



P-ISSN: 2349-8528
 E-ISSN: 2321-4902
 IJCS 2019; 7(5): 2462-2466
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 Received: 27-07-2019
 Accepted: 28-08-2019

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International Journal of Chemical Studies

Consequence of pineapple (*ananas cosmous*) pulp on physico-chemical and sensory properties of *shrikhand*

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Abstract

Effect of addition of different levels of pineapple pulp on chemical composition of pineapple pulp added *shrikhand*. The three levels of pineapple pulp viz. 5(T₁), 10(T₂) and 15(T₃) on weight basis of *shrikhand* were *shrikhand* prepared as 40% sugar as per the weight of *chakka* and compare T₁, T₂ and T₃ along with T₀ (as a control). With increase in the level of pineapple pulp acidity, moisture and fiber goes on increase and pH, fat, protein, total solid and ash goes on decrease. The range of acidity for pineapple pulp added *shrikhand* was 1.03, 1.18, 1.28 to 1.43 for treatments T₀ to T₃, respectively and the pH range for pineapple pulp added *shrikhand* was 4.08 to 4.68 per cent, respectively. The fat content of pineapple pulp added *shrikhand* was 9.13, 7.50, 7.48 to 6.25 and the of protein content for pineapple pulp added *shrikhand* was 7.70, 7.29, 6.91 and 6.52 for treatment T₀, T₁, T₂ and T₃. The moisture content of pineapple pulp added *shrikhand* was 39.43, 41.44, 44.08 and 47.32 per cent and total solids content of pineapple pulp added *shrikhand* was found to be 60.55, 58.56, 55.92 and 52.48 per cent for treatment T₀, T₁, T₂ and T₃. The mean ash content in the pineapple pulp added *shrikhand* was found to be 0.82 to 0.52 per cent. The range of fiber content in pineapple pulp added *shrikhand* was found to be 0.00 to 0.07.

Keywords: Pineapple pulp *shrikhand*, physico-chemical analysis, sensory property

Introduction

Shrikhand is one of the fermented indigenous milk product obtained by fermented action of lactic acid bacteria. The name *shrikhand* is derived from the Sanskrit word 'Shrikharani' meaning a curd prepared with added sugar, flavouring agent like saffron fruits and nuts Srinivas *et al.* *Shrikhand* commonly prepared from *chakka*, is base material for making *shrikhand*. Besides fresh milk, other products like diluted condensed milk, reconstituted skim milk, buttermilk, skim milk and condensed milk has been used for preparation of *shrikhand*. However, quality of *shrikhand* obtained from these products is inferior. Fermented milk product like *shrikhand* has some advantages over fluid milk because of more keeping quality, digestibility and palatability, with its distinct taste, richness, delicacy, diversity, fairly longer shelf-life Abhimanyu *et al.* Pineapple (*Ananas cosmosus*) is the third most important fruit crop in the tropical and subtropical region of world preceded by Banana and Citrus. It is one of the most important commercial fruit crop in the world and known as the Queen of fruits due to it's excellent flavour and taste. Pineapple belongs to the *bromeliaceous* family and grows on the ground. It can be grow upto 1 M height and 1.5 M wide.

Pineapple mainly contains water, carbohydrates, sugar, vitamins –A, vit-C, and Beta- carotene. It contain low amount of protein, fat, ash, and fiber. Pineapple contains antioxidants namely flavonoids, vit-A and C. These antioxidants reduce the oxidative damage such as that caused by free radicals and chelating metals. It also has enzymes complex protease (Bromelain). Bromelain contains peroxidase and acid phosphate, several protease inhibitors and organically bound calcium Tochi *et al.*

Materials and Methods

Materials

Following material were collected to meet the objectives of the present study.

1. Collection of buffalo milk

Already standardized fresh buffalo milk was procured from local market of Latur city, of Natural Milk Pvt., Ltd., Latur having 6.0 per cent fat and 9 per cent SNF.

2. Collection of pineapple pulp

Fresh pineapple purchased from local market of Latur and pineapple pulp was prepared in laboratory.

3. Dahi culture

Standard *dahi* culture (NCDC-167) was available in laboratory which was procured from National Dairy Research Institute, Karnal.

Preparation of Pineapple Pulp:

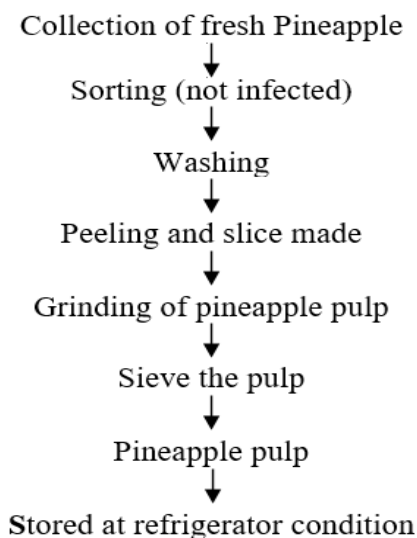


Fig 1: Preparation of Pineapple Pulp. Preparation of Pineapple Pulp added *Shrikhand*:

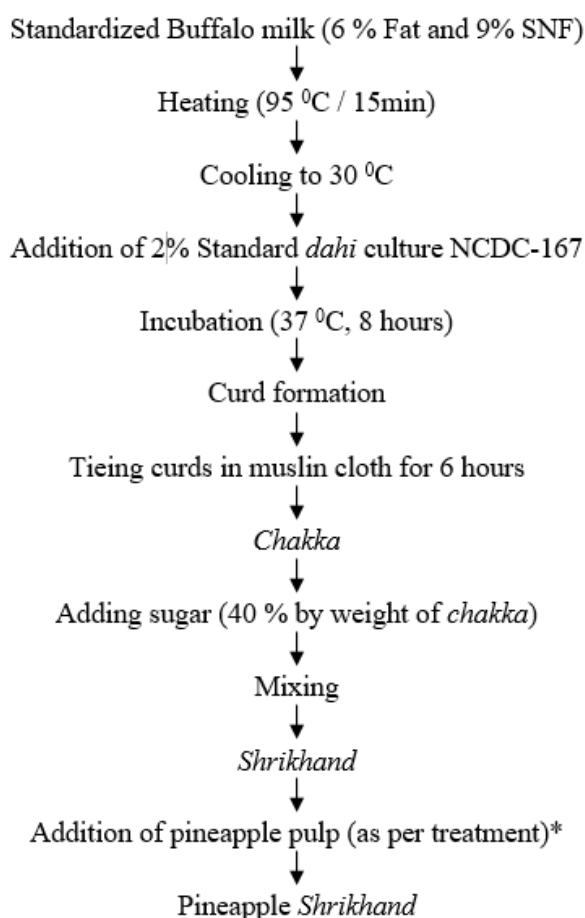


Fig 2: Preparation of Pineapple Pulp added *Shrikhand*. (De Sukumar 2011) [3]

Treatment Combinations

For preparation of *shrikhand* by using pineapple fruit (*Ananas cosmosus*) pulp, the treatments combinations were finalized on weight basis as per follows:

T₀ - 100 Parts of *shrikhand* as a control

T₁ - 95.0 Parts of *shrikhand* + 5.0 Parts of pineapple pulp

T₂ - 90.0 Parts of *shrikhand* + 10.0 Parts of pineapple pulp

T₃ - 85.0 Parts of *shrikhand* + 15.0 Parts of pineapple pulp

The different levels was tried and compared with control (T₀). For all treatments 40 per cent ground sugar was used.

Results and Discussion

The present study was based to evolve "Preparation of *Shrikhand* by using Pineapple pulp". The data collected on different aspects were tabulated & analyzed statistically using the method of analysis of variance and critical difference. The significant & non significant differences observed have been analyzed critically within & between the treatment combinations. The physico-chemical Analysis was determined during three different conditions.

Effect of Pineapple Pulp on Composition of *Shrikhand*

Table 1: Effect of Pineapple Pulp on Composition of *shrikhand*

Treatment	Acidity	pH	Fat	Protein	Moisture	Total solid	Ash	Fiber
T ₀	1.03	4.68	9.13	7.70	39.43	60.55	0.82	0.00
T ₁	1.18	4.43	7.50	7.29	41.44	58.56	0.75	0.02
T ₂	1.28	4.23	7.48	6.91	44.08	55.92	0.62	0.05
T ₃	1.43	4.08	6.25	6.52	47.32	52.48	0.52	0.07
S.E.	0.052	0.070	0.146	0.063	0.208	0.210	0.012	0.004
C.D.at 5%	0.160	0.218	0.450	0.195	0.643	0.647	0.038	0.014

Acidity: The average acidity per cent of finished product found to be 1.03, 1.18, 1.28 and 1.43 per cent for treatment T₀, T₁, T₂ and T₃, respectively. The acidity content of finished product was increased as increased in concentration of pineapple pulp. It may be due to higher acidity content of pineapple pulp. Siddhu *et al.*, prepared *kulfi* blended with pineapple pomace. They observed acidity content of *kulfi* goes on increased with addition of pineapple pomace. Sonawane *et al.*, prepared strawberry pulp added *shrikhand*. In that they observed that significant increased in acidity content as the level of strawberry pulp increased, in strawberry pulp added *shrikhand*.

pH: The pH content in the develop product as found to be 4.68, 4.43, 4.23 and 4.08 per cent for treatment T₀, T₁, T₂ and T₃, respectively. The treatment T₀ and T₃ was significantly different from each other at 5% level of significance. Bhavsagar *et al.*, manufacture of pineapple flavoured beverage from channa whey and observed the addition of increased level of pineapple increased the acidity of beverage and decreased the pH content of beverage. Chaudhari *et al.*, prepared *shrikhand* by using banana pulp. In the standard *shrikhand* pH was 6 but in banana pulp added *shrikhand* pH goes on decreased was about 4.

Fat: The fat content ranged between 6.25 to 9.13 per cent. The highest value of fat content was recorded for treatment T₀ (9.13 per cent) and lowest value was for treatment T₃ (6.25 per cent) and found that the pineapple was reduced the fat content of *shrikhand*. It may be due to low fat content in pineapple pulp. Sawant *et al.*, evaluated physico-chemical qualities of yoghurt drink fortified with pineapple pulp. The

addition of pineapple pulp resulted in no significance result between control and pineapple yoghurt drink samples for fat per cent. While fat percentage was decreased with increased in level of pineapple pulp. Thakur *et al.*, prepared of *shrikhand* by using mango pulp and observed that increasing the level of mango pulp in *shrikhand* decreased the fat content of *shrikhand*.

Protein: The average protein content of the *shrikhand* samples was found to be 7.70, 7.29, 6.91 and 6.52 per cent for treatment T₀, T₁, T₂ and T₃, respectively. The highest protein content was recorded for control treatment T₀ (7.70) per cent and the lowest protein content was recorded for treatment T₃ (6.52) per cent. There was significantly difference between the protein content of all treatment. Revathi and Singh, chemical analysis of whey based pineapple. They observed that the protein content in whey based pineapple beverage decreased with increased of fruit pulp level. Kolape *et al.*, evaluate chemical quality of papaya *shrikhand*. They observed that control treatment had significantly highest protein content while *shrikhand* prepared with papaya pulp had lowest protein content.

Moisture: It was observed that the average moisture content of finished product were to be found as 39.43, 41.44, 44.08 and 47.32 per cent in treatments T₀, T₁, T₂ and T₃, respectively. It was also observed that the lowest moisture content was in T₀ (39.43) and the highest was found in T₃ (47.32). All treatments significantly difference from each other. This might be due to due to higher water holding capacity of interactive mixture of pineapple and milk solids. Kamble *et al.*, they prepared *burfi* blended with pineapple pulp and observed that moisture content of *burfi* increased in different level of pineapple pulp. This might be due to pineapple pulp content more moisture (84.00%). Sharma *et al.*, prepared *shikhand* with incorporation of sapota pulp and cocoa powder. Addition of different level of sapota pulp and cocoa powder increased the moisture content of *shrikhand*.

Total solid: It was observed that the average total solid content of treatment T₀, T₁, T₂ and T₃ were 60.55, 58.56, 55.92 and 52.48, per cent respectively. The values of total solid content in all the treatment significantly differed from each other. It was also observed that the total solid content was in decreasing order from treatment T₀ to T₃. Kamble *et al.*, prepared pineapple pulp blended *burfi*. The total solid content in *burfi* was affected by addition of different levels of pineapple pulp. Highest level of total solid was noticed in control *burfi* i.e. 83.53 per cent and lowest level of total solid at 25% level of pineapple pulp was observed i.e. 80.73 per cent.

Ash: The average ash content of finished product was 0.82, 0.75, 0.62, and 0.52 percent in treatment T₀, T₁, T₂ and T₃, respectively. It was also observed that the lowest ash content was in T₃ and highest was found in T₀. All the treatments were significantly different from each other and decreased the ash content as the pineapple was increased. Hossain *et al.*, studied nutritional value and medicinal benefits of pineapple. In that they observed that the pineapple pulp had very low ash content. Sameem *et al.*, observed that ash of *shrikhand* changes due to addition of dragon fruit pulp while *shrikhand* preparation. The ash content of *shrikhand* treatment T₀, T₁, T₂ and T₃ was 1.70, 1.66, 1.63 and 1.59, respectively.

Fiber: The pineapple contains about 0.4-0.5% fiber. it is revealed that fiber content in the develop product as found to be 0.00, 0.02, 0.05 and 0.07 per cent for treatment T₀, T₁, T₂ and T₃, respectively. The all treatment was significantly different from each other at 5% level of significance. The fiber content range was about 0.00 to 0.07 for pineapple pulp added *shrikhand*. Suvera *et al.*, developed fiber fortified *shrikhand*. In that they incorporate banana powder, oat powder and inulin powder. They observed that fiber content of *shrikhand* goes on increased with increase in level of the powder.

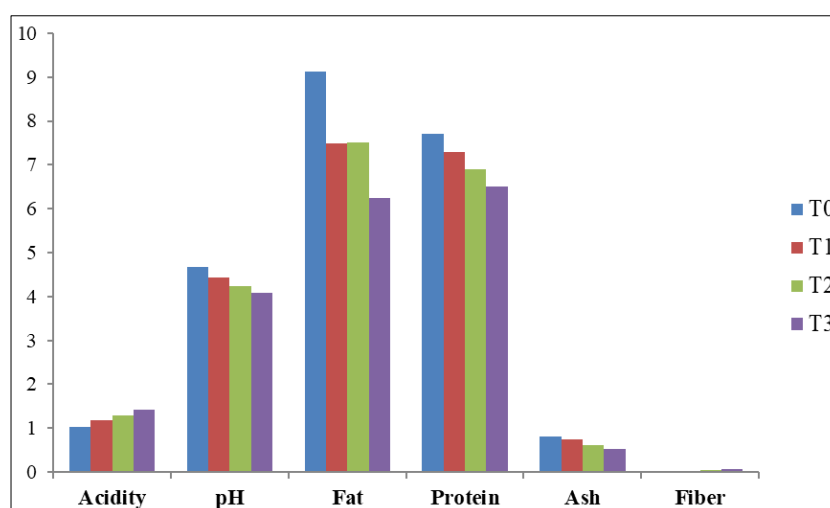


Fig 1: Physico-chemical Properties of Pineapple Pulp added *Shrikhand*

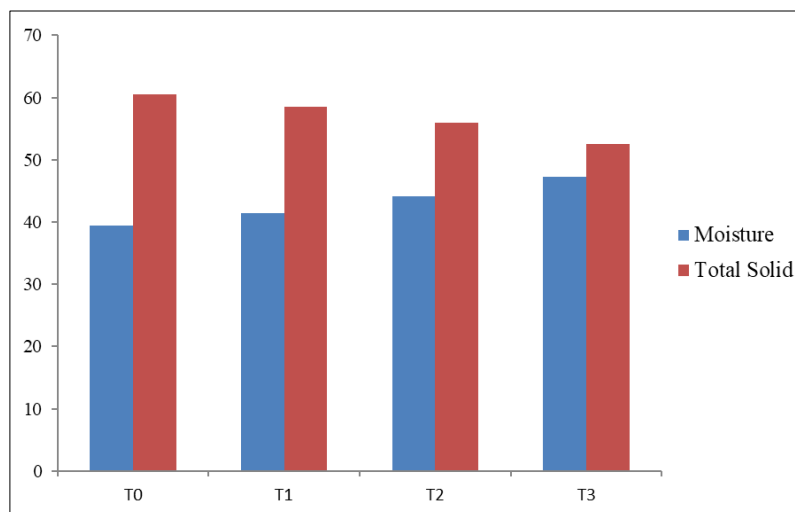


Fig 2: Moisture and Total solid Properties of Pineapple Pulp added *Shrikhand*

Outcome of pineapple pulp on sensory property of *shrikhand*

Sensory evaluation has been defined as a scientific method used to evoke, measure, analyze and interpret those responses to products as perceived through the senses of sight, smell, touch, taste, and hearing. The *shrikhand* samples prepared from buffalo milk *chakka* with mixture of pineapple pulp with different levels were subjected for the sensory attributes such as colour and appearance, flavour, consistency, taste and overall acceptability by a semi panel of judges using a 9 point Hedonic scale and the data so obtained were analyzed by using completely randomized block design (CRBD).

Table 2: Effect of Pineapple Pulp on Sensory property of *shrikhand*

Treatment	Colour and appearance	Flavour	Taste	Consistency	Overall acceptability
T ₀	7.88	7.88	8.00	8.25	8.00
T ₁	8.00	8.13	8.25	8.00	8.09
T ₂	8.83	8.13	8.38	7.88	8.30
T ₃	8.00	8.50	8.38	7.70	8.16
S.E.	0.221	0.108	0.114	0.152	0.091
C.D.at 5%	0.682	0.333	0.351	0.470	0.286

Colour and appearance score: The average scores for colour and appearance attributes ranges between 7.88 to 8.83. That means of all treatment were acceptable and secured score for the point of like very much but T₂ have much like on 9 point hedonic scale for colour and appearance. The score of colour attribute for the treatments T₀, T₁, T₂ and T₃ were 7.88, 8.00, 8.83 and 8.00, respectively. The colour and appearance score was found lowest for control treatment T₀ (7.88) as compared to developed treatments and highest in T₂ (8.83) indicate that the use of pineapple for *shrikhand* preparation have positive impact. The score in T₃ treatment reduced subsequently might be due to the excessive yellow colour of *shrikhand*. The treatment T₀, T₁ and T₃ were at par with each other and significantly differed from T₂. Shambharkar *et al.* (2011), prepared sapota pulp added *shrikhand*. In that they observed that the colours of *shrikhand* indicate highest mean score out of 10 observed for T₃ prepared with 10 per cent sapota pulp.

Flavour score: The mean score of flavour for treatments T₀, T₁, T₂ and T₃ were 7.88, 8.13, 8.13 and 8.50, respectively. The lowest flavour score was recorded for treatment T₀ (7.88) and highest score was recorded for treatment T₃ (8.50) indicated the increasing tendency for flavour due to the pineapple. As

the proportion of pineapple pulp increased the flavour score was also increased. The treatments T₀, T₁ and T₂ were significantly at par to each other. Whereas treatment T₀ and T₃ was significantly differs from each other. Kamble *et al.* (2010), prepared the pineapple pulp added *burfi*. They observed that concentration of pineapple pulp increased the flavour score of prepared *burfi*. It was revealed that the 15 per cent level of pineapple pulp addition gives a highest score for flavour. i.e. (42.16).

Taste score: The taste of developed *shrikhand* was superior over control in all treatments. The mean score of taste for the treatments T₀, T₁, T₂ and T₃ was 8.00, 8.25, 8.38 and 8.38, respectively. The treatment T₀ was significantly differs from treatment T₂ and T₃. Treatment T₀ was significantly at par with treatment T₁. The treatment T₂ and T₃ was at par with each other. The treatment T₁ was also at par with T₂ and T₃. The highest score for taste for treatment T₂ and lowest score for taste for treatment T₀ was observed. Bhavsagar *et al.* (2010) [1], manufacture of pineapple flavoured channa whey. In that taste firstly goes on increased up to the T₂ treatment and then decreased. The highest score for taste at 10 per cent level of pineapple pulp added in channa whey.

Consistency score: It was observed that the score for consistency for all treatments T₀, T₂, T₃ and T₄ was 8.25, 8.00, 7.88 and 7.70, respectively. The highest score for consistency was recorded for treatment T₀ (8.25) whereas lowest score was recorded for treatment T₃ (7.70). When we looked regarding consistency, it was clearly indicate that as the proportion of pineapple pulp increased the score was decreased, less consistency was observed in treatment T₃ which disturbed the consistency of *shrikhand* prepared by using 15 per cent of pineapple pulp. For consistency treatment T₀ and T₃ was significantly different from each other. Treatment T₀, T₁ and T₂ were at par with each other whereas developed treatments T₁, T₂ and T₃ treatment also at par with each other. Similar result was recorded by Thakur *et al.* (2014), prepared *shrikhand* by using mango pulp. The score for consistency was recorded for T₁, T₂, T₃ and T₄ were 7.44, 7.40, 7.64 and 7.32, respectively. The score for consistency goes on decreased with increasing level of the mango pulp.

Overall acceptability score: The mean score for overall acceptability of pineapple pulp added *shrikhand* for treatments T₀, T₁, T₂ and T₃ were 8.00, 8.09, 8.30 and 8.16,

respectively. The lowest score of overall acceptability was recorded for treatment T₀ (8.00) and highest score for overall acceptability was recorded for treatment T₂ (8.30). It was observed that the overall acceptability score were found to be increased up to T₂ treatment and then after decreased. The overall score for *shrikhand* was found decreased after T₂ treatment as the proportion of pineapple increased it is due to the decreasing score of consistency otherwise all sensory

properties were positively affected by pineapple. Only treatment T₂ was found significantly superior over control and non-significantly differ with pineapple added treatments. The similar result for overall acceptability was obtained by Bhavsagar *et al.* (2010) [1], who prepared channa whey beverage by addition of pineapple pulp. They observed that the overall acceptability was increased for 10 per cent level of pineapple pulp addition i.e. 7.9 per cent.

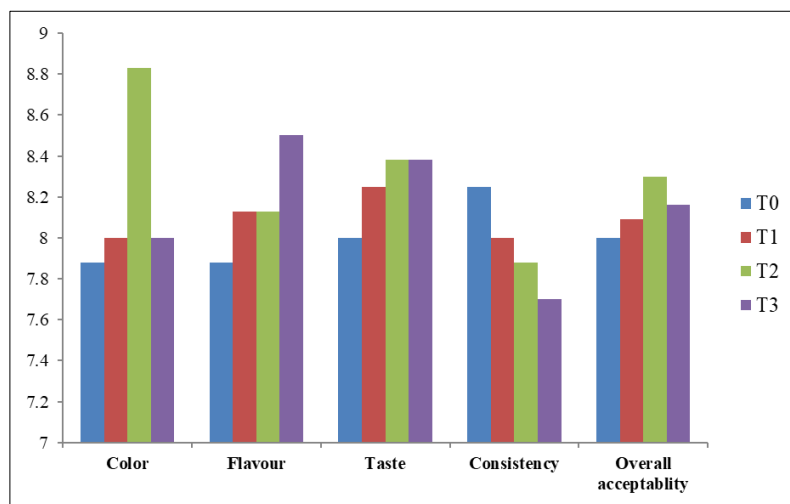


Fig 3: Sensory Evaluation of Pineapple Pulp added *Shrikhand*

Conclusion

It was observed that as the level of pineapple pulp increased, there was increased acidity, moisture, fiber content and decreased in ash, fat, total solid, protein and pH content of pineapple pulp added *shrikhand*.

It was observed that the score for colour and overall acceptability goes on increased at limited extent. The score for flavour and taste increased and score for consistency goes on decreased with addition of pineapple pulp.

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