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Studies on Physico-chemical and organoleptic quality characteristics of shrikhand fortified with banana pseudo-stem powder

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Abstract

The present investigation is designed and formulated to study the effects of banana pseudo-stem powder on physico-chemical and organoleptic qualities of shrikhand. Shrikhand is a popular Indian dessert prepared by fermentation of milk. It has a semi-solid consistency and is sweet sour in taste. In this study shrikhand is prepared by using different proportion of banana pseudo-stem powder at 0, 5, 10, 15 and 20 percent which are sampled as T₀, T₁, T₂, T₃ and T₄ respectively. The physico-chemical analysis results shows that treatment 4 (T₄) possess maximum moisture, protein, fat, ash content, TSS, acidity while the control sample (T₀) has maximum moisture, Carbohydrates. The sensory evaluation of shrikhand revealed that sample T₁ got good score for all the sensory parameters. From the research it may concluded that Use of banana pseudo-stem powder the nutritional value yet increasing the quality of the shrikhand as compare to T₀ (control) sample T₁ is higher in protein i.e increased by 7.08g in per 100g. and treatment T₁ with 5 percent banana pseudo-stem powder was significantly superior over treatment T₂, T₃ and T₄ which had the highest sensory score with respect to color, flavour, texture and overall acceptability.

Keywords: banana pseudo-stem powder, Shrikhand, physico-chemical parameters

Introduction

India's market potential and current growth rate of traditional dairy products is unparalleled and all set to boom further under the technology of mass production. An estimated 50 to 55 % of the milk produced in India is converted into a variety of traditional milk products, using processes such as coagulation, desiccation and fermentation. Indian fermented milk products utilize 7% of total milk produced and mainly includes three product dahi, shrikhand (sweetened concentrated curd) and lassi which may be considered the western equivalent to yogurt, quarg and stirred yogurt, respectively. Fermented milk products constitute a vital component of the human diet in many regions of the world. In the Indian sub-continent such products are also classified as "indigenous milk products" like dahi (curd), lassi, shrikhand etc. which are prominent in people's diet. Shrikhand is the indigenous fermented milk product prepared by the fermentation of milk by using known strain of lactic acid bacteria. Shrikhand is extensively used as a sweet dish after meals. It is also used as a festive sweet in India. Sugar is added as additive to the Shrikhand to enhance taste and does not have any preservative effect. Other natural additives like dried fruits are added to the shrikhand to enhance flavour. Shrikhand is traditionally made at home in western India. The name shrikhand is derived from the Sanskrit work "Shikharini". A lactic acid bacterium refers to a large group of beneficial bacteria that have similar properties and all produce lactic acid as an end product of the fermentation process. They are widespread in nature and are also found in our digestive systems (Swapna *et al.*, 2013).

The increasing demand from consumers for dairy products with „functional“ properties is a key factor driving value sales growth in developed markets. This has led to the promotion of added-value products such as probiotic and other functional yoghurts, reduced-fat and enriched milk products, fermented dairy drinks, and organic cheese. Present day consumers prefer foods that promote good health and prevent diseases. Furthermore, these foods must fit into current lifestyles providing convenience of use, good flavour and an acceptable price value ratio. Such foods constitute current and future waves in the evolution of the food development cycle. Shrikhand is a popular Indian dessert prepared by the fermentation of milk. It has a semi-soft consistency and a sweet and sour taste.

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Shrikhand originated in Persia using Frasi-shir (milk) and khand (sugar), and was later brought to the shores of Gujarat by the Parsi Zohrastrian settlers (Rita Narayanan *et al.*, 2013). India is the largest producer of banana next to mango and major banana producing states are Maharashtra, Kerala, Tamilnadu, Gujarat, Bihar, West Bengal, Assam, Andhra Pradesh and Karnataka. Banana is cultivated primarily for their fruit and to a lesser extent to make fiber and as ornamental plants (Desai *et al.*, 2016).

Inside the central part of the pseudo-stem is the core which edible. In many parts of india, the pith or the tender core of the banana pseudo-stem has been used as food after boiling and the addition of spices. Banana central core is rich in fibre and aids in weight loss. It helps to relieve constipation. It is also found to be rich in potassium and vitamin B6. It helps to detoxify the body being a diuretic. It is used in the treatment of kidney stones (Lakshman *et al.*, 2015).

Materials and Methods

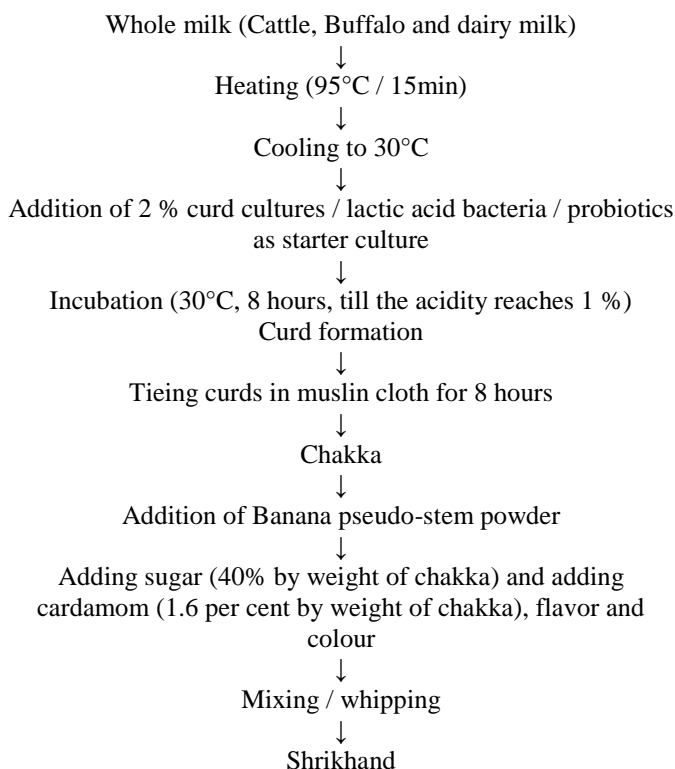
Material

All the raw material such as milk, banana pseudo-stem, etc was procured from local market of Aurangabad. Chemical and microbial culture were purchased from Thomas baker Mumbai.

Methods

Preparation of banana pseudo-stem based shrikhand

During the experiment period five treatments were studied. Treatments studied in the experiment were planned like T₀ (control sample means shrikhand prepared with 100% buffalo milk chakka), T₁ (shrikhand prepared with 95% buffalo milk chakka and added 5 % banana pseudo-stem powder), T₂ (shrikhand prepared with 90% buffalo milk chakka and added 10 % banana pseudo-stem powder), T₃ (shrikhand prepared with 85% buffalo milk chakka and added 15 % banana pseudo-stem powder), T₄ (shrikhand prepared with 80% buffalo milk chakka and added 20 % banana pseudo-stem powder) sugar used in all treatments at 40% by weight of chakka and it was stored under refrigeration temperature.



Physical analysis of shrikhand

Acidity: Acidity of prepared Shrikhand was estimated by titration method as per the procedure described in IS: 1166, 1973.

pH: The pH of prepared Shrikhand was determined by using a Digital pH meter.

Total solid content: Total solid content of prepared Shrikhand was determined by using gravimetric method as per the procedure described in IS: 12333, 1997; ISO: 6731, 1989.

Chemical analysis of shrikhand

Shrikhand was analyzed for proximate composition; moisture, ash, protein, fat, and total carbohydrates according to their respective methods (A.O.A.C., 2000).

Organoleptic evaluation of shrikhand

Freshly prepared low cost paneer were served to panel members consisting of 5 members. The test was performed and drafted the results by taking perception of panel through 9 point hedonic scale (Amerine *et al.*, 1965).

Result and Discussion

Table 1: Effect of banana pseudo-stem powder on physical quality characteristics of shrikhand fortified with banana pseudo-stem powder

Sample code	TSS	pH	Acidity
T ₀	65.32±0.02	4.2±0.02	1.02±0.01
T ₁	64.10±0.04	4.3±0.03	1.19±0.05
T ₂	67.05±0.03	4.6±0.03	1.20±0.02
T ₃	69.12±0.02	4.7±0.02	1.25±0.04
T ₄	70.50±0.03	4.8±0.01	1.27±0.01
SE±	0.016	0.134	0.018
CD at 5%	0.050	0.42	0.056
CV	0.040	5.141	2.585

*Each value is average of three determinations

The data presented in table-1 revealed the effects of banana pseudo-stem powder on physical qualities of shrikhand. The highest TSS in shrikhand sample is T₄ (70.50) followed by T₃ (69.12), T₂ (67.05), T₀ (65.32) and minimum protein content is T₁ (64.10). The highest pH value in shrikhand sample is T₄ (4.8) followed by T₃ (4.7), T₂ (4.6), T₁ (4.3) and minimum pH value is T₀ (4.2). The highest acidity in shrikhand sample is T₄ (1.27) followed by T₃ (1.25), T₂ (1.20), T₁ (1.19) and minimum acidity is T₀ (1.02). The similar results were obtained with David (2015).

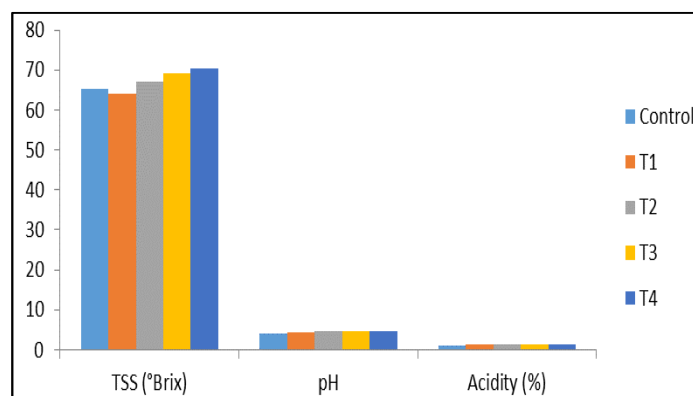


Fig 1: Effect of banana pseudo-stem powder on physical quality characteristics of shrikhand fortified with banana pseudo-stem powder

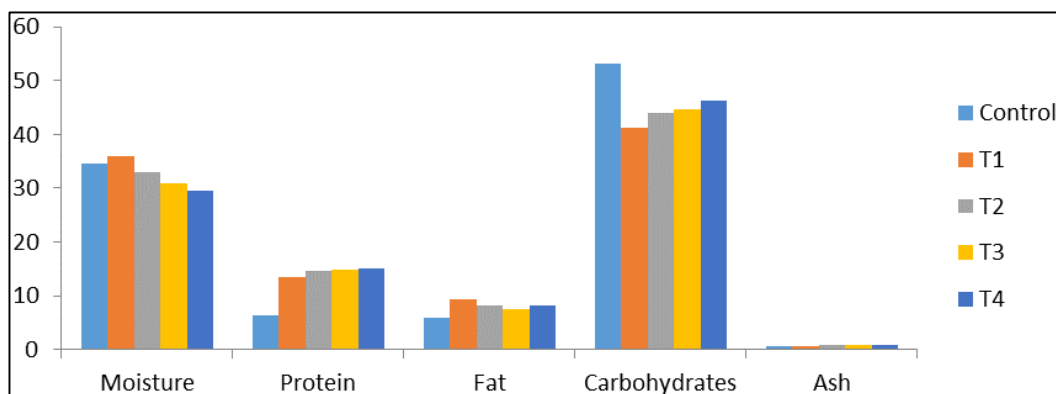
Table 2: Effect of banana pseudo-stem powder on chemical quality characteristics of shrikhand fortified with banana pseudo-stem powder

Sample code	Moisture	Protein	Fat	Carbohydrate	Ash
T ₀	34.68±0.03	6.40±0.05	5.80±0.03	53.12±0.01	0.71±0.03
T ₁	35.90±0.02	13.48±0.05	9.35±0.02	41.20±0.05	0.75±0.01
T ₂	32.95±0.04	14.61±0.03	8.15±0.05	44.02±0.02	0.82±0.01
T ₃	30.88±0.03	14.91±0.01	7.56±0.03	44.65±0.03	0.85±0.02
T ₄	29.50±0.01	15.05±0.02	8.25±0.05	46.20±0.02	0.89±0.02
SE ±	0.016	0.022	0.022	0.016	0.011
CD at 5%	0.052	0.070	0.070	0.050	0.036
C.V.	0.085	0.295	0.485	0.059	2.424

*Each value is average of three determinations

The presented in table-2 showed the effects of banana pseudo-stem powder on chemical parameters of shrikhand. The highest moisture content in shrikhand sample is T₁ (35.90) followed by Control sample T₀ (34.68), T₂ (32.95), T₃ (30.88) T₄ (29.50). The highest protein content in shrikhand sample is T₄ (15.05%) followed by T₃ (14.91%), T₂ (14.61%), T₁ (13.48%) and minimum protein content is T₀ (6.40%). The highest fat content in shrikhand sample is T₁ (9.35%)

followed by T₄ (8.25%), T₂ (8.15%), T₃ (7.56%) and minimum fat content is T₀ (5.80%). The highest carbohydrates in shrikhand sample is T₀ (53.12%) followed by T₄ (46.20%), T₃ (44.65%), T₂ (44.02%) and minimum carbohydrates is T₁ (41.20%). The highest ash content in shrikhand sample is T₄ (0.89%) followed by T₃ (0.85%), T₂ (0.82%), T₁ (0.75%) and minimum Ash content is T₀ (0.71%). The similar results were obtained with David (2015).

**Fig 2:** Effect of banana pseudo-stem powder on physical quality characteristics of shrikhand fortified with banana pseudo-stem powder

Organoleptic evaluation of shrikhand fortified with banana pseudo-stem powder

Table-3 shows different organoleptic evaluation of control and banana pseudo-stem based shrikhand. The sensorial quality characteristics of shrikhand fortified with banana pseudo-stem powder play a vital role in attracting consumers to purchase the product. Consumer judges Shrikhand fortified

with banana pseudo-stem powder quality on the basis of its sensory parameters such as color, flavour, texture, Overall acceptability etc. Sensorial evaluation was done using 9 point Hedonic scale. These Shrikhand was evaluated for acceptability based on characteristics such as color, flavour, and texture.

Table 3: Organoleptic evaluation of shrikhand fortified with banana pseudo-stem powder

Sample	Color	Texture	Flavor	Overall acceptability
Control	8.38	8.11	8.05	8.38
T ₁	7.55	7.77	7.6	7.88
T ₂	7.16	7.41	7.4	7.27
T ₃	6.44	7.00	6.77	6.88
T ₄	6.16	6.5	6.33	6.38
SE ±	0.318	0.327	0.323	0.338
CD at 5%	0.911	0.937	0.927	0.969
C.V.	13.340	13.315	13.391	13.762

*Each value is average of three determinations

The data presented in table-3 revealed that the effects of banana pseudo-stem on sensory quality of shrikhand. The sample T₂ got highest score for color, texture, flavour and overall acceptability as 7.55, 7.77, 7.60 and 7.88 respectively

and hence the sample T₁ was taken for further analysis. The similar results were obtained with the finding of the Lakshman *et al.* (2015).

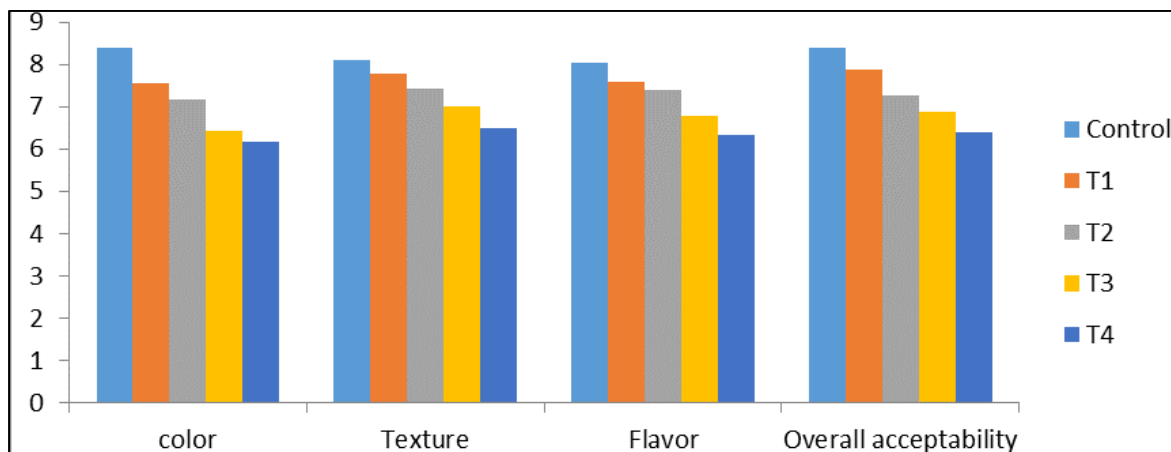


Fig 3: Sensory evaluation of Shrikhand fortified with banana pseudo-stem powder

Conclusion

From the present investigation it can be concluded that banana pseudo-stem powder can be successfully fortified up to 5 percent. Use of banana pseudo-stem powder founded improvement in nutritional value of the product. As compare to T_0 (control) sample T_1 is higher in protein i.e increased by 7.08g in per 100g, and treatment T_1 with 5 percent banana pseudo-stem powder was significantly superior over treatment T_2, T_3 and T_4 which had the highest sensory score with respect to color, flavour, texture and overall acceptability.

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