

Study on sensory evaluation and the optimum levels of Calcutta betel vine (*Piper betel*) leaves extract in the preparation of Shrikhand

ABSTRACT

The present investigation was conducted at Section of Animal Husbandry and Dairy Science, College of Agriculture, Nagpur (Dr. PDKV, Akola) during 2022-2023. An effort was made to determine the optimum level of Calcutta betel vine leaves extract in the preparation of shrikhand, with an objective to evaluate the product by sensory quality along with its cost structure and physio-chemical properties. The present study was carried out with five treatments including control T₁ and shrikhand prepared from cow milk chakka with different levels of Calcutta betel vine leaves extract i.e. 2.0%, 4.0%, 6.0% and 8.0% in treatment T₂, T₃, T₄ and T₅, respectively. The results showed that, the mean score of flavour of shrikhand in treatment T₄ was highest (8.5) and lowest was recorded in T₅ (5.0). The mean score for body and texture of shrikhand was highest in T₄ (8.5) and lowest in T₅ (5.2). In terms of colour and appearances, the highest score was recorded in T₄ (8.5) and lowest in T₅ (5.5). The highest overall acceptability score was recorded in T₄ (8.5) over other treatments. This superiority was found due to the addition of 6.0% betel vine leaves extract in shrikhand. It is concluded that, shrikhand of acceptable quality can be prepared by adding 6.0% Calcutta betel vine leaves extract.

Key Words: Cow milk, Chakka, Betel vine, Shrikhand, Sensory evaluation, Chemical composition, Cost of production

Introduction

The bovine milk is consumed more prominently than milk from other species. Bovine and caprine are the foremost sources of milk, which also play a noteworthy role in the socioeconomic development of developed and under-developed countries. Both cow and goat are comprised of an adequate number of bioactive constituents (Chauhan *et al.*, 2021). Milk products are prepared to increase their shelf life and preserve its nutritive value. As milk is the most perishable product (Harper and Richard, 2008).

Shrikhand is made by blending chakka with 50-100% sugar. Despite shrikhand's popularity and growing market in India and beyond, organised marketing choices are limited due to a lack of systematic packaging and shelf life studies (Khojare *et al.*, 2018). The Indian

Comment [SR1]: Please add statements which cover the background and the importance of this study which could show its novelty.

fermented dairy products uses 7 per cent of total milk produced in all over India and in that mainly include three sweetened products i.e. dahi, shrikhand and lassi Fermented foods have long been recognized for their nutritional and therapeutic properties, and they play an important role in the creation of the vitamin B complex in the human body. These products also protect stomachic problems since certain lactic organisms produce natural antibiotics (Devi *et al.*, 2018).

Betel vine leaves are the leaves of a betel vine plant that is both evergreen and perennial creeper. The fresh leaves of betel vine are popularly known as '*Paan*' in India. It belongs to the family piperaceae. About 100 varieties of betel vine plant are currently available in the world, of which about 40 originated in India and 30 in West Bengal. Fresh juice of betel leaves is also used in many Ayurvedic preparations. Betel leaves have long been studied for their diverse pharmacological actions. (Guha, 2006). It helps in curing various diseases like hypertension, diabetes, brain toxin, boils and abscesses, headache, leucorrhoea, cuts and injuries, ringworm infestation, swelling of gum, voice problems, rheumatism, wound healing, obesity, conjunctivitis, constipation and abrasion *etc.* (Aishwarya *et al.*, 2016). The betel leaves have starch, sugars, diastases and an essential oil. The leaves contain the important phenolic compound hydroxychavicol, which is reported to possess anticarcinogenic, antinitrosation and antimutagenic effects. The chief component of the leaves is a volatile oil, called betel oil and contains 2 phenols, betel phenol like chavibetol and chavicol (Dwivedi and Tripathi, 2014).

Objective

The present investigation on "Preparation of cow milk shrikhand blended with calcutta betel vine (*Piper betel*) leaves extract" was undertaken with following objectives, to find out the optimum levels of Calcutta betel vine leaves extract in the preparation of shrikhand and to evaluate the sensory quality.

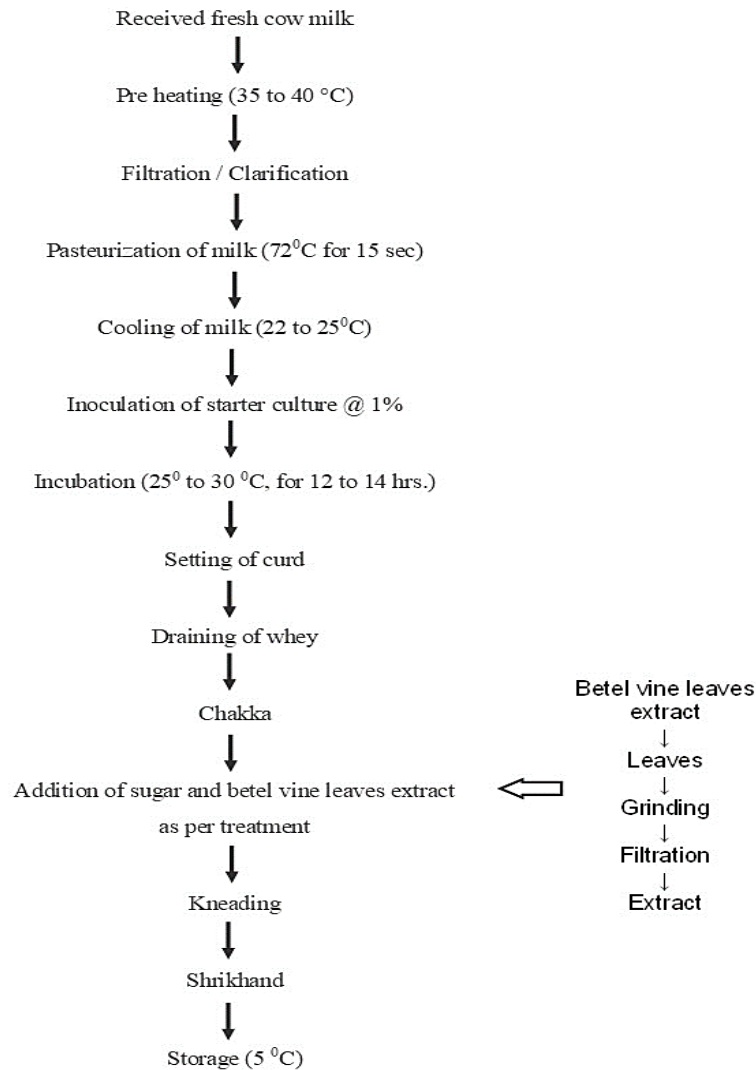
Materials and Methods

Fresh, clean, whole cow milk was used for shrikhand preparation. Cow milk was procured for every trial from Livestock Instructional Farm of Section of Animal Husbandry and Dairy Science, College of Agriculture, Nagpur. Betel vine leaves, clean crystalline cane sugar and dahi culture was procured from local market. The muslin cloth, electric mixer and

Comment [SR2]: Please add the measurement method used in this study and the ethical clearance of this study.

few glassware were also used during the experiment. The method suggested by Aneja *et al.* (1977) was used for the preparation of Shrikhand.

Flow chart for preparation of cow milk shrikhand blended with Calcutta betel vine (*Piper betel*) leaves extract



List 1 : Treatment Details

T₁	100 % Shrikhand as per standard (Control)
T₂	T1 + 2 % BLE

T₃	T1 + 4 % BLE
T₄	T1 + 6 % BLE
T₅	T1 + 8 % BLE

(BLE: - Betel vine leaves extract)

(In all treatments sugar was used @ 45% by wt. of chakka)

No. of treatment = 05

No. of Replication = 04

Statistical Design - CRD (Completely Randomized Design)

Results and Discussion

The present study and investigation was carried out in the following order. The present study shifts in consumption pattern of the Indian consumers from milk to innovative milk products brings a large scope for dairy processing in the country. It is a great challenge to innovate methodologies and technologies at the same time encouraging the value addition as well as the by-product utilization of these commodities.

Flavour

The mean flavour score of shrikhand used betel vine leaves extract for treatment T₁, T₂, T₃, T₄ and T₅ were 6.00, 6.50, 7.20, 8.50 and 5.00 respectively. The treatment T₄ was significantly superior over T₁, T₂, T₃ and T₅ treatments. Scores allotted by the judges for flavour of shrikhand samples the effect of level of betel vine leaves extract on flavour score of shrikhand was significantly different. It was clear from present finding that, 6 per cent betel vine leaves extract used for preparation of shrikhand observed acceptable flavour.

Singh *et al.* (2015) reported that process optimization for development of jamun enriched shrikhand. The process was optimizing with 12.18 per cent jamun pulp powder show the higher impact on flavour of Jamun enrich shrikhand with 8.6 score.

Body and texture score

The mean score of body and texture of shrikhand using betel vine leaves extract for treatment T₁, T₂, T₃, T₄ and T₅ were as 6.2, 6.5, 7.5, 8.5 and 5.2, respectively. The highest body and texture score was recorded for treatment T₄ (8.5) for shrikhand prepared using 6 per

Comment [SR3]: Please explain the measurement criteria for this number and add references that support it. It would be great if author used table to showed the result.

Comment [SR4]: Please used the latest references. They should be published no more than the last 5 years.

cent betel vine leaves extract while the lowest score was observed for treatment T₅ (5.2) prepared using 8 per cent betel vine leaves extract. Treatment T₄ (8.5) was found to be significantly superior over T₁, T₂, T₃ and T₅ treatments.

The above results are in agreement with the results obtained by Narayanan and Lingam (2013), who prepared shrikhand by using pulp and reported increasing trend of body and texture score of shrikhand with increased levels of banana pulp.

Comment [SR5]: The reference is outdated and it is not explain and support the method that the author used for this study.

Colour and appearance score

The mean score of colour and appearance of betel vine leaves extract blended shrikhand for treatments T₁, T₂, T₃, T₄ and T₅ were as 6.5, 7.2, 7.7, 8.5 and 5.5, respectively. The treatment T₄ was significantly superior over T₁, T₂, T₃ and T₅ treatments. It was revealed from present finding that, 6 per cent betel vine leaves extract blended shrikhand evolve rich colour and appearance whereas, the lowest recorded in shrikhand prepared with 8 per cent betel vine leaves extract. T₅ indicates that as the level of betel vine leaves extract increases the sensory quality in respect of colour and appearance decreases.

Comment [SR6]: Please explain the measurement criteria for this number and add references that support it. It would be great if author used table to showed the result.

Jerish *et al.* (2020) found contradictory results in case of colour score for shrikhand enriched by using curry leaves extract. They reported that there is a highly significant difference in different treatments for colour and appearance of shrikhand. The colour and appearance score increased from 7.50 to 7.95 as the level of curry leaves percentage (1 to 3 per cent) increased.

Comment [SR7]: The discussion is not suit to explain and support this study as this study used the beetle leaves instead curry leaves.

Overall acceptability score

The overall acceptability score between the treatments was statistically significant. It showed that, the mean score of overall acceptability of shrikhand blended with betel vine leaves extract for treatments T₁, T₂, T₃, T₄ and T₅ was, 6.2, 7.2, 7.7, 8.5 and 5.2, respectively. The treatment T₄ was significantly superior over T₁, T₂, T₃ and T₅ treatments. It was clear that 6 per cent betel vine leaves extract blended with shrikhand recorded highest score for overall acceptability where as shrikhand prepared with 8 per cent betel vine leaves extract showed lowest score.

Comment [SR8]: Please provide more thoroughly explanation for the discussion in this section.

Conclusions

According to results of present investigation it is concluded that, the blending of 6% calcutta betel vine leaves extract was optimum and standardised for the preparation of acceptable quality shrikhand. The sensory quality and overall acceptability of shrikhand blended with betel vine leaves extract in respect of flavour, body and texture, colour and appearance of T₄ has highest score and better suitable for large scale production.

References

- Aishwarya, J., E. S. Chauhan, A. Singh and A. Tiwari, 2016. A Review: Nutraceutical properties of piper betel (paan). *American journal of phytomedicine and clinical therapeutics*. 4(2): 028-041.
- Aneja, R. P., M. N. Vyas, Karan Nanda and V. K. Thareja, 1977. Development of an industrial process for manufacture of shrikhand. *J. Food. Sci. Technol.* 14(4): 159.
- Chauhan, S., P. Powar and R. Mehra, 2021. A review on nutritional advantages and nutraceutical properties of cow and goat milk *Inter. J. of Applied Research* 7(10): 101-105.
- Devi, R., N. Khanna, A. A. Vaquil and S. S. Ahlawat, 2018. Utilization of soy milk in strawberry pulp based Shrikhand for development of a novel fermented milk product. *The Pharma Innovation J.*; 7(4): 91-93.
- Dwivedi, V. and Tripathi, S. 2014. Review study on potential activity of Piper betle, *J. of Pharmacognosy and Phytochemistry*; 3(4): 93-98.
- Guha, P. 2006. Betel Leaf: The Neglected Green Gold of India, *J. of Human Ecology*. 19(2): 87-93.
- Harper, N. and H. Richard, 2008. Survival and growth of food borne microorganisms in processed and individually wrapped cheese slices. *J. of Environmental Health*. 70: 10-14.
- Jerish, A. J., K. S. Gnanalakshmi, K. V. Rani and Manikkavasagan, 2020. Iron fortification of shrikhand using *Murrayakoenigii* leaves extract. *Indian J. Dairy Sci.* 73(1): 46-50.
- Khojare, A. S. 2018. Moisture sorption characteristics of Shrikhand at 20°C and 30°C. *Indian J. Dairy Sci.*; 71(4): 381-388.
- Narayanan, R. and Jyothi Lingam, 2013. Sensory analysis of banana blended shrikhand. *African J. of Agri. Research*. 8(44): 5518-5521.
- Singh, C. H. and V. K. Paswan, 2015. Process Optimization for Development of Jamun (*Syzygium Cumini* L.) Enriched Shrikhand *Int. Journal. Curr. Microbiol. App. Sci.* 4(12).

Comment [SR9]: Author need to add more references to support the research results and the references should not dated more than 5 years ago.