



Development and Storage Studies on Amla-Lemon Rts Beverage

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ABSTRACT

Amla Lemon RTS beverage was prepared by blending amla & lemon juice along with sugar. Black salt and jeera extract were added as flavouring agents and product was evaluated for best flavour and sensory evaluation performed by using 9-point hedonic scale. Storage studies were carried out at ambient and refrigerated temperatures. The product was regularly analyzed for TSS, acidity, vitamin C and browning changes. Decrease in vitamin C was comparatively slower at refrigerated temperatures than at ambient conditions as same with browning changes. Hence, the product is recommended to store at refrigerated temperatures for retaining better nutritional and quality attributes.

Key Words: *Acidity, Amla, Browning, Lemon, TSS, Vitamin C.*

Amla (*Embllica officinalis* Geartn) is an important minor fruit and a crop of commercial significance is quite hardy prolific bearer and highly remunerative even without much care. It belongs to the family Euphorbiaceae and is commonly known as aonla, amalaki; ambala, usiri and nelli in different parts of India. The estimated average total production of amla is about 1.081 million MT in 2016-17. India is facing lot of challenges in the area of malnutrition. Though it is facing a lot of deficiency in proteins and carbohydrates, a considerable amount of vitamin C deficiency is also seen. According to a survey conducted by NIN (National Institute of Nutrition) in 2006 about 25% of men and 16% women in low income or materially deprived population are suffering with vitamin C deficiency. Recommended Daily or dietary allowance (RDA) for vitamin C stands now at 75 to 90mg/day for adults.

Vitamin C is an essential ingredient for human beings as it is required for synthesis of intercellular cement "collagen". It is responsible for keeping various cells of human body together. As an antioxidant, it acts like a cop in body apprehending molecules called free radicals that are naturally formed during various chemical reactions in the body and have the potential to prevent damage (Jie sun et al., 2002). Vitamin C is required for dentin formation in teeth and it also

aids in absorption of iron from body. Ting (1986) stated that amla is a very rich source of vitamin C in range of 1100-1700mg/100gm which is said to be the second highest among all fruits next only to Barbados cherry (*Marphigia glabra*). The amla because of its high acidity, astringent taste, is not palatable for direct consumption, but its excellent and therapeutic values offer enormous potentiality for processing. The fruits are processed into various products like amla preserves (murabba), sauce, candy, dried chips, tablets, jellies, pickles, toffees, powder etc. A comparative evaluation of different products revealed that amla juice had maximum nutritive value followed by chyavanprash, amla preserve (murabba), pickle and brined amla fruits (Naik and Chundawat, 1993).

Objectives

The present investigation was carried out for development of RTS beverage by blending amla and lemon juices, to determine the proximate composition and to conduct microbial analysis at regular intervals along with sensory evaluation.

MATERIAL AND METHODS

Amla, Lemon, Sugar, Black salt, Jeera, Potassium metabisulphite, Carboxy methyl cellulose are required for amla-Lemon RTS beverage.

Procurement of raw materials

Fully matured large size amla fruits and lemon were purchased from the local market of Bapatla. Different materials used in the preparation of amla-lemon RTS beverage are as follows.

Pre-processing of amla-Lemon RTS beverage

The amla and lemon fruits were procured from the local market and washed well. The amla fruits were blanched in 2% NaOH solution at 100°C for 5 minutes (lye treatment). They were then washed with cool water and dipped in 0.5% citric acid solution for 5 minutes. Then the seeds were removed and separated into segments. Water is added in the ratio of 1:1 to the amla segments and passed through the pulper. The pulp was clarified and juice was extracted (Fig.1). Lemons were then

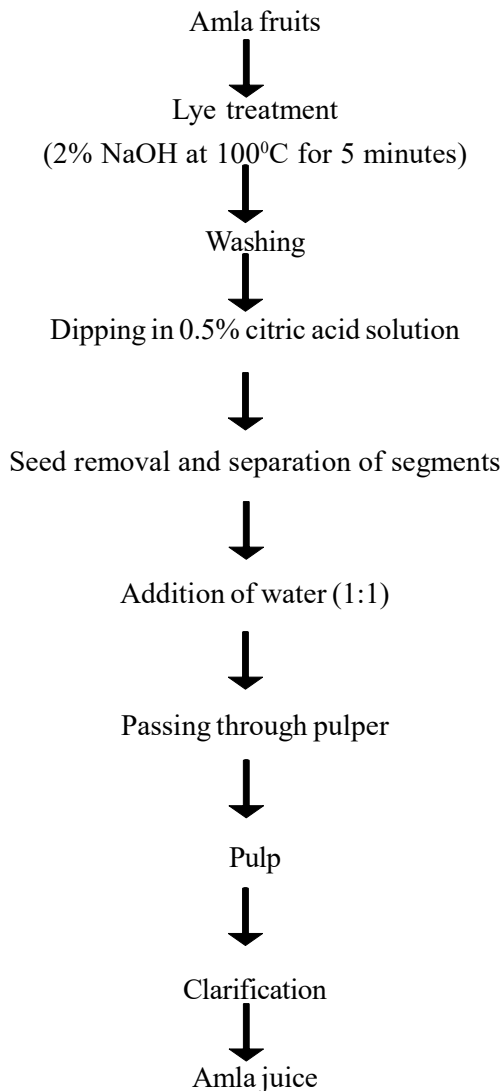
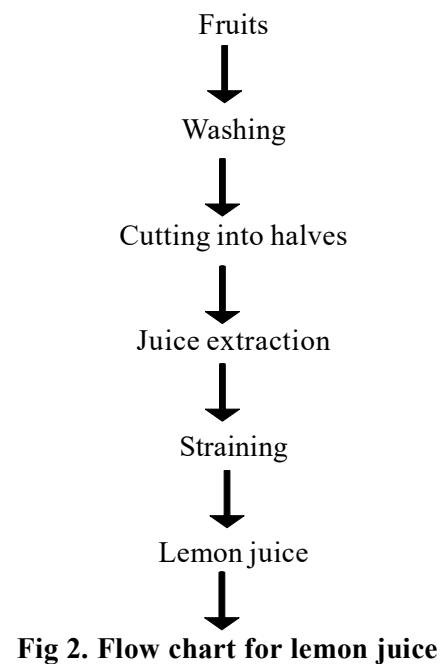


Fig 1. Flow chart for amla juice

cut into two halves. The halves were kept into squeezer and the juice was extracted. The juice was strained and the clear juice was obtained. (Fig.2) And make the black salt into fine powder. Take aside the required amount of cumin seeds and grind it to fine paste.

Preparation of amla-lemon RTS beverage

Both amla and lemon juices were blended well. It is then mixed with strained syrup solution. Water is to be added to the recipe to adjust the total soluble solids to 15° brix. Two such lots were prepared and black salt was added in first lot and whereas jeera extract was added in second lot (each at 1% of the final product) as flavouring agent and homogenize it. The beverage is then poured into sterile bottles separately and corking is done (Fig.3). The bottles are then pasteurised at 90°C for 25 minutes. After 25 minutes, the bottles are cooled and stored in cool place (Fig.4).



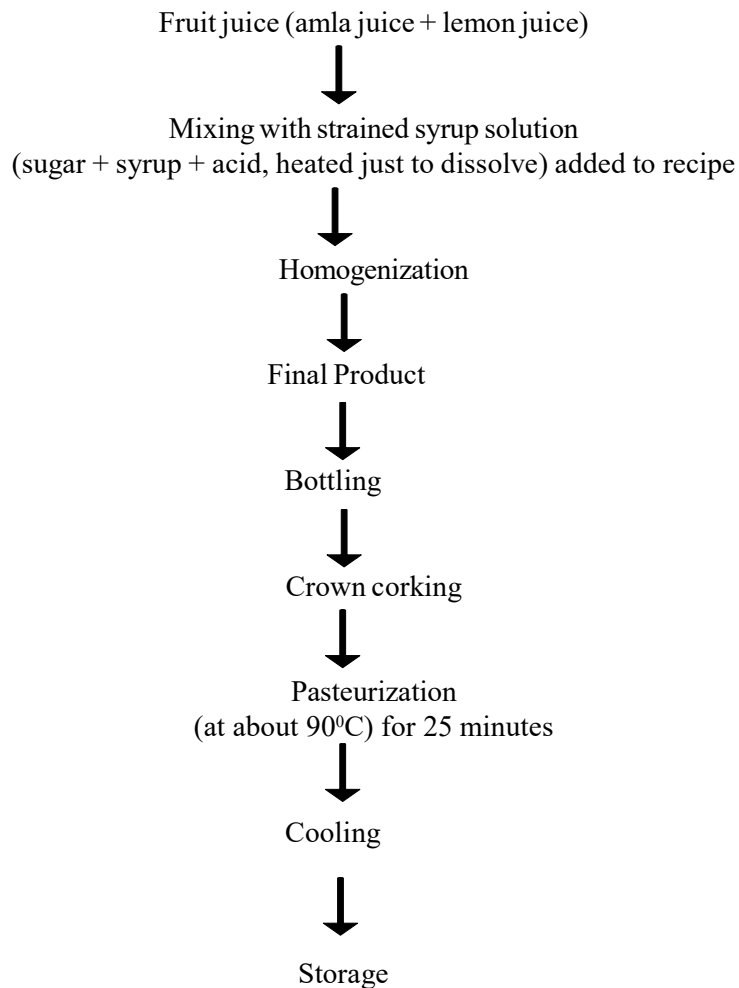


Fig 3. Flow chart for amla-lemon RTS beverage

Physico-chemical properties of amla-lemon RTS beverage

The following physico-chemical properties of amla-lemon RTS beverage namely TSS, ascorbic acid, pH, consistency and color were analyzed. Total soluble solids were determined using Atago Hand Refractometer (0-32%). A drop of amla-lemon RTS beverage was used to determine the TSS with the help of refractometer (Ranganna, 2011). The titrable acidity was analyzed by titration method and expressed in terms of citric acid (Ranganna, 2011). The ascorbic acid content was determined by 2,6 Dichlorophenol, Indophenol visual titration method (Ranganna, 2011). pH was measured by using standard method (Ranganna, 2011).

Microbial analysis of amla-lemon RTS beverage

The following parameters like TPC, fungi were evaluated in microbial analysis of amla-lemon RTS beverage (Ranganna, 2011). Pour plate

method was used for detection of TPC. Spread plate method used for detection of fungi. PDA agar is used for yeast & moulds were incubated at 37°C for 2 days without inverting the plates. SDA agar was used for fungi and incubated at 22-25°C for 5 days without inverting the plates.

Organoleptic evaluation of amla-lemon RTS beverage

Organoleptic evaluation of amla-lemon RTS beverage was carried out in this experiment. The 9-point Hedonic scale was used to compare the control with the formulated samples. Organoleptic evaluation was conducted in sensory evaluation laboratory, Department of Food Technology, College of Food Science and Technology, Bapatla.

Non-enzymatic browning

Preparation of sample: Centrifuge the sample at 4000 rpm for 15 minutes. To 20ml of centrifuge add 30ml of 60% alcohol and mix

Table 1. Nutritional values of amla and lemon per 100gm of sample

Nutrient	Amla	Lemon
Moisture	81.8g	84.6g
Protein	0.5g	1.5g
Fat	0.1g	1.0g
Minerals	0.5g	0.7g
Fibre	3.4g	1.3g
Carbohydrate	137g	10g
Calcium	50mg	90mg
Phosphorus	20mg	20mg
Iron	1.2mg	0.3mg
Carotene	9µg	15µg
Vitamin C	600mg	63mg

Source: Nutritional Value of Foods, NIN, Hyderabad. 2007

Table 2. Ingredients used in amla-lemon RTS beverage

Ingredients	Quantity
Amla	1000 ml
Lemon	200 ml
Sugar	1450 g
Water	9 lit
KMS	700mg/lit
Jeera extract	1% of final product
Black salt	1% of final product

Table 3. Sensory evaluation of amla-lemon RTS beverage

Attributes	Control	Sample A	Sample B
Colour	7.6	8.2	7.3
Flavour	7.3	8	7.3
Taste	6.8	8.3	7.5
Overall acceptability	7.5	8.3	7.5

Proximate analysis

Table 4. Proximate composition of Amla-Lemon RTS beverage

Temperature (°C)	Storage Period (days)	TSS %	Acidity%	Vitamin C (mg)	Browning changes (O.D)
Ambient	0	14.90	0.28	19.99	0.01
	5	15.30	0.29	19.58	0.02
	10	15.30	0.31	18.90	0.02
	15	15.30	0.31	18.40	0.03
	20	15.60	0.32	17.60	0.03
Refrigeration	0	14.90	0.28	19.99	0.01
	5	15.16	0.28	19.40	0.01
	10	15.16	0.31	19.00	0.01
	15	15.16	0.31	18.30	0.02
	20	15.16	0.31	17.80	0.02

Microbial analysis

The microbial analysis for the amla-Lemon RTS beverage was given as below

Table 5. Microbial analysis of amla-lemon RTS beverage

Name of the Test	Control	Sample
Total Plate Count (cfu/g)	0	58
Fungal count (cfu/g)	0	34



Fig 4. Amla-Lemon RTS beverage

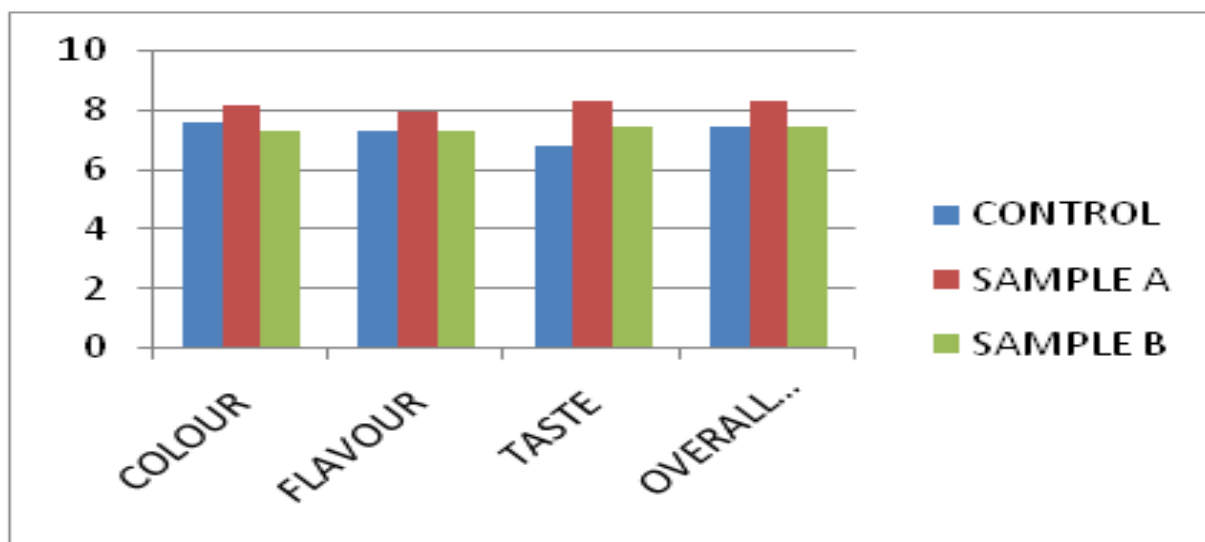


Fig 5. Sensory evaluation graph

TSS

On observation, it was seen that TSS gradually increases at ambient temperature compared to refrigerated conditions.

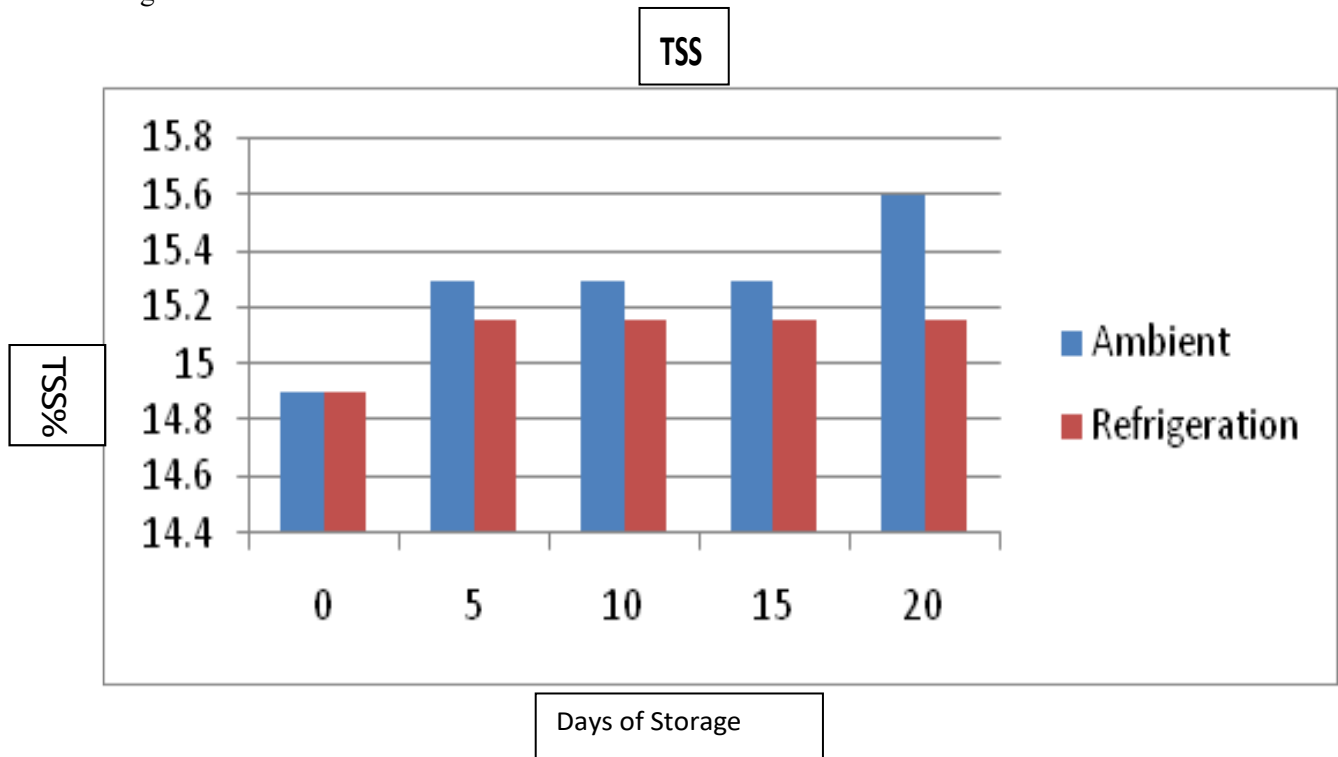


Fig 6. TSS of RTS beverage under ambient and refrigeration conditions

Acidity

The acidity of the sample increases in beverage on storage. Under ambient temperatures the increasing level is more compared to refrigerated conditions.

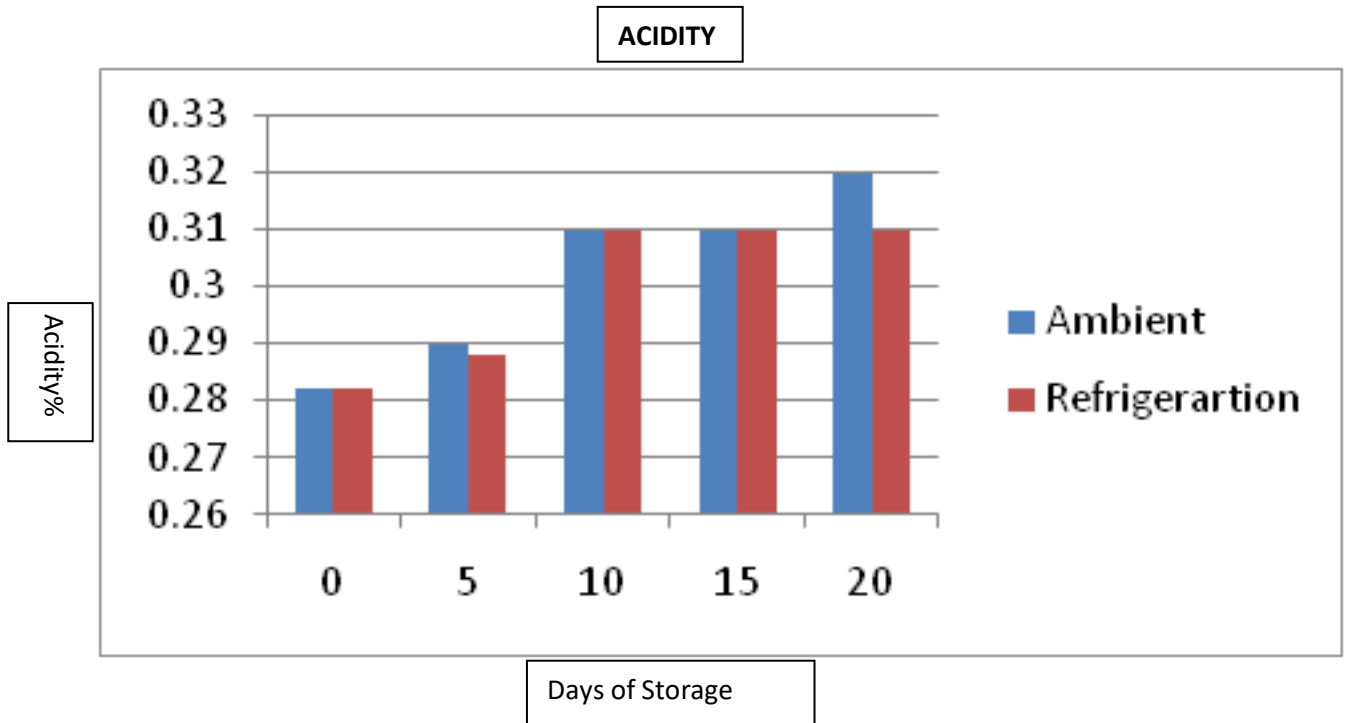


Fig 7. Acidity of RTS beverage under ambient and refrigeration conditions

Vitamin C

Vitamin C of the beverage was decreased continuously at ambient temperatures when compared to refrigerated conditions. The reduction in vitamin C content could be due to oxygen entrapped in the glass bottles which resulted in the formation of dehydroascorbic acid.

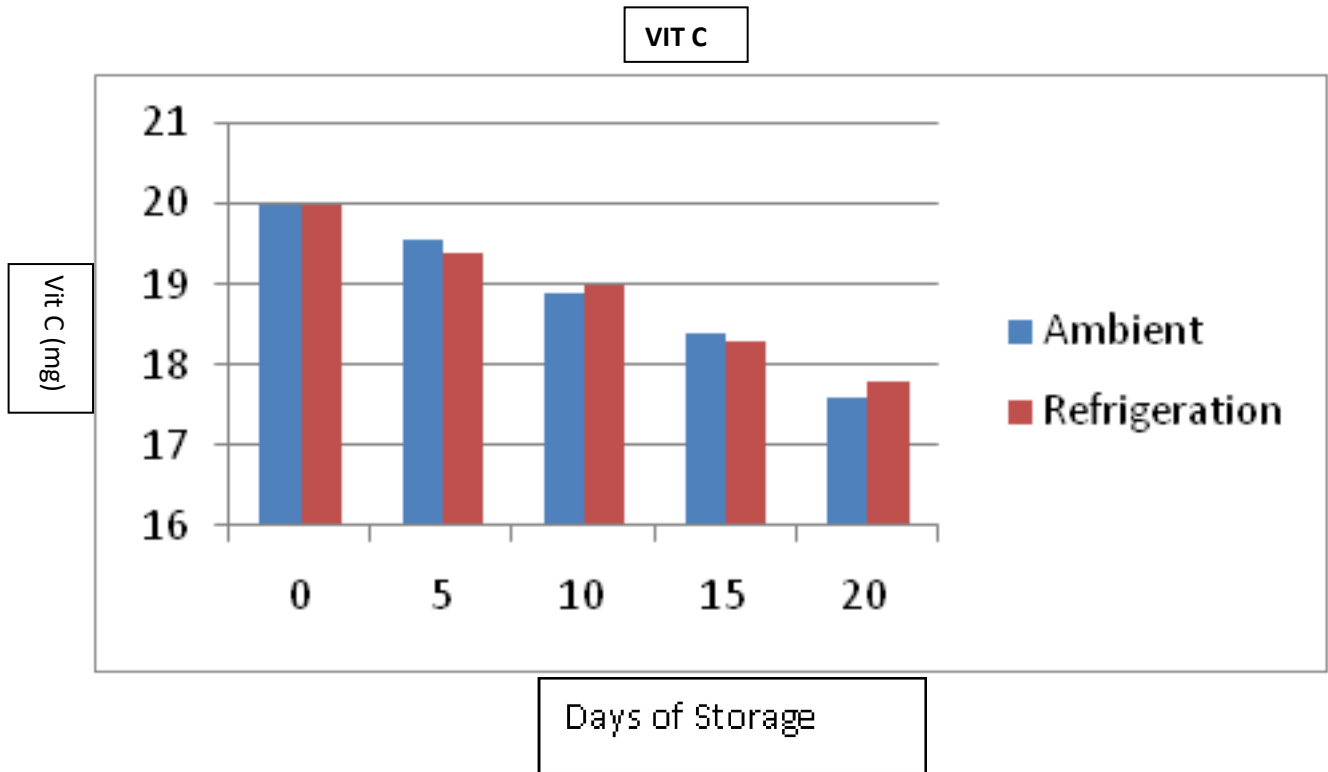


Fig 8. Vitamin C of RTS beverage under ambient and refrigeration conditions

Browning changes

The results of browning reactions clearly indicated that there was increase in browning reactions at steady rate at ambient temperature. The increase in browning was comparatively lower in samples stored at refrigerated conditions (Fig. 9).

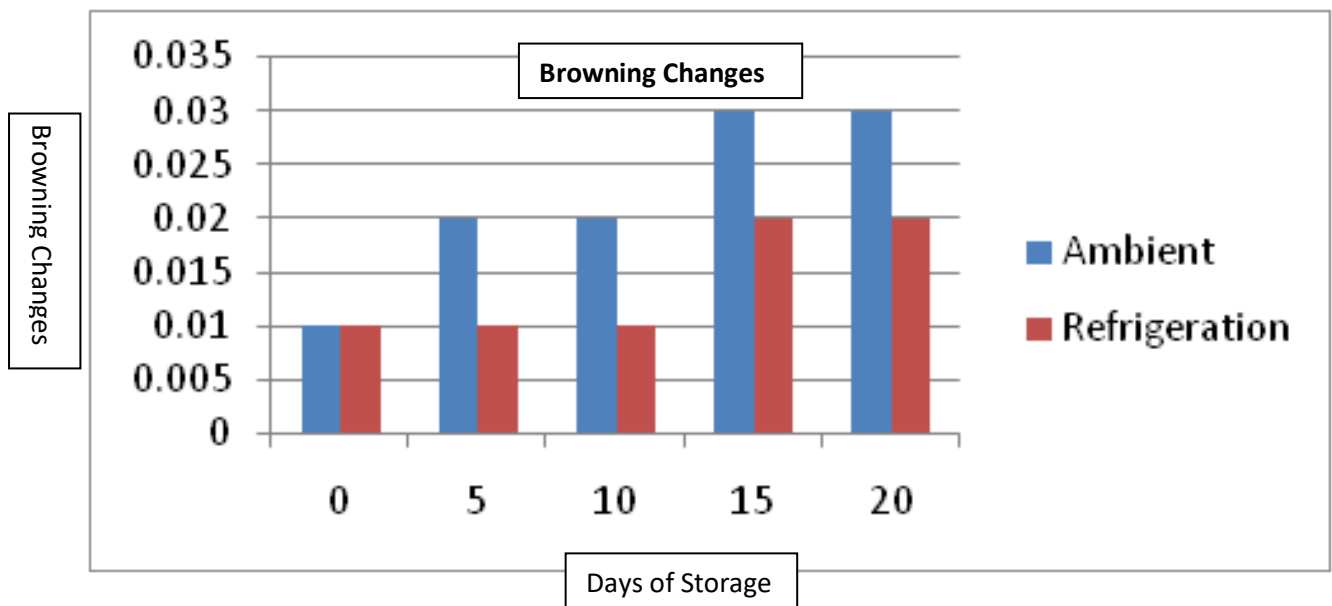


Fig 9. Browning changes in RTS beverage under ambient and refrigeration conditions

thoroughly and filter. Record the absorbance of the filtrate at 440 nm using 60% alcohol as blank and express as optical density. (Srivastava R.P, Sanjeev Kumar 2002)

RESULTS AND DISCUSSION

The present study includes the development of amla-lemon RTS beverage from amla and lemon. The results of this study are tabulated and discussed keeping in view the various objectives studied earlier. The result of the different chemical analysis is also discussed in this chapter.

Organoleptic characteristics of amla-lemon RTS beverage:

Method of preparation of amla-Lemon RTS beverage was standardised and three samples were developed with different flavours and subjected to organoleptic evaluation. The sensory test used for this purpose was Hedonic rating. Hedonic relates to a pleasant and unpleasant status of a person and in hedonic rating effective rates of preferences of liking and disliking are measured.

All the optimum conditions required for sensory evaluation were provided. The panel members were comfortably seated in a room which is well ventilated and lighted. They were given water to rinse their mouths before and after tasting each recipe. The mean scores of different attributes for all given samples are given in the Table 3.

Score for colour was found highest in sample B with a score of 8.2 which was accepted overall. Score for flavour was found highest in sample B with score of 8 which is a control sample without any flavourings. Taste of beverage was observed as highest in sample B with score of 8.3 which is a control sample. Among different samples of beverage prepared, the sample B which is a control was more acceptable in terms of its sensory attributes (Fig.5).

Conclusion

Amla-Lemon RTS beverage was prepared from amla and lemon and black salt and jeera extract as flavourings. The beverage was prepared according to the standard procedures. The beverage with two different flavours and control prepared were analysed to study their chemical composition and overall acceptability. The amla Lemon RTS beverage formulated with amla and lemon showed a significant increase in vitamin C content. The Amla Lemon RTS beverage without

addition of added flavour has attained highest acceptability (8.3) in terms of hedonic rating. The formulated Amla-Lemon RTS beverage is highly preferable to people suffering from scurvy and diabetic. Amla also acts as an anti oxidant, antiscorbutic, diuretic and laxative. The amla fruit, owing to its high acidity and astringent taste, is not preferred for direct consumption, hence it is to be consumed after processing.

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