



P-ISSN: 2349-8528

E-ISSN: 2321-4902

www.chemijournal.com

IJCS 2021; 9(1): 1561-1564

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Received: 24-10-2020

Accepted: 17-12-2020

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Sensory evaluation of probiotic tender coconut (*Cocos nucifera* L.) Lassi

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DOI: <https://doi.org/10.22271/chemi.2021.v9.i1v.11448>

Abstract

A study on process standardization of probiotic tender coconut (*Cocos nucifera* L.) lassi was carried out by using buffalo milk. The attempts have been made to study effect of different levels of probiotic strain and tender coconut on lassi. After organoleptic evaluation in case of *Lactobacillus acidophilus* strain highest score was recorded by S₁^a i.e. at 1 per cent level of inoculation (7.87) Same trend was observed in case of *Lactobacillus casei*. S₂^a i.e. 1 per cent level of inoculation scored highest (7.74) and in case of mixed strain S₃^b i.e. 1.5 per cent level score highest (7.82).

Keywords: Probiotic lassi, tender coconut, sensory evaluation

Introduction

Lassi is ready to serve fermented milk beverage. Lassi a popular product close to sweet stirred yoghurt, has been used as a refreshing beverage from time immemorial in India, especially in western, northern and central regions. Lassi a popular product close to sweet stirred yoghurt, has been used as a refreshing beverage from time immemorial in India, especially in western, northern and central regions. The lassi is generally served with some flavour blends. It can be made more delicious and nutritious with addition of fruits.

Probiotic is a relatively new word meaning 'for life', which is used to microorganisms that are associated with the beneficial effects for humans and animals. Dairy foods serve as an ideal system for delivery of probiotic bacteria to the human gastrointestinal tract due to provision of a favourable environment that promote the growth and enhances the viability of this micro-organism.

Tender coconut is valued both for its sweet water, which is refreshing drink and the delicious gelatinous kernel. Its cultivation is largely confined to the coastal region of the country. At national level, the consumption of coconut as tender coconut is less than 10 per cent of the total production of coconut (Kretchmer and Bose, 2009) [3]. Coconut production is 198.85 million nut Maharashtra.

Hence by considering the importance of probiotics from health point of view as well as nutritional properties of tender coconut, the research project entitled, "Process standardization of probiotic tender coconut lassi" was carried out and evaluated the product for its acceptability.

Material and Methods

The study, was carried out at Department of Animal Husbandry and Dairy Science, College of Agriculture, Dr. Balasaheb Sawant Konkarn Krishi Vidyapeeth, Dapoli (M.S). Fresh buffalo milk was obtained from the instructional dairy farm of the College of Agriculture, Dapoli. Ingredients like tender coconut, sugar and salt were purchased from local market. Freeze dried cultures viz., *Lactobacillus acidophilus* and *Lactobacillus casei* were procured from The National Collection of Dairy Cultures, NDRI, Karnal (Haryana). These dried strain were used to prepare stock, mother and working strain. Different dried agar media like Rogosa SL Agar, Plate count Agar, Violet Red Bile Agar, Sugar Free Agar and MRS Broth Agar were procured from Hi Media Laboratories Ltd., Mumbai.

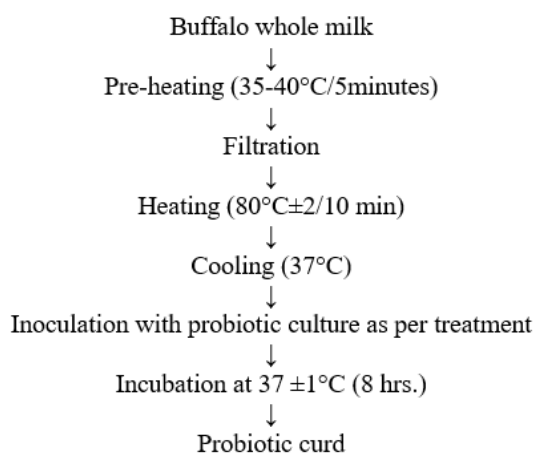
Phase I: Determination of optimum level of probiotic strain

Probiotic Strain	Level
<i>S₁-Lactobacillus nmnacidophilus</i>	a – 1.0 per cent of milk
	b – 1.5 percent of milk
	c – 2.0 per cent of milk
<i>S₂ - Lactobacillus casei</i>	a – 1.0 per cent of milk
	b – 1.5 percent of milk
	c – 2.0 per cent of milk
<i>S₃-Mix(Lactobacillus acidophilus + Lactobacillus casei in 1:1 proportion)</i>	a – 1.0 per cent of milk
	b – 1.5 percent of milk
	c – 2.0 per cent of milk

On the basis of sensory evaluation of probiotic curd prepared, the optimum level of these three probiotic strains were finalized independently.

Flow chart for preparation of probiotic curd

The probiotic curd was prepared as per the standard procedure, narrated by Kadlag (1982) [2] with slight modifications.



Phase - II

Preparation of probiotic tender coconut (*Coccus nucifera* L.) Lassi

Treatment details

In this phase, different levels of tender coconut were evaluated. Optimum level of probiotic strain was found in Phase-I was used for curd making. The treatment details were as under.

- S₁C₁:** Optimum level of *Lactobacillus acidophilus* and tender coconut @ 5 per cent of curd
- S₁C₂:** Optimum level of *Lactobacillus acidophilus* and tender coconut @ 10 per cent of curd
- S₁C₃:** Optimum level of *Lactobacillus acidophilus* and tender coconut @ 15 per cent of curd
- S₂ C₁:** Optimum level *Lactobacillus casei* and tender coconut @ 5 per cent of curd
- S₂C₂:** Optimum level *Lactobacillus casei* and tender coconut @ 10 per cent of curd

S₂ C₃: Optimum level *Lactobacillus casei* and tender coconut @ 15 per cent of curd

S₃ C₁: Optimum level mixed strain and tender coconut @ 5 per cent of curd

S₃ C₂: Optimum level mixed strain and tender coconut @ 10 per cent of curd

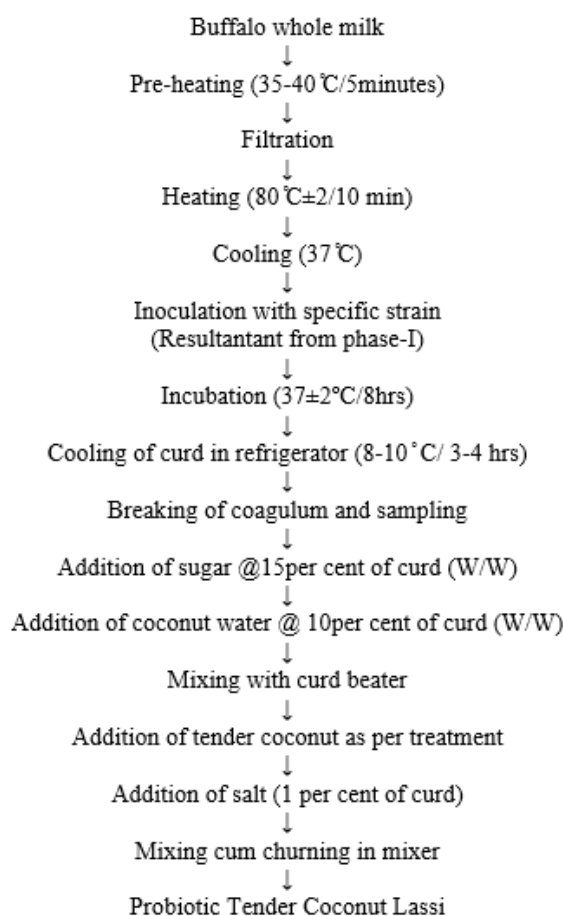
S₃ C₃: Optimum level mixed strain and tender coconut @ 15 per cent of curd

Replications

The experiments in Phase I and Phase II were replicated thrice

Flow chart for preparation of probiotic tender coconut lassi

Lassi was prepared as per the procedure described by Kadlag, 1982 with partial modification by mixing tender coconut. Similarly in normal lassi preparation potable water is used as diluents, instead of that in the present investigation tender coconut water @ 10 per cent of curd was used for dilution.



Sensory evaluation

The product was evaluated for sensory characteristics, viz. colour and appearance, flavour, consistency and overall acceptability by using 9 points hedonic scale as per IS: 6273, Part-II (1971) [1].

Colour and appearance

Table 1: Effect of different level of probiotic curd and tender coconut on colour and appearance of probiotic lassi during storage

Treatments	Storage Days			
	0 day	4 th day	8 th day	12 th day
Probiotic culture (PC)				
S ₁	7.79	7.76	7.68	7.67
S ₂	7.58	7.47	7.40	7.26
S ₃	7.76	7.67	7.61	7.60
S.E.±	0.03	0.03	0.03	0.03
CD <i>P</i> <0.01	0.09	0.09	0.09	0.09
Tender coconut (TC)				
C ₁	7.67	7.59	7.51	7.44
C ₂	7.71	7.64	7.58	7.52
C ₃	7.75	7.67	7.61	7.57
S.E.±	0.03	0.031	0.03	0.03
CD <i>P</i> <0.01	NS	NS	NS	0.09
Interaction (PC x TC)				
S ₁ C ₁	7.74	7.69	7.65	7.64
S ₁ C ₂	7.78	7.78	7.68	7.67
S ₁ C ₃	7.85	7.81	7.73	7.70
S ₂ C ₁	7.52	7.44	7.27	7.12
S ₂ C ₂	7.53	7.46	7.45	7.28
S ₂ C ₃	7.70	7.52	7.48	7.39
S ₃ C ₁	7.75	7.65	7.60	7.58
S ₃ C ₂	7.82	7.69	7.61	7.60
S ₃ C ₃	7.71	7.67	7.63	7.62
Mean	7.68	7.64	7.56	7.51
S.E.±	0.05	0.05	0.05	0.05
CD <i>P</i> <0.01	0.16	NS	NS	NS

The highest score for colour and appearance was observed in S₁C₃ (7.85) and lowest (7.5) in S₂C₁. There was reduction in score for colour and appearance as storage period progressed.

Flavour

Table 2: Effect of different probiotic curd and tender coconut on flavour of probiotic lassi during storage

Treatments	Storage Days			
	0 day	4 th day	8 th day	12 th day
Probiotic culture (PC)				
S ₁	7.77	7.58	7.45	7.34
S ₂	7.37	7.31	7.08	6.98
S ₃	7.58	7.44	7.26	7.22
S.E.±	0.02	0.02	0.02	0.02
CD <i>P</i> <0.01	0.07	0.07	0.07	0.07
Tender coconut (TC)				
C ₁	7.60	7.50	7.23	7.15
C ₂	7.52	7.43	7.26	7.20
C ₃	7.60	7.42	7.30	7.19
S.E.±	0.02	0.02	0.02	0.02
CD <i>P</i> <0.01	0.07	0.07	NS	NS
Interaction (PC x TC)				
S ₁ C ₁	7.74	7.65	7.40	7.38
S ₁ C ₂	7.64	7.58	7.44	7.34
S ₁ C ₃	7.92	7.52	7.51	7.27
S ₂ C ₁	7.38	7.34	7.17	6.93
S ₂ C ₂	7.31	7.24	7.03	7.00
S ₂ C ₃	7.41	7.36	7.05	7.02
S ₃ C ₁	7.67	7.50	7.13	7.10
S ₃ C ₂	7.60	7.46	7.30	7.25
S ₃ C ₃	7.47	7.37	7.35	7.30
Mean	7.57	7.45	7.26	7.18
S.E.±	0.04	0.04	0.04	0.04
CD <i>P</i> <0.01	0.12	NS	NS	NS

Flavour attribute indicate that for different treatment combination highest 7.92 score was recorded for treatment S₁C₃ and lowest 7.31 score in S₂C₂. The highest reduction in flavour was noted for treatment combination S₁C₃ and lowest in case of S₁C₂ during entire storage period.

Consistency

Table 3: Effect of different level of probiotic curd and tender coconut on consistency of probiotic lassi during storage

Treatments	Storage Days			
	0 day	4 th day	8 th day	12 th day
Probiotic culture				
S ₁	7.77	7.73	7.42	7.33
S ₂	7.37	7.33	7.11	7.03
S ₃	7.71	7.63	7.27	7.19
S.E.±	0.05	0.05	0.05	0.05
CD <i>P</i> < 0.01	0.15	0.15	0.15	0.15
Tender coconut (TC)				
C ₁	7.59	7.52	7.21	7.16
C ₂	7.60	7.56	7.27	7.15
C ₃	7.66	7.62	7.33	7.24
S.E.±	0.05	0.05	0.05	0.05
CD <i>P</i> < 0.01	NS	NS	NS	NS
Interaction (PC x TC)				
S ₁ C ₁	7.73	7.70	7.37	7.32
S ₁ C ₂	7.77	7.71	7.39	7.23
S ₁ C ₃	7.80	7.79	7.50	7.44
S ₂ C ₁	7.33	7.31	7.09	7.01
S ₂ C ₂	7.35	7.33	7.12	7.03
S ₂ C ₃	7.42	7.35	7.13	7.05
S ₃ C ₁	7.71	7.55	7.18	7.15
S ₃ C ₂	7.66	7.62	7.29	7.20
S ₃ C ₃	7.76	7.72	7.35	7.22
Mean	7.62	7.57	7.27	7.18
S.E.±	0.09	0.09	0.09	0.09
CD <i>P</i> <0.01	NS	NS	NS	NS

Consistency of probiotic tender coconut flesh lassi during storage indicate that in case of different treatment combination highest point (7.80) was secured by S₁C₃ and lowest (7.33) by S₂C₁. There was decreasing trend in consistency scored as storage period progressed.

Overall acceptability

Table 4: Effect of different level of probiotic curd and tender coconut on overall acceptability of probiotic lassi during storage

Treatments	Storage Days			
	0 day	4 th day	8 th day	12 th day
Probiotic culture (PC)				
S ₁	7.79	7.76	7.58	7.50
S ₂	7.32	7.23	6.97	6.94
S ₃	7.73	7.62	7.35	7.30
S.E.±	0.05	0.05	0.05	0.05
CD P<0.01	0.14	0.14	0.14	0.14
Tender coconut (TC)				
C ₁	7.58	7.47	7.15	7.12
C ₂	7.61	7.54	7.35	7.24
C ₃	7.65	7.60	7.39	7.38
S.E.±	0.05	0.05	0.05	0.05
CD P<0.01	NS	NS	0.14	0.14
Interaction (PC x TC)				
S ₁ C ₁	7.74	7.71	7.52	7.45
S ₁ C ₂	7.76	7.74	7.61	7.48
S ₁ C ₃	7.87	7.83	7.60	7.57
S ₂ C ₁	7.29	7.17	6.72	6.67
S ₂ C ₂	7.30	7.25	7.05	6.96
S ₂ C ₃	7.37	7.28	7.13	7.18
S ₃ C ₁	7.70	7.54	7.22	7.22
S ₃ C ₂	7.77	7.63	7.40	7.29
S ₃ C ₃	7.72	7.69	7.43	7.40
Mean	7.61	7.54	7.30	7.25
S.E.±	0.08	0.08	0.08	0.08
CD P<0.01	NS	NS	NS	NS

Results regarding overall acceptability of lassi indicates that in case of fresh lassi highest point (7.87) was secured in treatment S₁C₃ and lowest (7.29) in S₂C₁. There was gradual decrease in score for overall acceptability during storage.

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