

STANDARDIZATION AND FORMULATION OF PEARL MILLET LACE COOKIE

Elakiya R¹, Subashini B², Dr Simmi Jain³

Post Graduate Student, Food Technology and Management, Department of Food Science,
M.O.P. Vaishnav College for Women (Autonomous), Chennai - 34¹

Post Graduate Student, Food Technology and Management, Department of Food Science,
M.O.P. Vaishnav College for Women (Autonomous), Chennai - 34²

Assistant Professor and Head, Food Technology and Management, Department of Food Science,
M.O.P. Vaishnav College for Women (Autonomous), Chennai - 34³

Abstract: Lace cookies also known as Florentine cookies, are very thin, flat, crispy with brittle texture and has a see-through appearance. Traditionally, they are prepared using almond or oats flour. The present study was done to develop lace cookie using pearl millet flour. Pearl millet is a gluten-free cereal grain, rich in protein, iron with multiple health benefits. The millet cookie dough was prepared using pearl millet flour, butter, brown sugar, honey, milk, vanilla essence and Cocoa powder. Addition of Cocoa powder was done to enhance the colour and flavour. Prepared cookies were evaluated for proximate composition (moisture content, ash content, fat, iron) sensory and physical characteristics (weight, diameter, thickness and spread ratio).

Keywords: Pearl millet flour, lace cookie, sensory characteristics, physical characteristics

I. INTRODUCTION

Pearl millet (*Pennisetum glaucum* L.), Bajra is the fourth most important cereal of India after rice, wheat and sorghum. It is a good source of energy, protein, essential mineral and dietary fibre. The grain has hypo allergic properties and is gluten-free. High fibre content reduces the risk of gall stone occurrence, aids in weight loss. Pearl millet flour has a slight bitter taste and grey colour due to which its products have low acceptability (A.A. Kulthe*, 2017). The addition of pearl millets to the convenience foods increases its nutritive value and production. Cookies prepared with them adds on to the healthy foods list.

They hold good position in the snack foods. (Florence Suma P1*, 2014) Lace cookie is very thin, has a see-through appearance, crispy and brittle in nature. They are native to Italy and its formulation has evolved over the years. Traditionally they are prepared using almond or oats flour with the addition of other nuts. They do not contain baking powder or egg due to which they are flat, thinner and has a good snap.

They do contain shortening agent (unsalted butter) and sweetener (brown sugar). The caramelisation of the sugar binds and holds together the other ingredients. The dough is prepared on low heat and immediately scooped out and dropped into the baking sheets. The baking time is shorter i.e., 6-7 minutes which makes them more convenient as an instant snack or a bakery product. Present study involves incorporation of pearl millet as the major flour with other ingredients in different proportion to standardize the formulation of lace cookie.

II. OBJECTIVES

The objective of this study is:

1. To standardize the formulation of a lace cookie prepared with pearl millet flour.
 2. To analyse the influence of pearl millet (bajra) flour on the baking properties of a lace cookie by studying the thickness, diameter and spread ratio of the cookie.
 3. To evaluate the two variations (LC 1 & LC 2) for its proximate composition, iron content and sensory characteristics.
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III. MATERIALS AND METHOD

The materials used for making lace cookies are pearl millet, unsalted butter, brown sugar, vanilla essence, cocoa powder, milk and honey were procured from the local market. Pearl millets were subjected to cleaning, slight roasting and then processed into a flour using a food processor.

A. Preparation of lace cookies

The lace cookies were prepared from pearl millet flour (PMF). Various formulation was prepared using pearl millet flour and other ingredients in different proportion. LC 1 and LC 2 were the two variations that were proceeded for further analysis. They only differed in their shortening content. To prepare the cookies, first, in a medium sauce pan, unsalted butter (LC1- 30g, LC 2-40g) and brown sugar (30g) were melted by cooking in low heat. To this PMF (60g), milk (2 tbsp), honey (1 tbsp), vanilla essence (1 tsp) and cocoa powder (5g) was added and stirred completely, until combined to form a dough. The mixture was removed from the heat and immediately half table spoon dough was scooped out and dropped into the baking sheet. The cookies were then baked at 165°C for 8-10 minutes. They were cooled and stored in air tight containers for further analysis.

B. Physicochemical Analysis

Moisture content, ash, fat and iron content were determined using AOAC methods. The physical characteristics weight, diameter, thickness and spread ratio were estimated. Diameter (D) was measured using vernier calliper. The thickness (T) of cookies was measured in triplicate and the means were recorded.

- Spread ratio was calculated using the formula: $S = D/T$
- Formula to calculate moisture content:

$$\text{Moisture content (\%)} = \frac{\text{Initial sample weight} - \text{Final sample weight}}{\text{Initial weight}} \times 100$$

C. Sensory Analysis

Sensory evaluation was done by 20 panellists using the 5-point hedonic rating. Parameters examined in sensory evaluation were appearance, colour, aroma, texture (brittleness, crunchiness), taste and overall acceptability. The mean scores obtained by hedonic scale were tabulated. All paragraphs must be indented. All paragraphs must be justified, i.e. both left-justified and right-justified.

IV. RESULT AND DISCUSSION

The lace cookies were formulated using PMF, unsalted butter, brown sugar as the major ingredients to standardize its preparation. The two suitable formulations were selected, LC 1 & LC 2, and subjected to physico-chemical and sensory evaluation. The results obtained are presented below.

Physicochemical analysis results of the pearl millet lace cookie are presented in table 1. Results revealed that the moisture and fat content of LC2 (7.43% & 24.67g) was slightly higher than LC1(6.65% & 20.53g) due to higher amounts of shortening agent in them. LC 2 had 40g of butter whereas LC 1 had 30g of butter. Iron content was estimated since pearl millet are rich in iron. Both the variation exhibited similar values of iron and ash content since they had same amount of PMF (60g). Amount of iron ranged from 6.3-6.9mg/100g.

Regarding the physical properties, it was observed that diameter of the cookies increased gradually from 60mm to 69mm with increased proportion of shortening agent. Therefore, the spread in LC 2 was higher than that of LC1. And the weight of a cookie ranged around 10-11g. The spread is generally higher in lace cookie and therefore less of a thickness. No trend was observed in the thickness for both the variations. In contrast, a previous study on usual pearl millet cookies prepared by substituting wheat Maida upto 50% showed that there was decrease in diameter, spread ratio with increase in the PMF as the water absorbing fibre content increases. (A.A. Kulthe*, 2017)

TABLE:1 PHYSICOCHEMICAL ANALYSIS OF PEARL MILLET LACE COOKIES

PHYSICAL ANALYSIS	LC1	LC2
Weight	10.978g	10.374g
Thickness	6mm	6mm
Diameter	60mm	69mm
Spread ratio	10	11.16
CHEMICAL ANALYSIS	LC1	LC2
Moisture content	6.65%	7.43%
Ash content	1.34%	1.18%
Fat	20.53g	24.67g
Iron	6.39mg/100g	6.87mg/100g

Sensory results are presented in figure 1. Taste, aroma and overall acceptability of LC1 was higher than that of LC 2. The overall acceptability significantly decreased with increasing levels of shortening agent which in turn increased the crunchiness and brittleness. Crunchiness and brittleness adhered to the texture of the cookies. The cookies had undesirable grey colour but desirable baked millet aroma. So, to enhance the colour and appearance of the cookies cocoa powder was added in slightest amount.

Taste of LC 1 was welcomed by the panellist. Thus, on overall acceptability score, lace cookies with 30g unsalted butter i.e., half the amount of PMF, LC 1, was considered as standardized formulation. In the present study the colour of the lace cookies affected its acceptability.

Whereas in a previous study, high acceptability of cookies prepared with PMF was observed, where depigmentation of pearl millet was carried out. And those cookies had higher rating for the sensory attributes. (Florence Suma P1*, 2014)

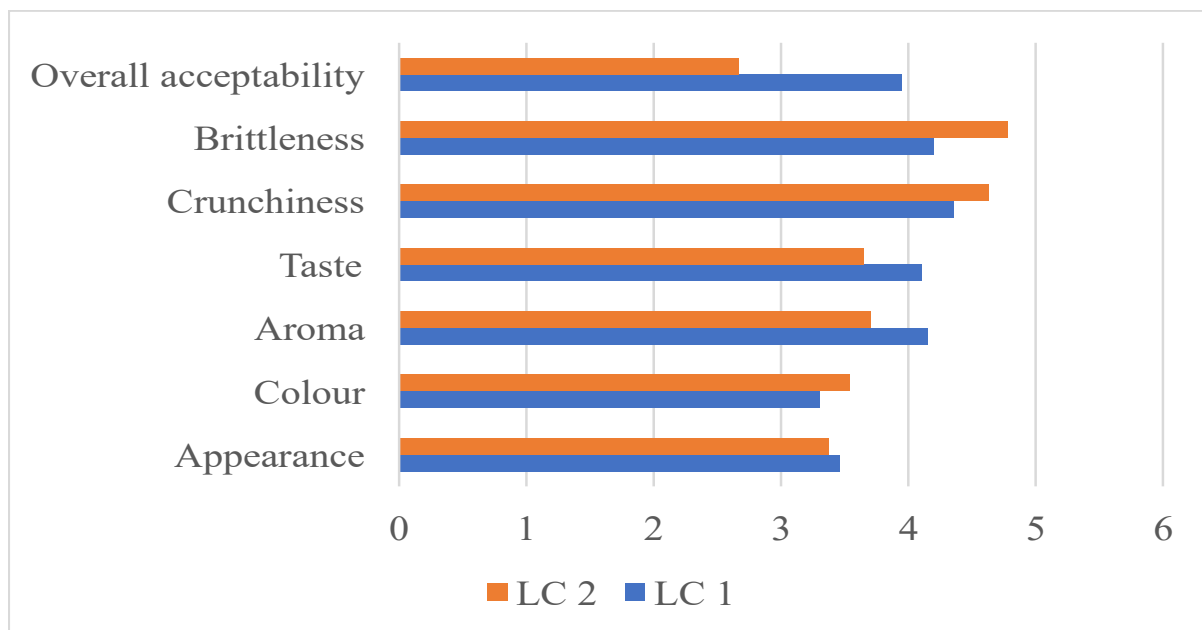


Figure 1: Sensory profile of the two variation – LC 1 & LC 2

**V. CONCLUSION**

The lace cookies prepared with PMF is a strategy to increase the consumption and consumers in the market. This is because of the nutrient composition of the millets and its gluten free nature that benefits the population suffering with gluten allergen, celiac disease (Shubli Bashir, 2020). Lace cookies significantly have differed nature from the cookies that are available in the market. They are thin, crunchier, brittle than regular cookies. Cookies prepared with higher amount of shortening agent showed more crunchiness and brittleness which was not much acceptable. It can be concluded that the cookies prepared with PMF, brown sugar and butter in the ratio 50:25:25 were found acceptable with respect to all the sensory parameters.

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