

Effect of Fruits Pulp on Chemical Qualities of Shrikhand

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Received: 2.09.2017 | Revised: 8.10.2017 | Accepted: 14.10.2017

ABSTRACT

This study was conducted to evaluate the effect of fruit pulp on chemical qualities shrikhand. There are neither any guideline available about neither the desired composition nor any regulatory checks on the composition of the product and therefore, it is felt that fruit pulp added shrikhand should receive due attention in respect of its technology and composition. There were three types of fruit Mango, Banana and Papaya with four different levels of fruit pulp as 0%, 20%, 40% and 60%. These combinations were stored at five various storage periods viz. 0 days, 7 days, 14 days, 21 days and 28 days at 5 °C temperatures. This process was replicated three times. Shrikhand was analysed for the following compounds- Moisture, Fat, Protein, lactose, sucrose, ash and total solids. Longer storage period was affected the chemical composition of shrikhand due to bacterial decomposition and evaporation of moisture so optimum level of banana fruit pulp was to be fit for human consumption up to 21days of storage at 5° C.

Key words: Shrikhand, Fruit pulp, Storage periods, Chemical quality.

INTRODUCTION

India ranks first in milk production, accounting for 18.5 % of world production, achieving an annual output of 146.3 million tonnes during 2014-15 as compared to 137.69 million tonnes during 2013-14 recording a growth of 6.26 %. Whereas, the Food and Agriculture Organization has reported a 3.1 % increase in world milk production from 765 million tonnes in 2013 to 789 million tonnes in 2014. Milk and milk products like curd, buttermilk lassi and Shrikhand is a traditional indigenous fermented semi soft, sweetened whole milk product prepared using Chakka (strained dahi)¹. Shrikhand is a semi soft,

sweetish sour, whole milk product prepared from lactic fermented curd. The curd (dahi) is partially strained through a cloth to remove the whey and thus produce a solid mass called chakka (the basic ingredient for Shrikhand). This chakka is mixed with the required amount of sugar, etc., to yield Shrikhand. *Shrikhand* is a delicious and delightful dessert of western India. It is made with *chakka* (strained dahi/curd) which is finely mixed with sugar and flavouring agents. It has the nutritive goodness of fermented milk products. Like *dahi*, it is very refreshing particularly during summer months.

Cite this article: Gupta, M., Yadav, M.P.S. and Chauhan, A.S., Effect of Fruits Pulp on Chemical Qualities of Shrikhand, *Int. J. Pure App. Biosci.* 6(2): 364-369 (2018). doi: <http://dx.doi.org/10.18782/2320-7051.5588>

The basic product of *shrikhand* is dahi (curd) which is the most popular fermented milk product of Indo-Pakistan². For some individuals, it has a definite therapeutic value, especially who suffer from some stomach and intestinal disorders^{3,7}. Similar view has also been reported during preparation of yoghurt as basic product⁴. Globally, yoghurt is one of the most popular fermented milk products and has gained widespread consumer acceptance as a healthy food due to its therapeutic properties beside its high nutritive value^{4,5,6}.

Fresh mango is a good source of potassium and sodium. Potassium is an important component of cell and body fluids that helps controlling heart beat rate and blood pressure. Fresh bananas provide adequate levels of minerals like copper, magnesium, and manganese. Magnesium is essential for bone strengthening and has a cardiac-protective role as well. Manganese is used by the body as a co-factor for the antioxidant enzyme, *superoxide dismutase*. Copper is required in the production of red blood cells. Papayas contain enzymes like arginine and carpain. Papaya is very good for those who frequently suffer from cold, cough or flu because intake of papaya boosts the immune system. The high concentration of Vitamin C and Vitamin A contained in papaya is very beneficial to strengthen the immune system. Papaya is low in calories and high in nutritive value hence it is an excellent food for those on a diet

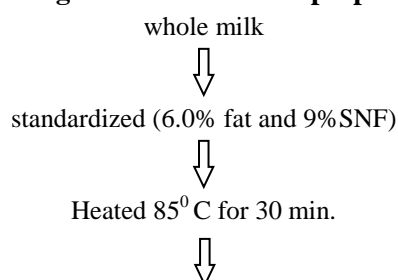
Because of the change in the economic status and food habit of consumer, the other varieties of fruit shrikhand are also in great demand. Fruits are one of the nutritious and delicious considered as an aid to digestion and used in milk shakes, beverages etc. So the

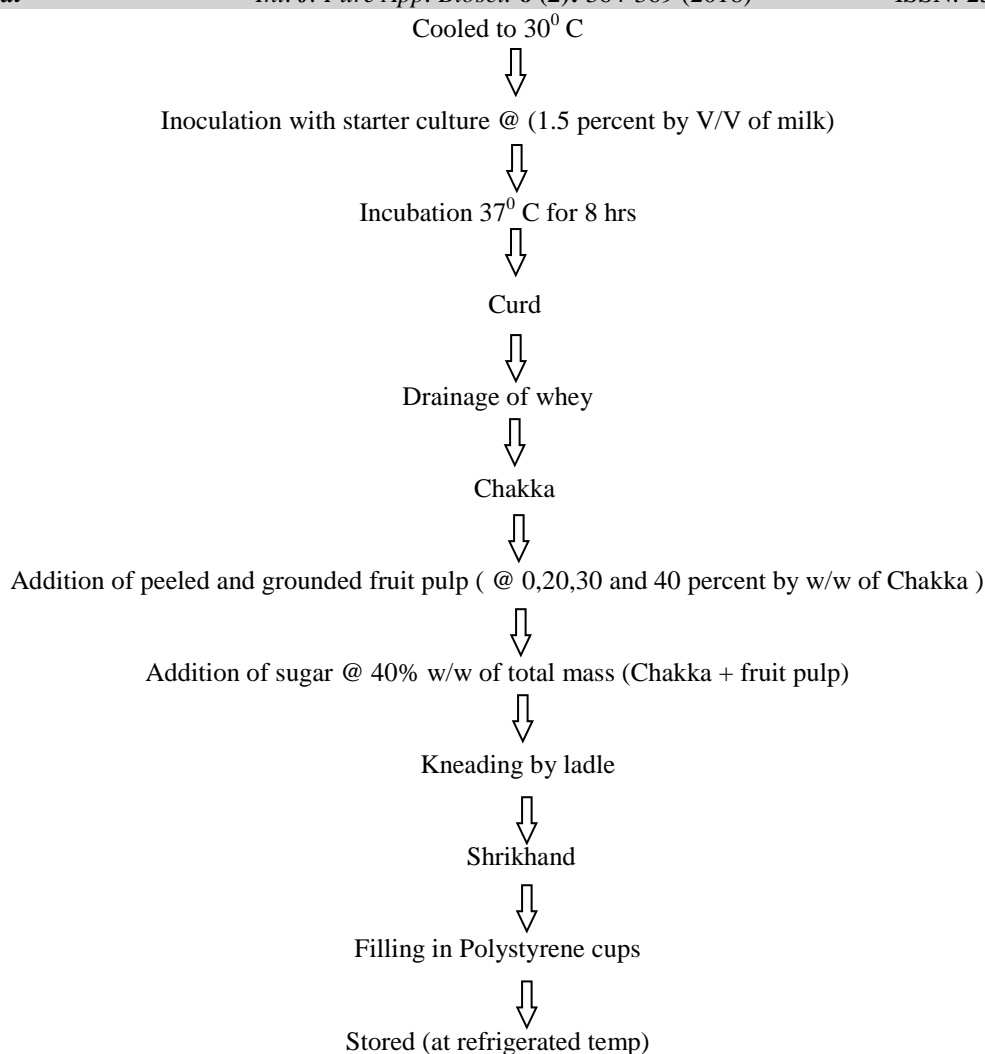
product may have longer keeping quality, in addition to enhancing flavour and also lowering cost of production. Therefore, it is expected that, there may be greater demand and consumer's appeal to the newly formulated product. But there is very low information and research work available on this product regarding technological and chemical aspects. There are neither any guideline available about neither the desired composition nor any regulatory checks on the composition of the product and therefore, it is felt that fruit pulp added shrikhand should receive due attention in respect of its technology and composition.

MATERIAL AND METHODS

Fresh buffalo milk having 6.0 percent milk fat and 9.0 percent SNF was used for this research project. Fruits of three types were used in this study which are the under. Ripe mangoes (*Mangifera indica* var. Dashahari) were obtained from local market. Ripen papaya (*Carica papaya* var. Pusa delicious) was obtained from local market. Ripen banana (*Musa Paradisica* var. Dwarf carendish) was obtained from local market. White ground cane sugar of commercial grade was used as a sweetening agent, which was obtain from open market of Kanpur city. It was ensured that the sugar was free from dust, dirt and other foreign impurities. Pure active culture of *lactococcus lactis* subsp. *lactis* obtained from Dairy Microbiology Division, National Dairy Research Institute, Karnal. Bacterial culture was propagated in sterilized skim milk to prevent strain compatibility. Polystyrene cups of 100g capacity were used for packing of shrikhand.

Flow diagram for shrikhand preparation





There were three types of fruits, Mango (A1), Banana (A2) and Papaya (A3) with four different levels of fruits pulp as 0% (B1) control level, 20% (B2), 40% (B3) and 60% (B4). These combinations were stored at five various storage periods viz. 0 day (C1), 7 days (C2), 14 days (C3), 21 days (C4) and 28 days (C5) at 5 °C temperatures. This process was replicated three times.

Shrikhand was analysed for the following compounds- Moisture, Fat, Protein, lactose, sucrose, ash and total solids. Moisture was determined by AOAC¹² method. Fat content in the sample was estimated by the procedure given in AOAC¹². The protein content was determined by Micro-Kjeldahl's process as described in AOAC¹². Lactose, Sucrose and Ash content was determined by the method described in AOAC¹². The data on chemical evaluation obtaining during the study were subjected for analysis of variance

(ANOVA) as described by Snedecor and Cochran¹³.

RESULTS AND DISCUSSIONS

Moisture percentage

It was observed that the combination of A3xB4xC1 got maximum moisture percentage (49.830) whereas, the least moisture percentage (43.910) found in A2xB1xC5 combination. Maximum moisture percent was noticed in the sample that contained 60% papaya pulp at 0 days of storage while minimum moisture containing sample was 20% mango pulp at 28days of storage against control combinations. The effect on moisture percentage by different levels of fruit pulp found to be significant ($P \leq 0.05$). Increasing percentage of total solids decreases moisture percentage, vice versa. These findings are similar with the findings of Thakur *et al.*⁸ who reported that 25% mango pulp based srikhand

contains 33.02% moisture was superior over all other treatment combinations but Kumar *et al.*⁹ reported as 55.48±0.08 % moisture in apple based srikhand.

Fat percent

The highest fat percentage obtained in the combination of A2xB1xC5 got maximum fat percentage (5.000) whereas the least fat percentage (3.080) found in A3xB4xC1 combination. Minimum moisture percent was noticed in the sample that contained 60% papaya pulp at 0 days of storage while maximum moisture containing sample was 20% mango pulp at 28days of storage against control combinations. From the results it can be revealed that a proportionate increase in fat percentage depends on added materials and days of storage. The effect on fat percentage by different levels of fruit pulp found to be significant ($P \leq 0.05$). These findings are similar with the findings of Thakur *et al.*⁸ who reported that 25% mango pulp based srikhand contains 3.99% fat was superior over all other treatment combinations but Kumar *et al.*⁹ reported as 8.24±0.09 % fat in srikhand.

Protein percent

It was observed that the combination of A1xB1xC5 and A2xB1xC5 got maximum protein percentage (5.280) whereas the least protein percentage (3.330) found in A3xB4xC1 combination. Highest protein was noticed pure milk combination because fruit pulp did not contain protein as in milk. The effect of different levels of fruit pulp on protein percentage found to be significant ($P \leq 0.05$). These findings are similar with the findings of Thakur *et al.*⁸ who reported that 25% mango pulp based srikhand contains 4.72 % protein was superior over all other treatment combinations but Kumar *et al.*⁹ reported as 3.17 ±0.09 % protein in 30% apple pulp based srikhand.

Lactose percent

It was observed that the combination of A1xB1xC1, A2xB1xC1 and A3xB1xC5 got maximum lactose percentage (4.460) whereas the least lactose percentage (2.620) was found in A1xB4xC5 combination. Lactose only found in milk not in fruits. The effect of

different levels of fruit pulp on lactose percentage found to be significant ($P \leq 0.05$).

Sucrose percent

Every combination of all samples contain only 40% added sugar which were to be evaluated as sucrose. All factors and their interactions were found to be non-significant. These findings are similar with the findings of Chavan *et al.*¹⁰ who reported that 30-40% sucrose superior over all other treatment combinations and Maurya *et al.*¹¹ reported as 40 % sugar in srikhand.

Titration acidity percentage

Present data showed that the combination of A1xB1xC5 got maximum Titration acidity percentage (0.860) whereas the least lactose percentage (0.500) found in A2xB4xC1 combination. Higher percentage of titration acidity found in milk composition rather than fruits pulp. So maximum acidity was noticed in pure milk combination and increases with days of storage due to bacterial decompositions. The effect on titration acidity percent by different types of fruit with their levels and storage periods were found to be significant ($P \leq 0.05$). These findings are similar with the findings of Thakur *et al.*⁸ who reported that 25% mango pulp based srikhand contains 0.70% T.A. was superior over all other treatment combinations.

Ash percentage

It can be depicted from the results of present investigation that the combination of A2xB2xC5 got maximum Ash percentage (0.600) whereas the least Ash percentage (0.510) found in A1xB1xC1, A2xB1xC1 and A2xB1xC2 combination. The effect on ash percentage by different levels of fruit pulp and storage periods found to be significant ($P \leq 0.05$). These findings are similar with the findings of Thakur *et al.*⁸ who reported that 25% mango pulp based srikhand contains 0.50% ash was superior over all other treatment combinations but Kumar *et al.*⁹ reported as 0.25±0.01 % ash in apple fruit pulp based srikhand.

Total solids percentage

It can be depicted from the results that the combination of A2xB1xC5 got maximum total

solids percentage (56.090) whereas the least total solids percentage (50.170) found in A3xB4xC1, A2xB1xC1 combination. Higher percentage of total solids was noticed in 0% banana pulp at 28 days of storage while minimum total solids was got in 60% papaya pulp stored for 0 days. Higher percentage of total solids depends on percentage of fat, protein, lactose, sucrose, titrable acidity and ash. As product goes older, total solids

increase due to evaporation of moisture. The effect on total solids percentage by different levels of fruit pulp found to be significant ($P \leq 0.05$). These findings are similar with the findings of Thakur *et al.*⁸ who reported that 25% mango pulp based srikhand contains 66.98% total solids was superior over all other treatment combinations but Kumar *et al.*⁹ reported as 44.52+or – 0.05 % total solids in srikhand.

Table: chemical findings of srikhand -

Combinations	Moisture	Fat	Protein	Lactose	Sucrose	Titrable acidity	Ash	Total solids
A1B1C1	44.06	4.93	5.22	4.46	40.00	0.82	0.51	55.94
A1B1C2	44.02	4.94	5.24	4.45	40.00	0.83	0.52	55.98
A1B1C3	43.99	4.95	5.26	4.43	40.00	0.84	0.53	56.01
A1B1C4	43.96	4.96	5.27	4.42	40.00	0.85	0.54	56.04
A1B1C5	43.92	4.98	5.28	4.41	40.00	0.86	0.55	56.08
A1B2C1	46.86	4.02	4.34	3.56	40.00	0.70	0.52	53.14
A1B2C2	46.82	4.04	4.35	3.55	40.00	0.71	0.53	53.18
A1B2C3	46.79	4.05	4.36	3.54	40.00	0.72	0.54	53.21
A1B2C4	46.75	4.07	4.38	3.52	40.00	0.73	0.55	53.25
A1B2C5	46.70	4.09	4.40	3.50	40.00	0.75	0.56	53.30
A1B3C1	48.21	3.57	3.90	3.12	40.00	0.65	0.55	51.79
A1B3C2	48.19	3.58	3.92	3.10	40.00	0.66	0.55	51.81
A1B3C3	48.15	3.60	3.93	3.09	40.00	0.67	0.56	51.85
A1B3C4	48.11	3.61	3.95	3.08	40.00	0.68	0.57	51.89
A1B3C5	48.10	3.62	3.97	3.06	40.00	0.68	0.57	51.90
A1B4C1	49.59	3.12	3.45	2.68	40.00	0.60	0.56	50.41
A1B4C2	49.56	3.13	3.47	2.67	40.00	0.61	0.56	50.44
A1B4C3	49.53	3.15	3.48	2.65	40.00	0.62	0.57	50.47
A1B4C4	49.50	3.16	3.49	2.64	40.00	0.63	0.58	50.50
A1B4C5	49.48	3.18	3.50	2.62	40.00	0.64	0.58	50.52
A2B1C1	44.06	4.93	5.22	4.46	40.00	0.82	0.51	55.94
A2B1C2	44.03	4.95	5.23	4.45	40.00	0.83	0.51	55.97
A2B1C3	43.99	4.97	5.25	4.43	40.00	0.84	0.52	56.01
A2B1C4	43.95	4.99	5.26	4.42	40.00	0.85	0.53	56.05
A2B1C5	43.91	5.00	5.28	4.40	40.00	0.86	0.55	56.09
A2B2C1	46.85	4.00	4.40	3.57	40.00	0.66	0.52	53.15
A2B2C2	46.81	4.02	4.41	3.56	40.00	0.67	0.53	53.19
A2B2C3	46.75	4.05	4.43	3.55	40.00	0.68	0.54	53.25
A2B2C4	46.71	4.07	4.45	3.53	40.00	0.69	0.55	53.29
A2B2C5	46.67	4.10	4.46	3.52	40.00	0.70	0.55	53.33
A2B3C1	47.83	3.54	4.40	3.12	40.00	0.55	0.56	52.17
A2B3C2	48.16	3.56	4.02	3.14	40.00	0.56	0.56	51.84
A2B3C3	48.08	3.58	4.04	3.17	40.00	0.56	0.57	51.92
A2B3C4	48.01	3.60	4.06	3.18	40.00	0.57	0.58	51.99
A2B3C5	47.93	3.62	4.08	3.20	40.00	0.58	0.59	52.07
A2B4C1	49.61	3.09	3.56	2.68	40.00	0.50	0.56	50.39
A2B4C2	49.54	3.10	3.58	2.70	40.00	0.51	0.57	50.46
A2B4C3	49.46	3.12	3.60	2.72	40.00	0.52	0.58	50.54
A2B4C4	49.38	3.14	3.62	2.74	40.00	0.53	0.59	50.62
A2B4C5	49.30	3.15	3.65	2.75	40.00	0.55	0.60	50.70
A3B1C1	44.06	4.93	5.22	4.46	40.00	0.82	0.51	55.94
A3B1C2	44.01	4.95	5.24	4.45	40.00	0.83	0.52	55.99
A3B1C3	44.00	4.96	5.25	4.43	40.00	0.84	0.52	56.00
A3B1C4	43.96	4.98	5.26	4.42	40.00	0.85	0.53	56.04
A3B1C5	43.95	4.99	5.27	4.40	40.00	0.85	0.54	56.05
A3B2C1	46.86	4.00	4.40	3.57	40.00	0.65	0.52	53.16
A3B2C2	46.80	4.02	4.41	3.56	40.00	0.68	0.53	53.20
A3B2C3	46.77	4.04	4.42	3.55	40.00	0.68	0.54	53.23
A3B2C4	46.74	4.06	4.44	3.53	40.00	0.69	0.54	53.26
A3B2C5	46.70	4.08	4.45	3.52	40.00	0.70	0.55	53.30
A3B3C1	48.44	3.54	3.80	3.12	40.00	0.55	0.55	51.56
A3B3C2	48.36	3.56	3.82	3.14	40.00	0.56	0.56	51.64
A3B3C3	48.28	3.57	3.84	3.17	40.00	0.57	0.57	51.72
A3B3C4	48.21	3.59	3.86	3.18	40.00	0.58	0.58	51.79
A3B3C5	48.13	3.60	3.88	3.20	40.00	0.60	0.59	51.87
A3B4C1	49.83	3.08	3.33	2.68	40.00	0.52	0.56	50.17
A3B4C2	49.76	3.10	3.34	2.70	40.00	0.53	0.57	50.24
A3B4C3	49.68	3.12	3.36	2.72	40.00	0.54	0.58	50.32
A3B4C4	49.62	3.13	3.38	2.74	40.00	0.54	0.59	50.38
A3B4C5	49.56	3.15	3.40	2.75	40.00	0.55	0.59	50.44

Analysis of variance:

Factorors	Moisture	Fat	Protein	Lactose	Sucrose	T. Acidity	Ash	Total solids
A	NS	NS	NS	NS	-	0.018	NS	NS
B	0.209	0.209	0.209	0.209	-	0.021	0.021	0.668
AxB	NS	NS	NS	NS	-	0.036	NS	NS
C	NS	NS	NS	NS	-	0.023	0.023	NS
AxC	NS	NS	NS	NS	-	NS	NS	NS
BxC	NS	NS	NS	NS	-	NS	NS	NS
AxBxC	NS	NS	NS	NS	-	NS	NS	NS

CONCLUSION

From the above investigation it can be easily concluded that higher percentage of chemical attributes (fat, protein, lactose, sucrose, titrable acidity ash and total solids) was noticed in 0% banana pulp at 28 days of storage while minimum chemical composition of sample was got in 60% papaya pulp stored for 0 days. Longer storage period was affected the chemical composition of shrikhand due to bacterial decomposition and evaporation of moisture so optimum level of banana fruit pulp was to be fit for human consumption up to 21days of storage at 5⁰ C.

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