

(MRBA) for mold count and fat media for lipolytic bacteria, following the standard plate count method. Samples were diluted to 103 for plating. The following media were used for enumeration of different microorganisms.

Organisms Medium

Bacteria : Nutrient agar (NA) (Anon, 1957)

Fungi : Martin's Rose Bengal Agar (MRBA) (Martin, 1950)

Lipolytic bacteria : Fat media (Collins *et al.*, 1995)

Plates were incubated at room temperature for 2, 4 and 2 days for bacteria, mold and lipolytic bacteria respectively and colony counts were recorded.

2.4 Statistical analysis of the data (Snedecor and Cochran, 1968)

The data was tabulated keeping in view the objectives of the study. Analysis of variance technique (F-test) was employed for the nutrient composition and sensory characteristics to test the significant difference between groundnut & safflower seed products in the study. One-way analysis of variance was employed for the storage study.

3. Results and Discussion

3.1 Mean sensory scores for shelf-life studies of paneer

Results pertaining to impact of storage on sensory attributes of paneer are presented in Table 21. Groundnut milk paneer (CMP3) has obtained low score on 4th and 7th day storage compared to cow milk paneer (CMP1) and safflower milk paneer (CMP2). On initial day before storage, score for overall acceptability was found to be 8.40 for CMP1, 7.70 for CMP2 and 7.50 for CMP3, but it was decrease to 4.40, 3.60 and 3.00 respectively for all the three samples. Results reveal that there was significant difference in the sensory characteristics among all three products. It indicates that as the number of days increased, the score for all sensory characteristic decreased in all the three paneer products.

3.2 Mean sensory scores for shelf-life studies of carrot halwa

Results pertaining to impact of storage on sensory attributes of carrot halwa are presented in Table 22. Incorporated safflower paste (CH2) and groundnut paste (CH3) carrot halwa control (CH1) were kept for storage study. Among all three products as the day increased the sensory score for all sensory attributes were found to be decreased. From the result, it was found that appearance, texture, colour, flavour, taste and overall acceptability scores significantly decreased among all the products. Overall acceptability had low scores on 7th day of storage *i.e.*, the scores decreased from 7.80 to 3.90, 8.20 to 3.30 and 6.40 to 2.80 in CH1, CH2 and CH3 respectively. Results reveal that there was significant difference in the sensory characteristics among all the three products at 5 per cent level.

3.3 Microbial study of milk on storage

Total bacterial, lipolytic bacteria and fungal population in milk of cow, safflower and groundnut at 1st, 4th and 7th

days of storage are presented in Table-23. It was found that, the bacterial populations in all the samples were not found to be not significantly different from each other on 1st day of storage, whereas on 4th and 7th day significant difference was found. The lipolytic bacterial population from all the samples found were not significantly different from each other on 1st and 7th day of storage, but on 4th day the lipolytic bacterial population was significantly higher in G2 sample (29.00 $\times 10^3$ cfu/g) compared to control and S2 samples (20.66 and 22.66 $\times 10^3$ cfu/g respectively). The mold population on initial day was significant in S2 and G2 samples (6.66 and 4.00 $\times 10^3$ cfu/g) compared to control.

On 4th day of storage, S2 and G2 samples showed significant lipolytic bacterial population (15.66 and 13.33 $\times 10^3$ cfu/g respectively) compared to control (6.00 $\times 10^3$ cfu/g). Similar trend was observed on 7th day, sample S2 and G2 showed higher mold population (32.66 and 31.66 $\times 10^3$ cfu/g respectively) compared to control (16.66 $\times 10^3$ cfu/g).

3.4 Microbial study of paneer on storage

Total bacterial, lipolytic bacteria and fungal population in safflower and groundnut milk incorporated paneer at 1st, 7th and 15th days of storage presented in Table-25. The bacterial population on initial, 7th and 15th day was not significantly different from all the samples. The lipolytic bacterial population on initial and 7th day storage was not significant among all the samples. Whereas on 15th day, the lipolytic bacterial population recorded higher in CMP2 and CMP3 (72.00 and 70.00 $\times 10^3$ cfu/g) than CMP1 (63.66 $\times 10^3$ cfu/g). On 1st day, the mold population was not recorded in any of the samples. Whereas on 7th and 15th day, the mold population was recorded non-significant. Sachdeva and Singh (1990) reported that fresh paneer had a total plate count of 101 to 103 cfu g⁻¹ whereas for spoiled samples counts ranged from 158 $\times 10^4$ cf/g-1 to 45 $\times 10^6$ cfu/g-1 Paneer.

3.5 Microbial study of halwa on storage

Total bacterial, lipolytic bacteria and fungal population in safflower and groundnut incorporated halwa at 1st, 4th and 7th days of storage are presented in Table-26. With respect to bacterial population, all the samples were found to be not significantly different from each other on 1st, 4th and 7th day. Whereas similar results were found in lipolytic bacterial population. Mold population was also non-significant on 7th day, but no growth was found on initial and 4th day of storage period.

4. Conclusion

Hence, it can be concluded from the study that formulated safflower seed and groundnut products were nutrient dense with good acceptability, fairly good storage stability which can be promoted for regular consumption. Such products will be particularly useful for those people who are allergic to cow or buffalo milk or people suffering from heart ailments, as it contains mono and poly unsaturated fatty acids. Keeping in view the importance of indigenous dairy products and the limitations associated with the existing

methods of manufacture, the National Commission on Agriculture recommends to take up the production of various indigenous milk products by the organized plants. The Commission has suggested rationalizing the technique of production of various indigenous milk products and exploring the possibility by improving their keeping quality and packaging with minimum expense.

References

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Table 1: Mean sensory score for shelf life studies of paneer

Product	Duration	Appearance	Texture	Colour	Flavor	Taste	Overall acceptability
CMP1	Initial	8.10	8.10	8.40	8.60	8.60	8.40
	15 days	7.70	7.50	6.60	6.70	7.00	6.60
	30 days	7.20	5.40	4.20	4.70	4.70	4.40
	F value	*	*	*	*	*	*
	SEm ±	0.23	0.34	0.26	0.23	0.17	0.22
	CD at 5%	0.67	0.99	0.75	0.67	0.51	0.64
CMP2	Initial	8.20	8.30	7.70	7.70	7.80	7.70
	15 days	7.80	7.80	6.90	5.30	5.90	6.30
	30 days	6.70	5.80	5.30	3.40	3.30	3.60
	F value	*	*	*	*	*	*
	SEm ±	0.20	0.30	0.39	0.30	0.19	0.32
	CD at 5%	0.59	0.88	1.13	0.87	0.57	0.94
CMP3	Initial	7.70	7.20	7.50	7.30	7.20	7.50
	15 days	7.40	5.20	6.20	5.50	5.60	5.50
	30 days	6.70	4.20	4.50	2.60	2.90	3.00
	F value	*	*	*	*	*	*
	SEm ±	0.21	0.27	0.27	0.31	0.33	0.27
	CD at 5%	0.62	0.80	0.80	0.91	0.98	0.80

CMP1- cow milk paneer, CMP2- safflower milk paneer and CMP3- groundnut milk paneer

Table 2: Mean sensory score for shelf life studies of carrot halwa

Product	Duration	Appearance	Texture	Colour	Flavor	Taste	Overall acceptability
CH1	Initial	7.30	7.60	7.30	7.40	7.70	7.80
	4 th day	6.50	6.40	6.00	6.50	6.50	6.70
	7 th day	3.40	2.40	4.00	4.00	3.70	3.90
	F value	*	*	*	*	*	*
	SEm ±	0.27	0.35	0.31	0.27	0.30	0.27
	CD at 5%	0.80	1.01	0.90	0.80	0.87	0.80
CH2	Initial	8.40	8.00	8.40	8.20	8.30	8.20
	4 th day	7.00	6.70	6.60	6.60	6.30	6.40
	7 th day	3.00	3.80	4.10	3.20	4.00	3.30
	F value	*	*	*	*	*	*
	SEm ±	0.28	0.24	0.20	0.22	0.24	0.25
	CD at 5%	0.83	0.69	0.60	0.65	0.71	0.75
CH3	Initial	6.80	6.70	6.60	6.40	6.10	6.40
	4 th day	5.70	5.90	4.90	5.00	4.70	5.00
	7 th day	2.80	3.10	2.60	2.50	2.90	2.80
	F value	*	*	*	*	*	*
	SEm ±	0.32	0.27	0.29	0.33	0.42	0.41
	CD at 5%	0.95	0.78	0.85	0.98	1.22	1.19

CH1- control, CH2- safflower paste and CH3- groundnut paste

Table 3: Enumeration of total bacterial, lipolytic bacteria and fungal population in safflower and groundnut milk on 1st, 4th and 7th days of storage (cfu/10³.g⁻¹)

Sample	Bacteria			Lipolytic bacteria			Mold		
	1 st day	4 th day	7 th day	1 st day	4 th day	7 th day	1 st day	4 th day	7 th day
Control	17.66	50.00 ^a	59.00 ^a	10.33 ^a	20.66 ^b	35.33 ^a	0.00 ^b	6.33 ^b	16.66 ^b
S2	20.66	57.35 ^a	69.00 ^a	14.33 ^a	22.66 ^b	45.66 ^a	6.66 ^a	15.66 ^a	32.66 ^a
G2	20.33	60.33 ^a	68.00 ^a	16.00 ^a	29.00 ^a	46.00 ^a	4.00 ^a	13.33 ^a	31.66 ^a
F value	NS	*	*	NS	*	*	*	*	*
SEm ±	1.37	3.40	3.39	2.25	1.58	3.22	1.12	2.51	3.03
CD at 5%	4.75	11.78	11.76	7.79	5.49	11.16	3.88	8.70	10.50

Control - Cow milk, S2 - safflower milk and G2 - groundnut milk

Table 4: Enumeration of total bacterial, lipolytic bacteria and fungal population in safflower and groundnut milk incorporated paneer on 1st, 7th and 15th days of storage (cfu/10³.g⁻¹)

Sample	Bacteria			Lipolytic bacteria			Mold		
	1 st day	7 th day	15 th day	1 st day	7 th day	15 th day	1 st day	7 th day	15 th day
CMP1	18.00	30.66	42.33	21.00	41.00	63.66 ^b	Nil	18.00	47.00
CMP2	18.66	32.00	47.33	23.33	46.66	72.00 ^a	Nil	23.00	46.66
CMP3	18.33	31.00	46.66	29.00	43.66	70.00 ^a	Nil	22.66	44.00
F value	NS	NS	NS	NS	NS	*	-	NS	NS
SEm ±	1.08	1.98	6.04	3.83	2.59	1.74	-	1.95	2.00
CD at 5%	3.76	6.85	20.92	13.26	8.98	6.03	-	6.75	6.95

CMP1- cow milk paneer, CMP2- safflower milk paneer and CMP3- groundnut milk paneer

Table 5: Enumeration of total bacterial, lipolytic bacteria and fungal population in safflower and groundnut incorporated halwa on 1st, 4th and 7th days of storage (cfu/10³.g⁻¹)

Sample	Bacteria			Lipolytic bacteria			Mold		
	1 st day	4 th day	7 th day	1 st day	4 th day	7 th day	1 st day	4 th day	7 th day
CH1	14.66	23.00 ^a	57.66	13.66	21.00	51.33	Nil	Nil	35.66
CH2	15.00	25.33 ^a	60.33	14.33	23.00	55.66	Nil	Nil	37.66
CH3	14.66	21.30 ^a	57.33	16.33	24.66	57.00	Nil	Nil	36.33
F value	NS	*	NS	NS	NS	NS	-	-	NS
SEm ±	1.74	1.38	1.56	1.73	1.30	2.15	-	-	1.00
CD at 5%	6.17	4.80	5.41	5.99	4.51	7.44	-	-	3.46

CH1- control, CH2- safflower paste and CH3- groundnut paste