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STANDARDIZATION OF RECIPE AND SENSORY EVALUATION OF SUGAR FREE COOKIES FORTIFIED WITH JAMUN SEED POWDER

Bandi Navya*, G.L. Sharma, Hemanth Kumar Panigrahi, Diptimayee Dash and Prabhakar Singh

Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, 492012, India

*Corresponding author E-mail:bandinavya1211@gmail.com

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ABSTRACT

The present investigation was conducted at Horticulture Processing Laboratory, Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh during 2022-23. The investigation was carried out to standardize the recipe of sugar free cookies fortified with jamun seed powder, to determine the sensory quality and shelf life of sugar free cookies fortified with jamun seed powder during storage through hedonic scale. The experiment was employed in Completely Randomized Design having thirteen different treatments, with three replications under laboratory condition. Efforts were made to prepare cookies having different proportions of cookies having different combinations of Wheat flour (WF), Finger millet (FM), Coconut powder (CP) and Jamun seed powder (JSP) were mixed in different proportions viz., T₁ (94% WF+ 6% JSP), T₂ (91% WF + 9% JSP), T₃ (88% WF + 12% JSP), T₄ (85%WF + 15%JSP), T₅ (84%WF + 10% FM + 6% JSP), T₆ (81%WF +10%FM +9%JSP), T₇ (78%WF + 10%FM + 12% JSP), T₈ (75%WF + 10%FM + 15%JSP), T₉ (84%WF + 10%CP + 6%JSP), T₁₀ (81%WF +10%CP + 9%JSP), T₁₁ (78%WF + 10%CP + 12%JSP), T₁₂ (75%WF +10%CP + 15% JSP) and cookies made with 100% WF considered as control T₀. Sensory evaluation of above made cookies done through hedonic scale by taking consideration of parameters like color and appearance, taste, flavor, texture and overall acceptability. The cookies of treatment T₁₁ (78%WF + 10%CP + 12%JSP) was found to be the best through hedonic scale score. During storage sensory evaluation done at 0, 30, 60, 90, 120 and 150 days. It was found that the sensory score for parameters like color and appearance, taste, flavor, texture and overall acceptability gradually decreased during the storage and it was concluded that the cookies are acceptable to be edible up to 90 days of storage without effecting the sensory quality parameters.

Keywords: Jamun seed powder, Finger millet, Coconut powder, fortification, sensory evaluation.

Introduction

Jamun (*Syzygium cumini*) belongs to myrtaceae family. Jamun also known as the Black plum, Indian blackberry, Ram jamun, and so forth. The tall, attractive tree is typically grown as a windbreak and source of shade along highways and avenues. Originally a big perennial tree native to the Indian subcontinent and these trees are bound widespread in Southeast Asia, Eastern Africa, South America, and Madagascar. Jamun tree fruits once in a year and starts flowering from March-April and fruits ripening takes place in the months of June-July, Shrivastava, R.P. and Kumar, S. (2009). It takes about 3-5 months to ripen

after full bloom. Jamun a small fruit crop, owing to these strong medicinal benefits, is becoming more and more well-liked by consumers. Jamun has been valued and used to manage diabetes since ancient times. Jamun seeds are widely used in alternative medicine systems to treat a variety of illnesses, including diabetes, cardiovascular disease, and gastro-intestinal problems. Due of these qualities, powdered jamun seeds have been commercialized to fulfil these needs.

Jamun has long been as a traditional medicine to cure various life style diseases such as diabetes, cardiovascular disease, age related macular degeneration anti-bacterial, free radical scavenging,

anti-diarrheal, gastro protective and other health beneficial properties, Mello *et al.* (2000); Sagrawat *et al.* (2006). Jamun seeds contain a glycoside, named jamboline which helps in maintaining of glucose levels as in the normal limits, Kalse *et al.* (2016). Jamun juice and seed powder is used as a curative to treat diabetic condition and it is useful against bleeding piles, correcting liver disorders, asthma, kidney stone, jaundice and blood pressure. The unripe fruit juice is carminative, stomachic and durative in nature and possesses cooling and digestive properties, Kirtikar, K. R. and Basu, B. D. (1975). The ellagic acid present in seed extract has been reported to lower blood pressure. In addition to anticancer properties, anthocyanins have shown antagonistic activity to some bacteria, virus and fungi and hence can protect food from spoilage of microbes. Chattopadhyay *et al.* (2008). Jamun seeds with anti-diabetic properties can be utilized in a variety of recipes, Banu, J. and Jyothi, A. (2016). The use of jamun seed powder in bakery products and the addition of additional nutrients through this increasing day by day.

Cookies, among the products, are most significant in the world. These are an important food product used as snacks by children and adults. Cookies differ from other baked product like bread and cake because of their low moisture content which ensure that they are free from microbial spoilage and confer a comparatively long shelf life. Cookies provide an excellent source of fat, carbohydrates, proteins, minerals and vitamins.

Wheat (*Triticum aestivum*) is staple food crop which occupies important place after rice in India. Wheat is regarded as an excellent food for enhancing health since it is a good source of protein, minerals, B-group vitamins, and dietary fibre. The main ingredient in breads, biscuits, cookies, cakes, pasta, and noodles as well as the primary source of dietary protein and energy for people is wheat flour. Finger millet (*Eleusine coracana*) is one of the important millets having good source of carbohydrate, fibre, calcium and iron. It is useful in reducing body weight and good source of fibre used in reducing the cholesterol from the body. Coconut (*Cocos nucifera*) powder is good source of dietary fiber and play an important role in controlling cholesterol and blood sugar levels and prevent colon cancer.

Materials and Methods

Preparation of sugar free cookies fortified with jamun seed powder

Jamun seed powder, Wheat flour, Finger millet powder, Coconut powder, Sugar free stevia powder, Ghee, other required ingredients and packing materials were procured from the local markets of Raipur. Jamun seed powder and other powders were weighed as per treatments and quantities of sugar free stevia powder, ghee and vanilla essence were added. The flour was molded into a smooth dough by kneading it. The cookies were made by hand from this dough, giving them a round form, and garnishing them with cashews. The cookies were then placed on trays that had been butter-smeared. After that, the trays were placed in the baking oven at 180 °C for 15 to 20 minutes to bake the cookies. Then the cookies were kept for organoleptic evaluation.

The combination of different treatments viz. T₁ (94% WF+ 6% JSP), T₂ (91% WF + 9% JSP), T₃ (88% WF + 12% JSP), T₄ (85%WF + 15%JSP), T₅ (84%WF + 10% FM + 6% JSP), T₆ (81%WF +10%FM +9%JSP), T₇ (78%WF + 10%FM + 12% JSP), T₈ (75%WF + 10%FM + 15%JSP), T₉ (84%WF + 10%CP + 6%JSP), T₁₀ (81%WF +10%CP + 9%JSP), T₁₁ (78%WF + 10%CP + 12%JSP), T₁₂ (75%WF +10%CP + 15% JSP) and cookies made with 100% WF considered as control T₀.

Organoleptic test of fortified cookies through Hedonic Scale:

A panel of judges evaluated the sensory quality of the fortified cookies made from jamun seed using Ranganna's Hedonic rating test, Ranganna, S. (1997). The products were evaluated based on their colour and appearance, texture as well as their flavour and taste. Acceptable characters received a mean score of 5 or higher out of a possible 9 points. The average ratings obtained from all of the characters tested were used to determine the overall acceptability of the products. A product was considered acceptable if it received an overall mean score of 5 or higher. The observations were recorded on the basis of colour and appearance, texture, flavour, taste and overall acceptability of cookies as per hedonic rating.



Different Treatments of Sugar Free Cookies Fortified with Jamun Seed Powder

Results and Discussion

The sensory evaluation was done on the basis of colour and appearance, taste, flavor, texture and overall acceptability. There were thirteen samples of cookies of different compositions. The quality was judged by a 15 member's panel. The products were rated on a 9-point hedonic scale.

The average score records of cookies were presented in the Table No. 1 and illustrated in fig. 1. It was observed that maximum score of color and appearance 7.55 was observed in T₉ (84% WF+ 10% CP+6% JSP) followed by 7.20 for T₁₁(78% WF + 10% CP+12% JSP), It was noticed that as the concentration of jamun seed powder increased the intensity of color

has also increased. The results obtained were similar with Patil *et al.* (2014); Thorat, A.V. and Khemnagar, M.B. (2015); Kulthe *et al.* (2017).

Maximum score of taste 8.10 was observed in T₁₁(78% WF + 10% CP+12% JSP) followed by 7.31 for T₁₀(81%WF+10%CP+9%JSP), It was noticed that as the concentration of jamun seed powder increased bitterness of cookies increased. The results obtained were similar with Patil *et al.* (2014) and Priyanka and Mishra (2015).

Maximum score of flavor 8.20 was observed in T₁₁(78% WF + 10% CP+12% JSP), followed by 7.20 for T₉ (84%WF+10%CP+6%JSP), It is found that with increasing the concentration of jamun seed powder the

score of flavor got decreased. The results obtained were similar with Patil *et al.* (2014).

Maximum score of texture 8.16 was observed in T₁₁(78% WF + 10% CP+12% JSP) followed by 7.16 for T₉ (84% WF+ 10% CP+6% JSP) It was found that by increasing the percentage of jamun seed powder quality of texture got decreased due to cracks in the cookies during baking. The results obtained were similar with Patil *et al.* (2014); Kulthe *et al.* (2017).

Maximum score of overall acceptability 8.70 was observed in T₁₁(78% WF + 10% CP+12% JSP) followed by 7.42 for T₉ (84% WF+ 10% CP+6% JSP), 7.25 for T₁₀(81%WF+10%CP+9%JSP).

It was concluded that T₁₁(78% WF + 10% CP+12% JSP) was mostly accepted among the all other treatment combination.

It was found that with addition of higher concentration of jamun seed powder the overall acceptability of cookies got decreased. The results obtained were similar with Patil *et al.* (2014); Kalse *et al.* (2016)

The changes in the sensory quality of T₁₁(78% WF + 10% CP+12% JSP) cookies during the storage period were analyzed. The average hedonic sale score records of cookies during storage were presented in the Table No. 2 and illustrated in fig. 2. It was found that the cookies highest score 8.40 for color and appearance was observed on D₁(date of preparation) and the least score 6.73 was observed on D₆ (150 days of storage). It was revealed that there was a gradual decrease in score of color and appearance during storage for 150 days of storage in cookies. Score for taste of cookies was highest 8.80 on D₁(date of preparation) and least score

7.06 was observed on D₆ (150 days). Score for texture of cookies was highest 8.06 on D₁(date of preparation) and least score 6.76 was observed on D₆ (150 days). The change in texture due to increase in moisture content of cookies during the storage. Wandhekar *et al.* (2021). Score for flavor of cookies was highest 8.00 on D₁(date of preparation) and least score 6.70 was observed on D₆ (150 days). The flavor of cookies acceptable up to D₄ (90 days of storage). Data show that, gradual decrease in the overall acceptability of cookies during the storage. Score for overall acceptability of cookies was highest 8.43 on D₁(date of preparation) and least score 6.43 was observed on D₆ (150 days). The product rating was like very much up to 90 days of storage, like moderately at 120 days of storage and like slightly at 150 days of storage, so the acceptability of cookies acceptable up to D₄(90 days of storage) with highly acceptable score and rating. Overall acceptability decreased due to increase in moisture content during storage, lipolytic and proteolytic changes leading to decreasing the acceptability of product. The similar results of decrease in overall acceptability scores were observed by Pasha *et al.* (2002); Mahmood *et al.* (2008).

Conclusion

The sensory evaluation was done on the basis of color and appearance, taste, flavor, texture and overall acceptability. Hence, in our study it can be finally concluded that Cookies having composition of 78% of wheat flour, 10% of coconut powder and 12% jamun seed powder was found to be fit for consumption up to 90 days from the date of preparation without any change in the quality attributes.

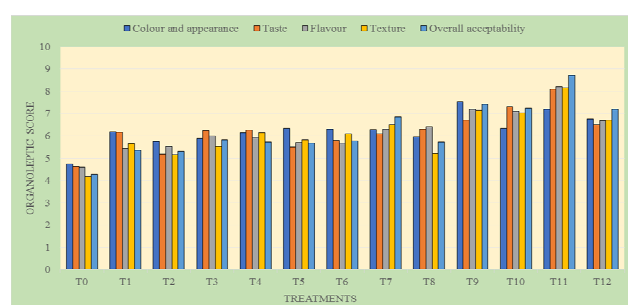
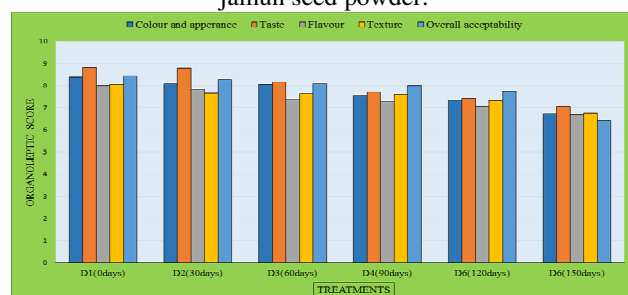
Table 1 : Organoleptic evaluation of sugar free cookies fortified with jamun seed powder (Hedonic Scale score).

S. No.	Notation	Treatments	Color and appearance	Taste	Flavor	Texture	Overall acceptability
1	T ₀	100% WF	4.75	4.62	4.61	4.20	4.29
2	T ₁	94% WF+ 6% JSP	6.19	6.16	5.42	5.65	5.35
3	T ₂	91% WF+ 9% JSP	5.75	5.17	5.53	5.15	5.32
4	T ₃	88% WF+ 12% JSP	5.89	6.23	6.00	5.53	5.82
5	T ₄	85% WF+ 15%JSP	6.13	6.25	5.93	6.15	5.72
6	T ₅	84%WF+ 10% FM+6% JSP	6.35	5.50	5.71	5.81	5.67
7	T ₆	81%WF+10%FM +9%JSP	6.30	5.79	5.68	6.10	5.77
8	T ₇	78%WF+10%FM+12%JSP	6.28	6.10	6.31	6.50	6.85
9	T ₈	75%WF+10%FM+15%JSP	5.95	6.31	6.42	5.20	5.72
10	T ₉	84%WF+10%CP+6% JSP	7.55	6.71	7.20	7.16	7.42
11	T ₁₀	81%WF+10%CP+9%JSP	6.35	7.31	7.10	7.03	7.25
12	T ₁₁	78%WF+10%CP+12%JSP	7.20	8.10	8.20	8.16	8.70
13	T ₁₂	75%WF+10%CP+15%JSP	6.75	6.50	6.68	6.71	7.20
		SEm±	0.04	0.06	0.04	0.05	0.05
		CD at 5%	0.13	0.19	0.14	0.17	0.14

Table 2 : Organoleptic evaluation of fortified cookies with jamun seed powder during storage up to acceptable edible quality. (Hedonic scale score)

S.No.	Notation	Days of storage	Color and appearance	Taste	Flavor	Texture	Overall acceptability	Rating
1	D ₁	0days	8.40	8.80	8.00	8.06	8.43	LV
2	D ₂	30days	8.11	8.79	7.83	7.67	8.27	LV
3	D ₃	60days	8.06	8.16	7.37	7.65	8.10	LV
4	D ₄	90days	7.56	7.70	7.30	7.60	8.00	LV
5	D ₅	120days	7.36	7.43	7.06	7.33	7.76	LM
6	D ₆	150days	6.73	7.06	6.70	6.76	6.43	LS
		SEm±	0.04	0.06	0.04	0.06	0.04	
		CD at 5%	0.15	0.18	0.14	0.19	0.13	

Abbreviation: LV- Like very much; LM-Like moderately; LS- Like slightly.

**Fig. 1:** Organoleptic evaluation of fortified cookies with jamun seed powder.**Fig. 2 :** Organoleptic evaluation of fortified cookies with jamun seed powder during storage up to acceptable edible quality

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