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 qualityalong with its cost structure and physio-chemical properties. As per current market scenario, the limited variety of shrikhand is available in the stores but this study might help in addition to available varieties in the market. The present study was carried out with five treatments including control T_1 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 T_2, T_3, T_4 and T_5, respectively. The results showed that, the mean score of flavour of shrikhand in treatment T_4 was highest (8.5) and lowest was recorded in T_5 (5.0). The mean score for body and texture of shrikhand was highest in T_4 (8.5) and lowest in T_5 (5.2). In terms of colour and appearances, the highest score was recorded in T_4 (8.5) and lowest in T_5 (5.5). The highest overall acceptability score was recorded in T_4 (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 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

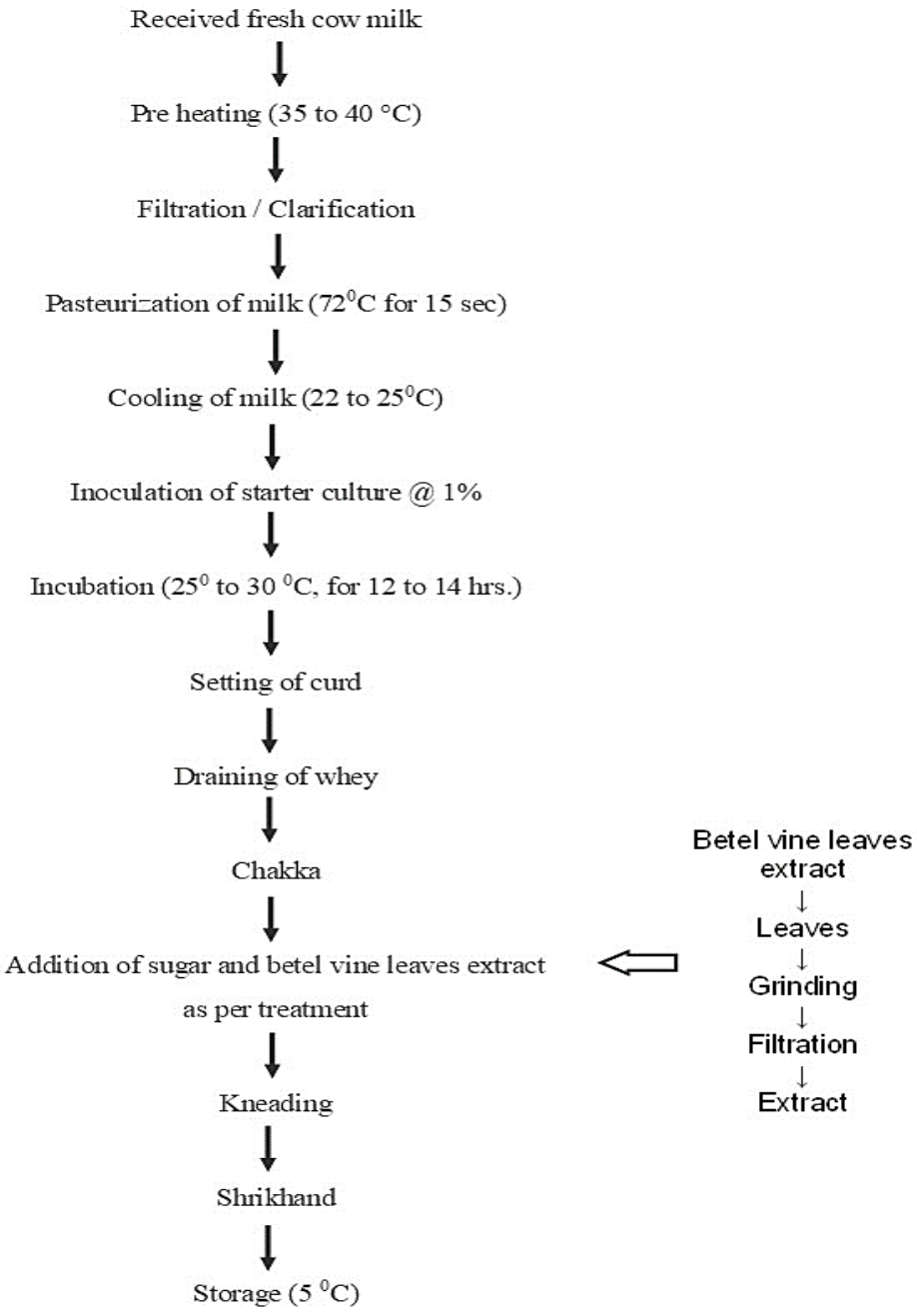
The present investigation on "Preparation of cow milk shrikhand blended with calcutta betel vine (*Piper betel)* leavesextract" was undertaken with following objectives, to find out the optimum levels of Calcutta betel vine leaves extract in the preparation of shrikhand and to evaluate the sensory quality.

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 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

T_1	**100 % Shrikhand as per standard (Control)**
T_2	**T1 + 2 % BLE**
T_3	**T1 + 4 % BLE**
T_4	**T1 + 6 % BLE**
T_5	**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 T_1, T_2, T_3, T_4 and T_5 were 6.00, 6.50, 7.20, 8.50 and 5.00 respectively. The treatment T_4 was significantly superior over T_1, T_2, T_3 and T_5 treatments. Scores allotted by the judges for flavour of shrikhandsamples the effect of level of betel vine leaves extract on flavour score of shrikhandwas 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 T_1, T_2, T_3, T_4 and T_5 were as 6.2, 6.5, 7.5, 8.5 and 5.2, respectively. The highest body and texture score was recorded for treatment T_4 (8.5) for shrikhand prepared using 6 per cent betel vine leaves extract while the lowest score was observed for treatment T_5 (5.2) prepared using 8 per cent betel vine leaves extract. Treatment T_4 (8.5) was found to be significantly superior over T_1, T_2, T_3 and T_5 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.

Colour and appearance score

The mean score of colour and appearance of betel vine leaves extract blended shrikhand for treatments T_1, T_2, T_3, T_4 and T_5 were as 6.5, 7.2, 7.7, 8.5 and 5.5, respectively. The treatment T_4 was significantly superior over T_1, T_2, T_3 and T_5 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. T_5 indicates that as the level of betel vine leaves extract increases the sensory quality in respect of colour and appearance decreases.Jerish *et al.* (2020) found contradictory results in case of colour score for shrikhand enriched by using the extracts. 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.

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 T_1, T_2, T_3, T_4 and T_5 was, 6.2, 7.2, 7.7, 8.5 and 5.2, respectively. The treatment T_4 was significantly superior over T_1, T_2, T_3 and T_5 treatments. It was clear that 6 per cent betel vine leaves extract blended with shrikhand recorded highest score for overall acceptability whereasshrikhand prepared with 8 per cent betel vine leaves extract showed lowest score.

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 T_4 has highest score and better suitable for large scale production.

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