as the "queen of fruits" due to its excellent flavor and taste. Pineapple is the third most important tropical fruit in the world after Banana and Citrus. Pineapples are consumed or served fresh, cooked, juiced and can be preserved. This fruit is highly perishable and seasonal. Mature fruit contains 14% of sugar; a protein digesting enzyme, bromelain, good amount of citric acid, malic acid, vitamin A, ascorbic acid (vit. C) and is fairly rich in vitamin B and B_{12}, it is also containing carbohydrate, protein, fat, fiber, calcium and iron, magnesium. Among the different bakery products, biscuits constitute the most popular group. Ajwain leaves are used for treating colds, coughs, and fevers in infants and small children. Similar to the seeds, ajwain leaves can also provide relief from stomach problems like flatulence and other abdominal discomforts. Ajwain leaf has a sharp, thyme like flavor. A few leaves would be enough to flavor the entire dish. The main component that gives the leaves its flavor is thymol and hence the similarity to thyme. Ajwain leaf is used in selective indian dishes while ajwain seeds are more extensively used. In certain parts of west india like in states of Andhra Pradesh and Maharashtra, ajwain leaves are ipped in chickpea batter and deep fat fried to make pakoras and mixed to make thambuli, southern inida delicacy. Ajwain leaf has many benefits and adding a few to your cooking would help you enjoy the same. Ajwain leaves are used for treating colds, coughs, and fevers in infants and small children. Cardamom is a spice with an intense, slightly sweet flavor that some people compare to mint.It originated in India but is available worldwide today and used in both sweet and savor recipes. The seeds, oils and extracts of cardamom are thought to have impressive medicinal properties and have been used in traditional medicine for centuries.

2. Materials and Methods
The raw materials namely pineapples, sugar, wheat flour, ajwain leaves, elachi powder, butter, baking powder, milk, salt, which were used to prepare pomace biscuits were procured from local market.

Table 1: Product formulation for the preparation of the pomace biscuits

Ingredients	Control Sample (%)	Pomace% 10%	Pomace% 15%	Pomace% 20%
Wheat flour(g)	100	90	85	80
Ajwain leaf powder(g)	-	2	3	5
Elachi poweder(g)	-	2	2	2
Fat(g)	50	50	50	50
Sugar(g)	30	30	30	30
Baking powder(g)	1	1	1	1
Milk(ml)	25	25	25	25
Salt(g)	2	2	2	2

Table 2: Composition pineapple pomace incorporated biscuits (per 100 g)

Content	Control sample	10% pomace biscuits	15% pomace biscuits	20% pomace biscuits
Protein (%)	6.40	5.96	5.45	5.36
Moisture content (%)	3.8	4.47	4.48	4.50
Ash (%)	1.56	2.01	2.4	2.93
Crude fibre (gm)	3.08	3.89	4.00	4.38
Iron content (gm)	0.32	1.26	1.40	2.16
Fat (%)	14.80	14.82	14.81	14.81
Calcium (mg)	0.36	0.54	0.78	1.03
Carbohydrates	73	65.85	68.86	68.02
Energy (kcal)	436	405.8	415.72	412.10

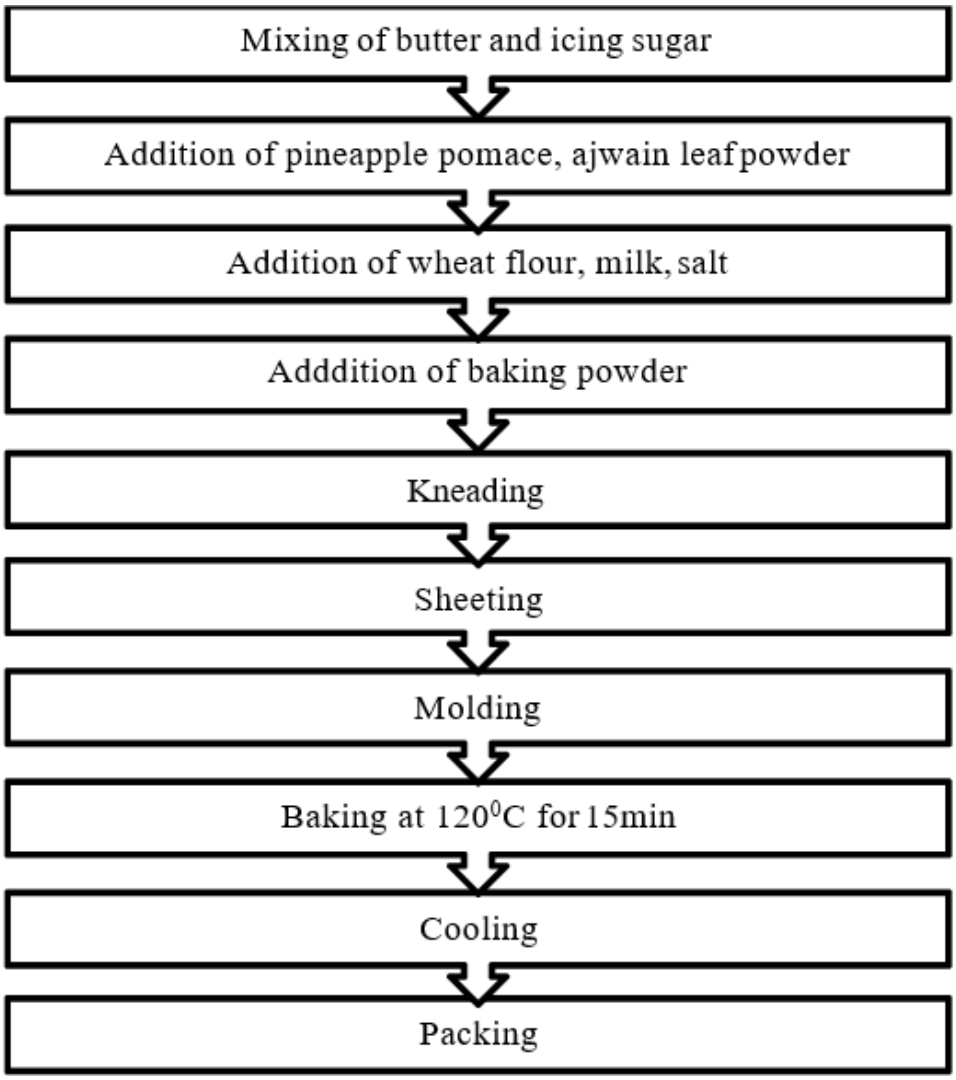


Fig 1: Flowsheet Preparation of Pineapple Pomace Biscuits

Fig 2: Pomace biscuits with three formulations

Fig 3: Pomace biscuits with three formulation and by adding ajwain leaf power

3. Results and Discussion

3.1 Evaluation of sensory attributes

Sensory evaluation was carried out by nearly thirty members. Samples of biscuits were presented to each of the panelist and were asked to asses the taste, color, texture, crispiness, appearance and overall acceptability using nine-point hedonic scale with 1 representing the least score(dislike extremely) and 9 the highest score (like extremely). The analysis was performed for the freshly made biscuits and for every one month (up to 3 moths) during the shelf life. The following graph representing the hedonic rating of the sample.

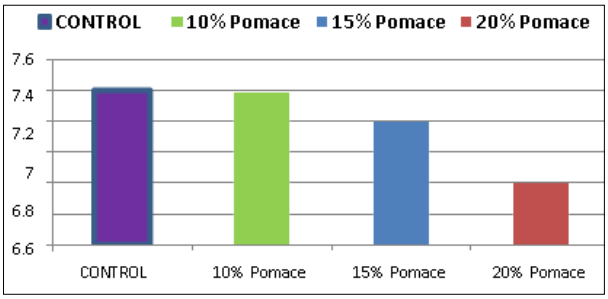


Fig 4: Hedonic ratings of the pomace biscuits

3.2 Physicho-Chemical Analysis of Pineapple Pomace Biscuits

The nutritional analysis indicated that all the biscuits contained favourable proportion of moisture, protein, fat, fibre and minerals. Substitution of pineapple powder for wheat flour improves the nutritive value of the product. There as decrease in protein, fat, fibre fat and minerals while increase in moisture level were observed in pineapple pomace powder incorporated biscuits during storage.

3.2.1 Physical Analysis

Samples are analyzed for physical properties like diameter, thickness, and spread ratio (D/T) using Vernier callipers.

$$SR = D/T$$

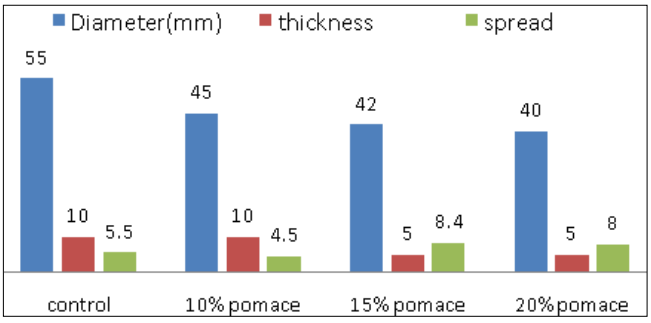


Fig 5: Physical analysis of pineapple pomace biscuits

3.2.2 Moisture Content

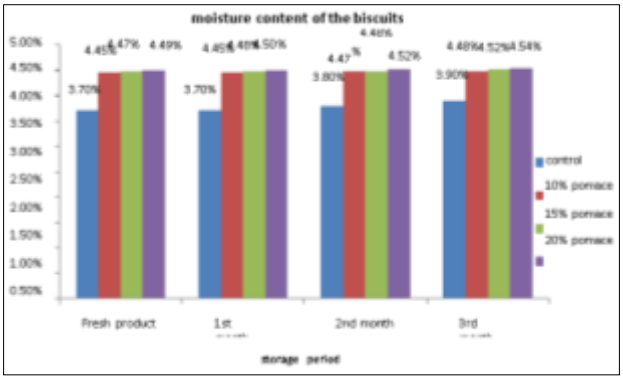


Fig 6: moisture content of the pineapple pomace biscuits

The moisture content of the biscuits significantly increased during storage. Biscuits are very hygroscopic and also the pomace flour easily absorbs the moisture from the environment. 10% of incorporated biscuits had the lowest rate of increasing in moisture content from 4.45 to 4.48% compared to other treatments.

3.2.2 Ash Content

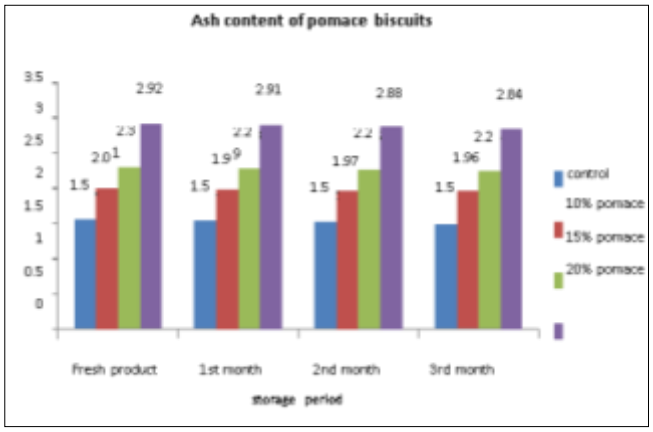


Fig 5: Ash content of the pomace biscuits

3.2.3 Protein Content

The protein content of the biscuits decreased during storage period a The amount of protein present in control, 10% dry pomace, 15% dry pomace,20% dry pomace per 100 gm respectively.

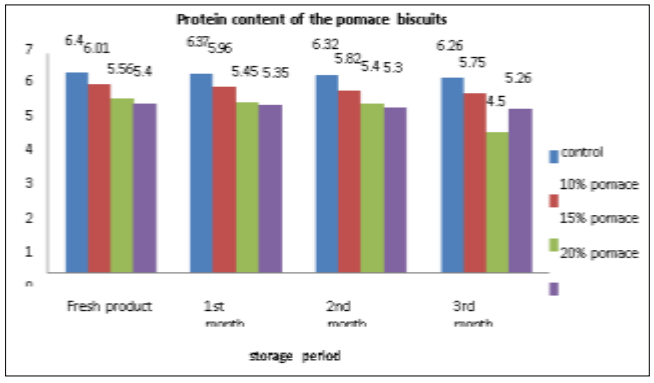


Fig 6: protein content of the pomace biscuits

3.2.4 Fibre Content

The amount of fibre present in control, 10% dry pomace, 15% dry pomace, 20% dry pomace were 3.1gm, 3.93gm, 4.02gm, 4. 4gm per 100gm respectively. Due to the addition of pomace in biscuits the fibre content in biscuits are increased, as the pomace is rich in fibre. During the storage period the fibre content of the biscuits decreased.

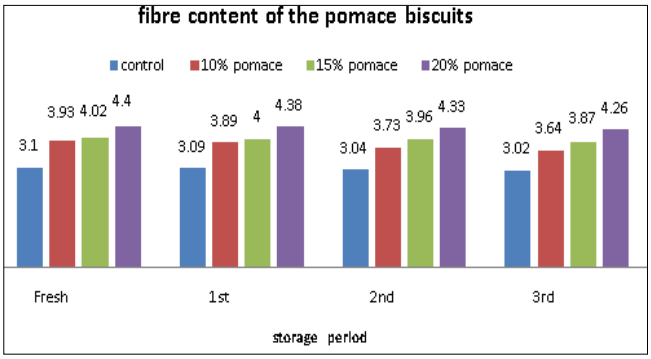
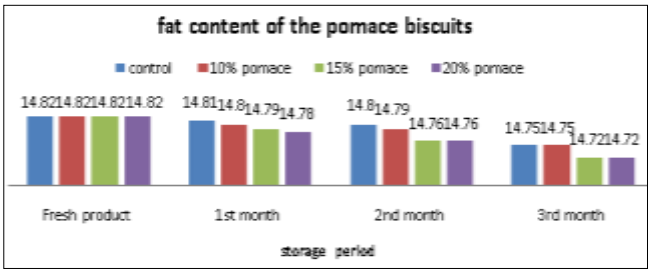


Fig 6: Fibre content of the pomace biscuits

3.2.5 Fat Content



Graph 7. Fat content of the pomace biscuits

3.2.6 Iron Content

Minerals in all treatments have undergone very little changes and the sample with 10% had a very slower rate of decreasing hen compared to the other samples.

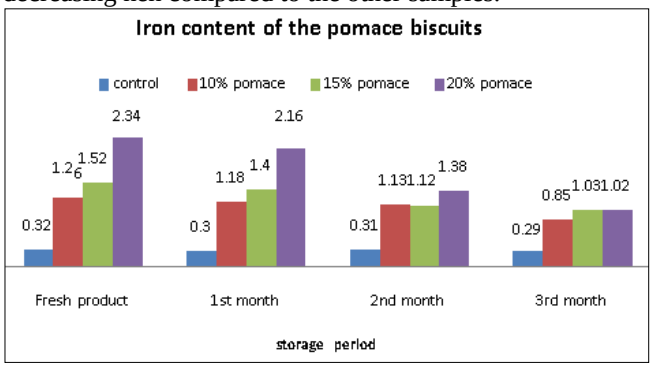


Fig 8: Iron content of the pomace biscuits

3.2.7 Calcium Content

The mineral content of the samples are decreased significantly throughout the storage period. Minerals in all treatments have undergone very littile changes and the sample with 10% had a very slower rate of decreasing hen compared to the other samples.

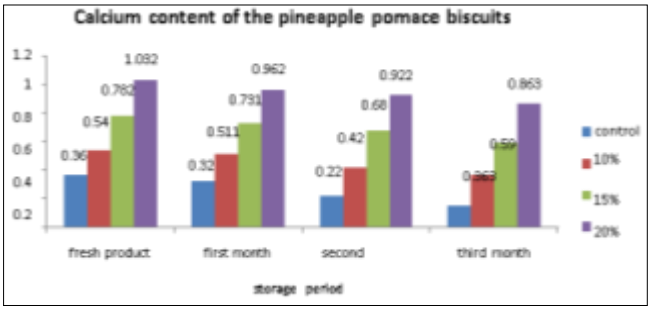


Fig 9: calcium content of the pomace biscuits

3.3 Microbial Analysis

The results of microbial analysis revealed that biscuits prepared with pineapple pomace are not deteriorated with microbial contamination. No bacteria and mould growth were observed in the biscuits. Therefore, there was no plate count found in these samples. The high temperature was used in the baking process, low water activity and low moisture content inhibited the microbial load.

4. Conclusions

This study demonstrated that utilization of fruit by-products. The pineapple pomace is the waste obtained after the extraction of juice. The pineapple pomace had rich in dietary fibre. Utilization of pomace in preparing other products increases the economic value. We used the pomace in the preparation of biscuits. The biscuits obtained were rich in fibre and other micronutrients. The fibre present in the pomace was converted into digestive fibre during the processes. Hence it gets digested easily and reduces the glycemic index in blood and gives satiefy feeling. Hence these biscuits are good for the people suffering from diabetes, cardiovascular diseases and obesity. Incorporation of pineapple pomace biscuits with 10%, 15%, and 20% and undergo sensory analysis proximate analysis of about three months of the shelf life studies of the biscuits.

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