



Research Article

EFFECT OF PHYSICO- CHEMICAL CHANGES OF CASHEW JUICE BLENDED BEVERAGES

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Abstract- The study was conducted at Agricultural and Horticultural Research Station, Ullal during 2016-17. The effect of physico-chemical changes of the cashew apple juice with other edible juices during the year 2016, revealed that significantly highest optical density of the juice was recorded in T1- Control (0.40) followed by T2 (C+N) and T5 -(C+N+T) (0.38 and 0.37, respectively). The lowest optical density was reported in T8- (C+N+T+P) (0.26). During the year 2017, with respect to the optical density of the juice the same trend was observed, recorded significantly highest colour value in T1 (Control) (0.38) followed by T2 (C+N). During 2016, significantly highest thickness value was recorded in T1 (control) (1.53) followed by T2 (C+N) recorded 1.43. During 2017, significantly highest thickness value was recorded in T1 (Control) 1.41 followed by while, lowest was recorded (1.20 each) in T6 (C+N+P), T7 (C+T+P) and T8 (C+N+T+P). During 2016, significantly highest TSS value was recorded in T1 (control) (12.00) followed by T4 (C+P) (11.00). Significantly lowest TSS value was recorded in T6 (C+N+P) and T8 (C+N+T+P) (9.80). During 2017, significantly highest TSS value was recorded in T1 (Control) and T4 (C+P) (10.06). Significantly lowest TSS value was recorded in T (C+N+T) (9.19).

Keywords- Effect, Physico-chemical, Cashew juice, Edible juice

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Introduction

Among all other plantation crops, cashew is known to provide high economic returns because of the foreign exchange earnings obtainable from the export of raw or processed cashew nut, which is relished by the consumers of Europe, America and other Asiatic countries. Cashew is cultivated in 32 countries around the world, with Brazil, India, Vietnam and Nigeria as the main production centers. In India cashew is grown in an area of 10.40 lakh hectares with an annual production of 7.79 lakh MT. The national average productivity is 753 kg per hectare [1]. It is grown mainly in Maharashtra, Goa, Karnataka and Kerala along the west coast and Tamil Nadu, Andhra Pradesh, Odisha and West Bengal along the east coast.

Cashew apples are harvested over a period of 4 -5 months during a year, its use as a raw material for a variety of fruit-based products can trigger revolution in cashew industry. This, apart from making cashew juice products available year-round, will equalize supply from one year to another and will improve earnings from cashew crop for the rural farmers. Cashew apples contain 85% juice, 10% of which is sugar [2] for which it tastes sweet and nutritious. Neither the cashew apples nor the juice extracted from the fruits is completely utilized in India, despite possessing nutraceutical properties as a result; large amounts of cashew apples are being wasted in the field itself after nut separation, whereas in Brazil, cashew apple is partially utilized in addition to concentrated and ready-to drink juice products. Cashew apple is converted into various products such as jam, syrup, vinegar, candies, alcoholic beverages and the pomace is utilized as animal feed [3]. Hence, keeping in view of the above aspects regarding importance and scope of cashew apple utilisation, this study was conducted to explore the physico-chemical changes of cashew juice blended with other edible juices. In order to utilize their full potential and by preparing cashew blended beverages.

Materials and Methods

The study was conducted at Agricultural and Horticultural Research Station, Ullal during 2016 and 2017. Cashew apples were procured from the experimental orchard of the Agricultural and Horticultural Research Station, Ullal, Mangalore, Karnataka. Fruits were harvested by hand at full ripe stage in the month of March and April. For the other materials like pineapple and Neera and Tender coconuts were purchased from the local market and are utilised in the present investigation. Immediately after harvesting, the fruits were brought to the laboratory and was hed thoroughly under potable water to remove all the extraneous substances such as dust, dirt and soil particles. The washed fruits were soaked in 20 ppm of KMS solution for 30 minutes to prevent browning reaction during extraction of the juice as described by the [4].

The cashew apple juice was strained through a muslin cloth and collected into a wide mouth stainless steel container then Polyvinyl pyrrolidone (PVP) @1.4g/l of juice was added slowly by stirring the juice in a circular motion till the entire juice formed into curd like precipitate. The precipitate was allowed to stand for 8 to 12 hours and the clear supernatant was collected slowly without disturbing the residue. The clear juice obtained was strained through a muslin cloth was used for the estimation of physico-chemical properties. The cashew juices prepared was mixed with 1:1 proportion with neera, pineapple and tender coconut water. The juices were pasteurized at 82 °C and bottle it and kept it for study.

Results and discussion:

Effect of physico-chemical analysis of the cashew apple juice blended with other juices presented in Table 1. During 2016, physico-chemical analysis of the cashew apple juice with respect to optical density indicated that significantly highest colour of the juice was recorded in T1- Control (0.40) followed by T2 (C+N) and T5 -

(C+N+T) (0.38 and 0.37, respectively). The lowest colour OD value was reported in T8- (C+N+T+P) (0.26). During 2017, physico-chemical analysis of the cashew apple juice with respect to colour the same trend was recorded in T1 (Control) recorded significantly highest colour value (0.38) followed by T2 (C+N). The lowest colour value was recorded in T8- (C+N+T+P) (0.25).

During 2016, significantly highest thickness value was recorded in T1 (control) (1.53) followed by T2 (C+N) recorded 1.43. Significantly lowest value was recorded in T6 (C+N+P) (1.19). During 2017, significantly highest thickness value was recorded in T1 (Control) 1.41 followed by while, lowest was recorded (1.20 each) in T6 (C+N+P), T7 (C+T+P) and T8 (C+N+T+P) (Table 1).

During 2016, significantly highest TSS value was recorded in T1 (control) (12.00) followed by T4 (C+P) (11.00). Significantly lowest TSS value was recorded in T6 (C+N+P) and T8 (C+N+T+P) (9.80). During 2017, significantly highest TSS value was recorded in T1 (Control) and T4 (C+P) (10.06). Significantly lowest TSS value was recorded in T (C+N+T) (9.19) (Table 1).

During 2016, significantly highest acidity value was recorded in T6 (C+N+P) (3.49 %) followed by T1 (C+P) and T7 (C+T+P) (3.31 and 3.33% respectively). Significantly lowest acidity value was recorded in T3 (C+T) (2.90%). During 2017, significantly highest acidity value was recorded in T6 (C+N+P) (2.26 %) followed by T3 (C+T) and T8 (C+N+T+P) (2.30%). Significantly lowest acidity value was recorded in T1 (Control) 2.03% (Table 1).

During 2016, significantly highest pH value was recorded in T1 (Control) 4.68 followed by T4 (C+P) and T7 (C+T+P) (4.57 and 4.57 respectively). Significantly lowest pH value was recorded in T5 (C+N+T) (4.00). During 2017, significantly highest pH value was recorded in T5 (C+N+T) (5.23) followed by T4 (C+P) (5.10). Significantly lowest pH value in T2 (C+N) (4.56) (Table 1).

During 2016, significantly highest sugar value was recorded in T1 (Control) (9.80%) followed by T4 (C+P) 9.10 per cent. Significantly lowest sugar value was recorded in T8 (C+N+T+P) 7.10 per cent. During 2017, significantly highest sugar value was recorded in T4 (C+P) 8.16 per cent followed by T2 (C+N) 7.86 per cent. Significantly lowest sugar value was recorded in T8 (C+N+T+P) 6.90 (Table 1).

Sensory qualities of cashew juice blended beverages with respect to appearance presented in table 2. During 2016, result indicated that among the eight treatments evaluated T5- (Cashew+ Neerea+ Tender coconut) scored significantly highest appearance (9.00) followed by T2 (Cashew+Neera), T3 (Cashew+ Tender coconut) T6-(Cashew+ Neerea+Pineapple) and T7-(Cashew+ Tender coconut+ Pineapple) scored (9.00) and on par with each other. Significantly lowest score for appearance was recorded in T8-(Cashew+Neera+ Tender Coconut+Pineapple) and in T1- (Control) recorded (8.00). During 2017, significantly highest score with respect to appearance was recorded in T5-(Cashew+ Neerea+ Tender coconut) (9.16) and followed by T2- (Cashew+Neera) (8.16). Significantly lowest score for appearance was recorded in T1-(Control).

Sensory qualities of cashew juice blended beverages with respect to thickness presented in Table 2. During 2016, result revealed that among the eight treatments significantly highest thickness was found in T2- (Cashew+Neera), T3- (Cashew+ Tender Coconut), T4-(Cashew+Pineapple), T5- (Cashew+ Neerea+ Tender coconut), T6-(Cashew+ Neerea+Pineapple) and T7- (Cashew+Tendercoconut+Pineapple) recorded (8.00).

Significantly lowest thickness score was recorded in T8-(Cashew+Neera+TenderCoconut+Pineapple) and T1-(Control) recorded (7.50 and 7.00, respectively). During 2017, result indicated that among the eight treatments significantly highest score for thickness was recorded in T4-(Cashew+Pineapple) (9.16) followed by T5- (Cashew+ Neerea+ Tender coconut) which recorded (9.00). Significantly lowest thickness score was recorded (7.00) in T8-(Cashew+Neera+TenderCoconut+Pineapple) and T1-(Control).

Sensory qualities of cashew juice blended beverages with respect to taste presented in Table 2. During 2016, result revealed that among the eight treatments significantly highest taste of cashew blended beverage score was recorded (10.00) in T6-(Cashew+ Neerea+Pineapple) followed by T2-(Cashew+Neera), T3- (Cashew+ Tender Coconut), T4-(Cashew+Pineapple), T5-(Cashew+ Neerea+ Tender coconut), T7-(Cashew+Tendercoconut+Pineapple) and T8-(Cashew+Neera+TenderCoconut+Pineapple) recorded (9.00). Significantly lowest taste score recorded (6.00) in T1-(Control). During 2017, result revealed

that among the eight treatments significantly highest score for taste was recorded (9.33) in T7-(Cashew+Tendercoconut+Pineapple) followed by T5- (Cashew+ Neerea+ Tender coconut) which recorded (9.16). Significantly lowest taste score was recorded (5.00) in T1-(Control).

Sensory qualities of cashew juice blended beverages with respect to colour presented in Table 2. During 2016, result revealed that among the eight treatments significantly highest colour score was recorded in T4-(Cashew+Pineapple), T5- (Cashew+ Neerea+ Tender coconut) and T8- (Cashew+Neera+TenderCoconut+Pineapple) (9.00). Significantly lowest colour score was recorded (7.00) in T1-(Control). During 2017, result indicated that, among the eight treatments significantly highest colour score was recorded in T3-(Cashew+ Tender Coconut), T4-(Cashew+Pineapple) and T5- (Cashew+ Neerea+ Tender coconut) (9.00). Significantly lowest colour score recorded (5.33) in T1-(Control).

Sensory qualities of cashew juice blended beverages with respect to smell presented in Table 2. During 2016, result revealed that among the eight treatments significantly highest smelling score was recorded in T2-(Cashew+Neera), T3-(Cashew+ Tender Coconut), T4-(Cashew+Pineapple), T5-(Cashew+ Neerea+ Tender coconut) and T8- (Cashew+Neera+TenderCoconut+Pineapple) (9.00) and on par with each other. Significantly lowest smell score was recorded (7.00) in T1-(Control). During 2017, result indicated that, among the eight treatments significantly highest score of smell was recorded in T3-(Cashew+ Tender Coconut) and T5- (Cashew+ Neerea+ Tender coconut) (9.00). Significantly lowest score was observed (5.66) in T1-(Control).

Sensory qualities of cashew juice blended beverages with respect to overall opinion presented in Table 2. During 2016, results of overall opinion among the eight treatments significantly highest overall opinion score was reported from the treatments T2- (Cashew+Neera), T3-(Cashew+ Tender Coconut), T4-(Cashew+Pineapple), T5- (Cashew+ Neerea+ Tender coconut) and T8-(Cashew+Neera+TenderCoconut+Pineapple) (9.00) and on par with each other. Significantly lowest overall opinion was towards in T1-(Control) (7.00). During 2017, result indicated that, among the eight treatments significantly highest overall opinion was in T5- (Cashew+ Neerea+ Tender coconut) recorded (9.00). The other treatments like T2- (Cashew+Neera), T3-(Cashew+ Tender Coconut), T4 (Cashew+Pineapple), T6-(Cashew+Neera+Pineapple), T7-(Cashew+Tendercoconut+pineapple) and T8- (Cashew+Neera+TenderCoconut+Pineapple) recorded (9.00) and on par with each other. Significantly lowest overall opinion score was recorded in T1-(Control) (7.00).

[5] revealed that by mixing coconut water and cashew apple two or more kinds of fruits, a product with more vitamins and minerals and with different sensory and flavor characteristics when compared to the raw materials the sensory analysis presented a good acceptance until 6 months of storage at room temperature. Present results endorse the findings of [6] who reported that 25% Organoleptic score for RTS prepared from 25% cashew apple juice + 75% mango juice blend (T₃), followed by 50% cashew apple juice + 50% mango juice blend (T₂), 25% cashew apple juice + 75% pineapple juice blend (T₆) and 50% cashew apple juice + 50% pineapple juice blend (T₅), were found high on quality, viz., colour, taste and overall acceptability, up to 60 days of storage, and were economical for RTS preparation.

According to the findings of [7] cashew apple juices blended with pine apple juice at 60:40 proportion, was liked by the judges the 'most' as compared to other blended combinations of pineapple and sweet orange juice. Present study proved Cashew+ Neera+ Tender coconut better in overall opinion [8] also revealed that cashew apple RTS beverage and squash when prepared by mixing cashew apple juice with different fruit juices like lime, pineapple, passion fruit, papaya and gooseberry improved the palatability and nutritional quality. RTS beverage and squash prepared with cashew apple juice and pineapple juice in equal proportions as well as cashew apple juice with equal quantity of passion fruit juice along with or without ginger drops had better acceptability. These samples showed maximum acceptable flavour, taste and sweetness with better appearance and colour of Cashew juice.

Table-1 Physico – Chemical analysis of the cashew juice blended beverages

Sl. No	Treatment	Colour (590OD)		Thickness (cP)		TSS (°Brix)		Acidity (%)		pH (Scale)		Sugar (%)	
		2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
1	T ₁ (Control)	0.40	0.38	1.53	1.41	12.00	10.06	3.31	2.03	4.68	4.80	9.80	7.73
2	T ₂ (C+N)	0.38	0.30	1.43	1.40	10.00	9.50	3.26	2.20	4.20	4.56	8.90	7.86
3	T ₃ (C+T)	0.33	0.29	1.36	1.20	10.50	9.73	2.90	2.30	4.57	5.06	8.00	7.10
4	T ₄ (C+P)	0.32	0.28	1.30	1.25	11.00	10.06	3.19	2.30	4.40	5.10	9.10	8.16
5	T ₅ (C+N+T)	0.37	0.28	1.25	1.21	10.00	9.19	3.26	2.06	4.00	5.23	8.10	7.10
6	T ₆ (C+N+P)	0.29	0.28	1.19	1.10	9.80	9.73	3.49	2.26	4.28	4.80	7.80	7.10
7	T ₇ (C+T+P)	0.28	0.27	1.36	1.10	10.30	9.76	3.33	2.20	4.57	4.90	8.80	7.20
8	T ₈ (C+N+T+P)	0.26	0.25	1.26	1.10	9.80	9.76	3.26	2.30	4.38	5.06	7.10	6.90
	F-Test	*	*	*	*	*	*	*	*	*	*	*	*
	SEm±	0.001	0.010	0.002	0.450	0.024	0.040	0.048	0.200	0.029	0.250	0.131	0.220
	CD at 5%	0.004	0.04	0.005	0.160	0.070	0.120	0.146	0.610	0.085	0.760	0.387	0.610

Cashew= C, Tender coconut= T, Neera= N, Pineapple= P

Table-2: Sensory Qualities of cashew juiceblended beverages as influenced by juice combinations (10 points scale)

Sl. No	Treatment	Appearance		Thickness		Taste		Colour		Smell		Overall opinion	
		2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
1	T ₁ (Control)	8.00	7.00	7.00	7.00	6.00	5.00	7.00	5.33	7.00	5.66	7.00	6.00
2	T ₂ (C+N)	9.00	8.16	8.00	8.00	9.00	9.00	8.00	8.00	9.00	7.33	9.00	8.00
3	T ₃ (C+T)	9.00	8.00	8.00	8.00	9.00	8.00	8.00	9.00	9.00	9.00	9.00	8.00
4	T ₄ (C+P)	8.00	8.00	8.00	9.16	9.00	8.00	9.00	9.00	9.00	8.00	9.00	8.00
5	T ₅ (C+N+T)	9.00	9.16	8.00	9.00	9.00	9.16	9.00	9.00	9.00	9.00	9.00	9.00
6	T ₆ (C+N+P)	9.00	8.00	8.00	8.00	10.00	9.33	8.00	8.00	8.00	8.00	8.00	8.00
7	T ₇ (C+T+P)	9.00	8.00	8.00	8.00	9.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
8	T ₈ (C+N+T+P)	8.00	8.00	7.50	7.00	9.00	8.00	9.00	8.00	9.00	8.00	9.00	8.00
	F Test	*	*	*	*	*	*	*	*	*	*	*	*
	SEm±	0.260	0.213	0.100	0.100	0.170	0.164	0.100	0.110	0.245	0.246	0.123	0.142
	CD at 5%	0.760	0.641	0.264	0.251	0.541	0.420	0.356	0.314	0.663	0.685	0.470	0.510

Contains : Cashew = C, Tender coconut= T, Neera= N, Pineapple

Conclusion: The present study indicated that the overall opinion with respect to cashew blended beverages, the beverage obtained from treatment (Cashew+ Neera+ Tender coconut) was found to be better. Therefore, by adding these combinations to cashew juice with neera and tender coconut can be effectively utilized for the preparation of the beverages which may help to increase the income of the farmers.

Application of research: Preparation of Cashew juice with other edible juices

Research Category: Horticultural Research

Abbreviations:

DCCD: Director of Cashew nut and Cocoa Development

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