

STUDY ON SENSORY EVALUATION OF CASHEW VARIETIES FOR PREPARATION OF READY TO SERVE BEVERAGE AND JAM

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ABSTRACT

The present study was conducted at AICRP on Cashew, SG CARS, Jagdalpur during 2018-19, aimed at screening varieties suitable for the preparation of cashew apple RTS drink and jam. Ten cashew varieties viz., Vengurla-4, Vengurla-7, Vengurla-9, BPP-1, BPP-4, BPP-8, VRI-3, NRCC Selection-1, NRCC Selection-2 and Priyanka were selected and products were prepared. The sensory evaluation of the two products using 5-point scale was carried out. The results revealed that, the maximum score of RTS beverage for appearance, taste, flavour, texture, overall acceptability was recorded in VRI-3 whereas, highest score for colour was recorded in Vengurla-4. Among the jam prepared from different varieties, the maximum score for appearance, colour and overall acceptability was recorded in NRCC Selection-1, whereas taste and flavour was recorded highest in NRCC Selection-2. The shelf life studies indicated that the longest keeping quality of RTS beverage and jam was observed in variety VRI-3.

(Key words : Cashew, RTS beverage, Jam, VRI-3)

INTRODUCTION

Cashew (*Anacardium occidentale* L.) belongs to the family Anacardiaceae having drupe fruit type. It is considered to be native of Central America. Cashew nut played an important role in diets of many cultures and civilizations for centuries due to its high energy and nutritional value as well as its huge variety of flavors and unique taste. Among tree nuts, cashew nuts ranks third in worldwide production (kernel basis), with a world average production of 5.47 lakh metric tons (kernel basis) in the last 10 years with a continuous raising trend (Rico *et al.*, 2016). In India cashew is grown on an area of 10.27 lakh ha with production of 7.25 lakh metric tons and productivity of 706 kg ha⁻¹ (Saroj *et al.*, 2014).

Cashew apple has lot of scope in processing industries due to its ability to be processed into various products, nutritional value and medicinal value. This crop is getting popularized in seeking to improve microbiological and curative potential. The chemical composition of cashew apple is moisture 86.3%, protein 0.2%, fat 0.1%, carbohydrate 12.3%, crude fibre 0.9%, calcium 10.0 mg 100 g⁻¹, phosphorus 10.0 mg 100 g⁻¹, iron 0.2 mg 100 g⁻¹, vit C 180 mg 100 g⁻¹, minerals 200.0 mg 100 g⁻¹, thiamin 0.02 mg 100 g⁻¹

¹, riboflavin 0.05 mg 100 g⁻¹, nicotinic acid 0.4 mg 100 g⁻¹ and carotene (Sobhana *et al.*, 2013). The utilization of cashew apple for preparation of beverages and intermediates moisture products has not been explored much. Pulp can be used as base for the preparation of these products. RTS is one of the refreshing beverages having zero carbonation, relatively few preservatives and excellent source of several important vitamins and minerals and is used as health drink. Therefore, it is necessary to utilize cashew apple for making nutritious processed health food like RTS. The astringent and acid principles in cashew apple produce a rough unpleasant and biting sensation on the tongue and throat, major drawback of the fruit which prevents the consumption of fresh fruits and the tannin content varies from 0.06 to 0.76 g 100 g⁻¹. This in fact limits the utilization of cashew apple as fresh fruit as well as raw material in the fruit processing industry (Narayanankutty and Augustine *et al.*, 2009). Processing of cashew apple is an economically viable enterprise in cashew growing tracts. Women self help groups can very well take up this enterprise, thereby effectively contributing to the cause of women empowerment. Therefore, the present investigation was conducted to find out the suitable variety of cashew for processing into RTS beverage and Jam.

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MATERIALS AND METHODS

The present investigation was carried out at Horticulture Laboratory, All India Coordinated Research Project on Cashew, S. G. College of Agriculture and Research Station, Jagdalpur, Bastar, Chhattisgarh during 2018-19 and 2019-20 to screen out the suitable cashew variety for RTS (Ready-To-Serve) and Jam preparation. Ten varieties were selected for the study *viz.*, Vengurla-4, Vengurla-7, Vengurla-9, BPP-1, BPP-4, BPP-8, VRI-3, NRCC Selection-1, NRCC Selection-2 and Priyanka. Observations were recorded in various organoleptic parameters (appearance, colour, flavor, taste and overall acceptability) of the prepared RTS and Jam from cashew apple during the period of investigation. Fifteen judges were involved in scoring the prepared product *i.e.*, RTS and Jam. In order to evaluate the sensory qualities of developed products, descriptive test, which analytically describes the sensory qualities of a product, was used. In order to rank the sensory qualities, ordinal scoring method (ranking) was used. Five point scale was used for ranking *i.e.*, from 1 to 5 and details of ranks/scores are as follows. 5- Excellent; 4- Good; 3- Fair; 2- Poor; 1- Very poor. A score card was developed to evaluate the acceptability of the products. For RTS preparation the fully ripe cashew apple without any bruises were collected and juice was extracted using screw type juice extractor. The fresh juice was clarified by adding sago @ 5g litre⁻¹ of juice. RTS and Jam was prepared following the procedure supplied by Cashew Research Station, Maddakathara, Kerala. The prepared RTS and Jam was subjected to organoleptic test for overall acceptability as per the score card provided by Cashew Research Station, Maddakathara, Kerala. The data of the year 2018-19 and 2019-20 were pooled to draw the and results of the sensory evaluation were analyzed statistically by ANOVA using computer aided SAS statistical analysis package to evaluate the significance at $P < 0.05$. Comparison of means of sensory evaluation was done by Turkey's Studentized Range Test.

RESULTS AND DISCUSSION

Organoleptic evaluation is one of the important indicators of the quality of processed product. Among the varieties studied for the preparation of ready to serve beverage (Table 1), the highest organoleptic score for appearance, taste, flavour and texture was recorded in variety VRI-3 whereas, the highest score for colour was reported in Vengurla-4. Variety BPP-4 had lowest scores for all sensory parameters under study. The overall acceptability and shelf life (days) was found to highest in variety VRI-3. However, the TSS recorded highest in the RTS prepared from NRCC Selection-1. Based on current study, cashew apple of variety VRI-3 was found to be suitable for RTS preparation. Similar finding were reported by Sobhana (2019), who reported that appearance, taste and flavour was highest in variety Priyanka.

The taste was the most appreciated attribute during evaluation of RTS whereas appearance was non determining factor during evaluation. This was expected due to varying level of acidity and sugar content in the varieties used for preparing RTS. Flavour of varieties with higher sweetness was preferred by the evaluators. Patil *et al.* (2018) reported similar findings for sweet taste of the manufactured carrot yoghurt. However, since the fruit does not have a strong odour, the flavour attributes were less appreciated by the evaluators. Similar results were also observed in a study conducted by Lago *et al.* (2006) when performed sensory evaluation of jam produced with jambolan pulp. Organic acid and sugars ratio primarily creates a sense of taste which is perceived by specialized taste buds on the tongue. Thus, sweetness due to sugar and sourness from organic acids are dominant components in the taste of many fruits (Kays, 1991).

The data presented in Table 2 showed variation in sensory attributes among jam prepared from different varieties. Among the varieties, NRCC selection-1 recorded highest score for appearance and colour whereas highest score for taste and texture was reported in VRI-3. Flavour was reported to be highest in Priyanka. The lowest score for appearance, colour and flavor was reported in Vengurla-9. The overall acceptability of product was recorded highest for the jam prepared from variety NRCC Selection-1 followed by VRI-3. Shelf life of jam was found to be highest in VRI-3. During the shelf life study crystallization was reported to be a major problem in Vengurla-7, NRCC Selection-2 and BPP-1. Priyanka had highest sweetness of jam compared to the other varieties under study. Sobhana (2019) reported similar results, who reported that score for flavour and sweetness was recorded highest in variety Priyanka under Kerala conditions.

The sweet taste of the jam pleased the evaluators. This might have been the factor that most influenced the jam score regarding the overall assessment. Regarding the texture of jam, it can be concluded that the variety of cashew slightly interfered with the sweetness of the jam. According to comments given by the evaluators, acidity precluded a better analysis of the taste, and some tasters mentioned lack of the fruit taste in the jam. The jam acidity is related to the physicochemical characteristics of the fruit such as pH and acidity. Sugar and acids are a primary taste compounds, enhance human perception of specific flavour notes, including aroma, but pH, acidity and TSS are also related well to sourness and astringency (Malundo *et al.*, 2001).

A number of biochemical reactions or metabolic activities are involved in the ripening process of cashew apple fruit such as increased respiration, ethylene production, change in structural polysaccharides causing softening, degradation of chlorophyll and synthesis of carotenoids, changes in carbohydrates or starch conversion into sugars, organic acids, lipids, phenolics and a number of volatile compounds. All these changes lead to ripening of fruit with softening of texture to acceptable quality. These factors predominantly contribute towards developing a total

Table 1. Sensory attributes of ready to serve beverage as affected by different varieties of cashew apple

Variety	Appearance	Taste	Colour	Flavour	Texture	Overall Acceptability	Shelf life (days)
Vengurla-4	3.70 ± 0.24 ^b	3.30 ± 0.19 ^d	4.00 ± 0.24 ^a	3.70 ± 0.21 ^b	3.40 ± 0.15 ^b	3.70 ± 0.18 ^b	112.00 ± 8.56 ^c
Vengurla-7	3.10 ± 0.18 ^d	3.30 ± 0.21 ^d	2.90 ± 0.18 ^e	3.30 ± 0.18 ^c	3.40 ± 0.18 ^b	3.30 ± 0.13 ^c	119.00 ± 7.84 ^b
Vengurla -9	2.70 ± 0.19 ^e	3.10 ± 0.18 ^e	2.80 ± 0.13 ^e	2.80 ± 0.16 ^f	2.40 ± 0.19 ^e	2.60 ± 0.16 ^e	112.00 ± 6.48 ^c
BPP-1	2.60 ± 0.14 ^f	2.50 ± 0.14 ^g	2.50 ± 0.18 ^f	3.10 ± 0.17 ^d	2.40 ± 0.14 ^e	2.60 ± 0.11 ^e	105.00 ± 8.69 ^d
BPP-4	2.30 ± 0.19 ^g	2.10 ± 0.19 ^h	2.50 ± 0.19 ^f	2.70 ± 0.13	2.30 ± 0.18 ^f	2.30 ± 0.18 ^f	126.00 ± 7.84 ^a
BPP-8	3.20 ± 0.24 ^g	3.30 ± 0.17 ^d	3.60 ± 0.13 ^b	3.40 ± 0.16 ^c	3.00 ± 0.17 ^c	3.10 ± 0.19 ^d	112.00 ± 8.41 ^c
VRI-3	4.00 ± 0.23 ^a	4.10 ± 0.16 ^a	3.40 ± 0.18 ^c	4.20 ± 0.21 ^a	4.10 ± 0.16 ^a	4.10 ± 0.21 ^a	133.00 ± 9.54 ^a
NRCC Selection-1	3.20 ± 0.18 ^c	3.70 ± 0.19 ^b	3.10 ± 0.21 ^d	3.20 ± 0.17 ^d	3.30 ± 0.21 ^b	3.20 ± 0.16 ^c	112.00 ± 7.46 ^c
NRCC Selection-2	3.30 ± 0.14 ^c	2.70 ± 0.14 ^f	3.20 ± 0.14 ^d	2.90 ± 0.12 ^e	3.10 ± 0.17 ^c	3.10 ± 0.17 ^d	119.00 ± 8.46 ^b
Priyanka	2.70 ± 0.18 ^e	3.40 ± 0.12 ^c	3.30 ± 0.17 ^c	2.80 ± 0.18 ^f	2.90 ± 0.18 ^d	3.00 ± 0.21 ^e	105.00 ± 7.41 ^d

Table 2. Sensory attributes of Jam as affected by different varieties of cashew apple

Variety	Appearance	Taste	Colour	Flavour	Texture	Overall Acceptability	Shelf life (days)
Vengurla-4	3.20 ± 0.18 ^d	3.93 ± 0.14 ^a	3.45 ± 0.12 ^c	3.60 ± 0.21 ^a	3.20 ± 0.18 ^b	3.70 ± 0.22 ^b	182.00 ± 8.65 ^a
Vengurla 7	3.10 ± 0.21 ^d	3.30 ± 0.18 ^e	3.05 ± 0.18 ^e	3.25 ± 0.17 ^d	2.80 ± 0.16 ^c	3.25 ± 0.18 ^d	161.00 ± 7.84 ^c
Vengurla -9	2.60 ± 0.16 ^f	3.40 ± 0.19 ^d	3.20 ± 0.19 ^d	3.33 ± 0.18 ^d	2.80 ± 0.14 ^e	3.25 ± 0.16 ^d	168.00 ± 7.69 ^b
BPP-1	3.40 ± 0.24 ^b	3.10 ± 0.17 ^f	3.43 ± 0.17 ^c	3.08 ± 0.17 ^f	3.10 ± 0.20 ^c	3.18 ± 0.14 ^e	154.00 ± 8.24 ^d
BPP-4	2.90 ± 0.19 ^e	3.48 ± 0.14 ^d	2.93 ± 0.09 ^f	3.13 ± 0.13 ^e	2.60 ± 0.09 ^f	2.88 ± 0.17 ^f	175.00 ± 9.54 ^b
BPP-8	3.40 ± 0.18 ^b	3.45 ± 0.21 ^d	3.20 ± 0.21 ^d	3.15 ± 0.18 ^e	3.30 ± 0.20 ^a	3.33 ± 0.13 ^d	154.00 ± 8.12 ^d
VRI-3	3.80 ± 0.21 ^a	3.58 ± 0.14 ^c	3.38 ± 0.17 ^c	3.20 ± 0.16 ^e	3.30 ± 0.28 ^a	3.50 ± 0.19 ^c	189.00 ± 8.23 ^a
NRCC Selection-1	3.90 ± 0.24 ^a	3.60 ± 0.09 ^c	3.78 ± 0.21 ^a	3.45 ± 0.24 ^c	3.10 ± 0.21 ^c	3.95 ± 0.23 ^a	161.00 ± 7.28 ^c
NRCC Selection-2	3.30 ± 0.26 ^c	3.80 ± 0.17 ^b	3.55 ± 0.24 ^b	3.68 ± 0.21 ^a	2.60 ± 0.18 ^f	3.50 ± 0.18 ^c	154.00 ± 9.24 ^d
Priyanka	3.50 ± 0.17 ^b	3.58 ± 0.16 ^c	3.60 ± 0.20 ^b	3.58 ± 0.24 ^b	2.90 ± 0.20 ^d	3.10 ± 0.16 ^e	182.00 ± 7.84 ^a

sensory profile (Herianus *et al.*, 2003). Sousa *et al.* (2013) reported that increase in mango pulp content in the mixture of mango, cashew apple and acerola pulp was also responsible for the increase in the acceptance of the attributes appearance, aroma and flavor. Anand *et al.* (2014) revealed that the blended cashew apple juice with orange and pine apple juice, increased the acceptability of cashew apple juice and nutritional quality of the blended juice was also increased along with taste and flavour. Proper blend sugar of and acid is believed to be responsible for better taste and acceptability of a preserved product (Tripathy *et al.*, 2015).

From the present study it can be concluded that variety VRI-3 was found to be suitable for RTS preparation and jam prepared from variety NRCC Selection-1 was more preferred by the evaluators hence, these varieties can be utilized for preparation of RTS beverage and Jam in South Chhattisgarh region.

REFERENCES

- Anand, A., G.S. Sahu and N. Mishra, 2012. Chemical composition and organoleptic evaluation of blended cashew apple juice. *Int. J. Res. Agric. Sci.* **1**(4): 2348 – 3997.
- Herianus, J.D., L.Z. Singh and S.C. Tan, 2003. Aroma volatiles production during fruit ripening of 'Kensington Pride' mango. *Post Harvest Biol. Tec.* **27**: 323-336.
- Kays, S.J. 1991. Post harvest physiology of perishable plant products; Van Nostrand Reinhold Book, AVI Publishing Co. pp. 149-316.
- Lago, E.S., E. Gomes and R. Silva, 2006. Production of jambolan (*Syzygium cumini* Lamarck) jelly: processing, physical-chemical properties and sensory evaluation. *Food Sci. Tec.* **26**: 847-852.
- Malundo, T.M.M., R.L. Shewfelt, G.O. Ware and E.A. Baldwin, 2001. Sugars and acids influence flavour properties of mango (*Mangifera indica*). *J. Amer.Soc.Hortic. Sci.* **126**: 115-121.
- Narayanankutty, M.C. and A. Augustine, 2009. Cashew apple quality attributes and its utilization. In: *Cashew Research and Development in Humid Tropics* (Eds: Jose Mathew, Mini, C and Abraham, M, 2009), KAU, Vellanikkara pp.137-142.
- Patil, L., V.G. Atkare, A.S. Ingole, S. Gawande and S. Bhosale, 2018. Utilization of carrot juice for the preparation of yogurt drink. *J. Soils and Crops.* **28**(1):128-131.
- Rico, R., M. Bullo and S. Jordi, 2016. Nutritional composition of raw fresh cashew (*Anacardium occidentale* L.) kernels from different origin. *Food Sci. Nutr.* **4**(2): 329–338.
- Saroj, P.L., N.K. Krishna Kumar and T. Janakiraman, 2014. Converting wastelands into goldmine by cashew cultivation, *Indian J.Hort.* **3** : 49-56.
- Sobhana, A., J. Mathew, C. Mini and P. B. Pushpalatha, 2013. Technologies for cashew apple utilization on commercial scale. *Souvenir, National Conference on Cashew.* pp. 65-71.
- Sobhana, A. 2019. Evaluation of cashew varieties for RTS beverage and jam. *Indian J. Hort.* **76** (1): 155-161.
- Sousa, P.H.M., A.M. Ramos, G.A. Maia, E.S. Brito, D.S. Garruti and R.W. Figueiredo, 2013. Comparison of acceptability of tropical fruit mixed nectars by mean test and multivariate statistical analysis, *Seminar : Ciências Agrárias, Londrina*, **34** (5): 2307- 2316.
- Tripathi, P., K. Sethi and S.K. Mukharjee, 2015. Screening of cashew (*Anacardium occidentale* L.) types for RTS preparation. *Trends in Biosci.* **8** (12):3064-3065.

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