

FORMULATION OF BAEL (*Aegle marmelos* (L.) Corr.) PULP VALUE ADDED SHRIKHAND

Spoorthi G.M¹, Deepa Terdal², Bhuvaneshwari, G³ and Arun Kumar Kamble⁴

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
3. Head & Professor, Department of PHM, COH, University of Horticultural Sciences, Bagalkot, Karnataka, India
4. Assistant Professor, Department of Fruit Science, COH, University of Horticultural Sciences, Bagalkot, Karnataka, India

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

Abstract

Bael (*Aegle marmelos* Correa.) is a lesser known fruit crop indigenous to India. However, in recent years, there has been observed increasing demand for so called dairy-based products. The increasing demand and purchasing power of consumers for dairy products with 'functional' properties is a key factor driving growth in sales value developed markets. Hence the study was undertaken to formulate bael pulp incorporated shrikhand. The bael pulp shrikhand was formulated using bael pulp, standardized milk, sugar and yogurt starter culture. Bael pulp was included at a level of 0–40% for making shrikhand. Among the treatments, T₇ (30% bael pulp + 70 mL milk + 40g sugar + L. *Bulgaricus* curd culture@ 1.5mL) showed organoleptically superior formulation to get the shrikhand.

Index terms: Bael fruit pulp, Shrikhand, L. *Bulgaricus* curd culture, dairy-based products and yogurt starter culture

Introduction

However, in recent years, there has been observed increasing demand for so called dairy-based products. The increasing demand and purchasing power of consumers for dairy products with 'functional' properties is a key factor driving growth in sales value developed markets. Dairy products have long been advertised as being excellent sources of nutrition. Milk and other dairy foods are important sources of macronutrients and micronutrients in the diets of children and adolescents and play a role in meeting multiple nutrient intake recommendations. Changing consumer needs indicate a great opportunity for innovations and development of functional food (Cam *et al.*, 2014).

Shrikhand is an indigenous fermented milk product particularly in western part of India especially Maharashtra and Gujarat prepared by the fermentation of milk by using known strain of lactic acid bacteria. The name shrikhand is derived from Sanskrit word “Shikharani. It has a semi-soft consistency with a sweet and sour taste. It improves the digestive system by strengthening immune system. According to FSSAI (Anon., 2018), shrikhand- means the product obtained from chakka or skimmed milk chakka to which milk fat is added. It may contain fruits, nuts, sugar, cardamom, saffron and other spices. It shall not contain any added colouring and artificial flavouring substances. It has the nutritive goodness of fermented milk products. It is very refreshing product particularly during summer months like dahi (curd) and it is popular because of its characteristics flavour, taste, palatable nature and possible therapeutic value (Singh and Singh, 2014). In this background the present study experiment on “formulation of bael (*Aegle marmelos* (L.) Corr.) pulp value added shrikhand was developed.

Material and Methods

Procurement of raw material

The bael fruit variety Kerala was procured from the MHREC, UHS, Bagalkot, Karnataka for the preparation of bael fruit incorporated shrikhand and ice cream premix. Other ingredients for both the product formulations were purchased from the local market to prepare the final product.

Optimization of ingredients for black carrot ready to service (RTS)

The bael fruit incorporated shrikhand was formulated using bael pulp, standardized milk, sugar and yogurt starter culture (Plate1).

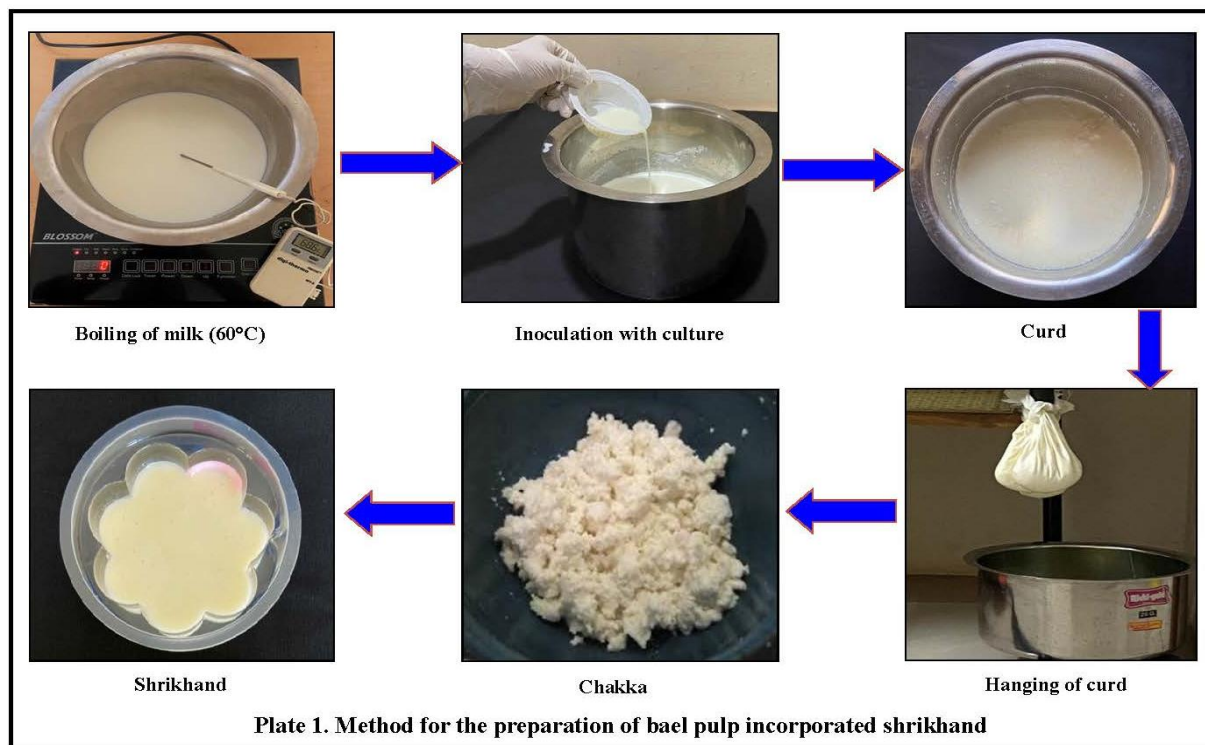
Observations recorded

Sensory evaluation (9-point hedonic scale)

Sensory evaluation of bael fruit pulp incorporated shrikhand by 10 semi trained panel consisting of teachers and post graduate students of College of Horticulture, Bagalkot with the help of nine point hedonic rating rate (1 = dislike extremely, 2 = like only slightly, 3 = dislike moderately, 4 = dislike slightly, 5 = neither like nor dislike, 6 = like slightly, 7 = like moderately, 8 = like very much and 9 = like extremely) for colour, flavour, texture, taste and overall acceptability. The bael fruit shrikhand were coded and served randomly to the panellists (10 panellists) for sensory evaluation.

Statistical analysis

The data on sensory evaluation, quality analysis and storage studies on bael fruit incorporated shrikhand was carried out by using Completely Randomized Design (CRD) analysed according to Panse and Sukathme (1985). The average, mean and standard deviation of basic statistical tools were adopted. The level of significance used in ‘F’ and ‘t’ test was $p=0.01$. Critical difference values were calculated whenever ‘F’ test found significant.



Results and discussion:

Sensory evaluation is an important opportunity and have greatly accelerated the food industry for the development of new products and it is an important framework to develop more precise food products according to consumers attitude (Sidel and Stone, 1993). Teradal *et al*, 2017 study indicated the evaluation of grain based wholesome functional food products in the form of composite mix is organoleptically accepted for geriatric population. In the present investigation, sensory evaluation of bael fruit incorporated shrikhand was carried out by employing 9 point hedonic scale. The sensory score for the shrikhand is depicted in Table 1.

Table 1: Effect of bael pulp incorporation on sensory evaluation (9 point hedonic scale) of shrikhand

Treatment	Colour*	Consistency*	Flavour*	Texture*	Taste*	Overall acceptability*
T1: 100mL milk (Control)	7.30d	7.17c	7.56b	7.31c	7.33c	7.43c
T2: 5% bael pulp + 95mL milk	7.52cd	7.20c	7.45b	7.15c	7.51bc	7.46c
T3: 10% bael pulp + 90mL milk	7.35d	7.18c	7.55b	7.36c	7.72bc	7.55bc
T4: 15% bael pulp + 85mL milk	7.40d	7.39bc	7.42b	7.42bc	7.26c	7.43c
T5: 20% bael pulp + 80mL milk	7.37d	7.28c	7.42b	7.32c	7.31c	7.42c
T6: 25% bael pulp + 75mL milk	7.94bc	7.96abc	8.11ab	7.93abc	7.98ab	8.02abc
T7: 30% bael pulp + 70mL milk	8.13ab	8.33ab	8.47a	8.44ab	8.32a	8.23ab
T8: 35% bael pulp + 65mL milk	8.44a	8.48a	8.57a	8.53a	8.42a	8.49b

T9: 40% bael pulp + 60mL milk	8.26ab	7.85abc	7.68b	7.70abc	7.76bc	7.63bc
Mean	7.75	7.65	7.80	7.68	7.74	7.74
S.Em±	0.10	0.22	0.15	0.23	0.13	0.16
CD at 1%	0.42	0.90	0.63	0.95	0.52	0.67

Note: 1. Similar alphabets within the column represents non significant differences at ($p < 0.01$)

2. 100ml milk yields 32g chakka

The above treatment includes the ingredients in common such as 40g sugar and *L. bulgaricus*@1.5 mL

Significant differences were observed for the sensory attributes. Up to 35 % of bael pulp incorporation in to shrikhand was appreciable by the panellists with respect to colour (8.44), consistency (8.48), flavour (8.57), taste (8.42), texture (8.53) and overall acceptability (8.49). Later with the increased addition of bael pulp was found unacceptable, this is mainly because of non-enzymatic reaction occurred during processing. Whereas, control sample showed decreased sensory score this might due to increased level of acidity and TSS. Fresh pomegranate peel powder scored acceptable sensory score (Ranjitha *et al*, 2018). The study done by Deshmukh *et al*. (2022) showed that up to 15 per cent of the guava pulp incorporation in kalakand was acceptable. The incorporation of pomegranate seed powder and defatted soybean flour up to 20% and 30%, respectively in cookies formulation were accepted at optimum level for all sensory parameters like taste, flavor and texture except for color (Harish *et al*, 2022). The bread supplemented with 5% Pinapple Pomace powder was found to be more acceptable (Darshini, 2021).

Conclusion: The results obtained in the present study suggest that the acceptable bael incorporated shrikhand had excellent sensory attributes and able to meet out the nutritional requirements for all the age groups.

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