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## Standardization of Recipe for RTS of Kagzi lime fruit blended with Aloe vera gel and Rose juice

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**Abstract**

RTS beverage is a liquid ready to serve drink and beverages prepared by horticultural produce are nutritional along with good taste, aroma and flavor. Research experiments on preparation of value added nutraceutical RTS from Kagzi lime juice blended with aloe vera gel and rose juice (50: 30: 20) were done by following standard recipes. Prepared product, RTS beverage is studied to observe sensory evaluation with overall acceptability along with study of variation in TSS, pH, titrable acidity and ascorbic acid content. A panel of 8 judges evaluated the products prepared for their quality attributes like appearance (color), flavor, taste and overall acceptability. The RTS beverage prepared with 20% juice with TSS of 10° B and 0.50% acidity stood best in the organoleptic quality followed by RTS with 20% juice and 12° B TSS and 0.47% acidity. Both the blends showed minimum loss in ascorbic acid content at the end of the storage period of 90 days. These recipes were recommended for commercial production of RTS beverage on large scale. Blended RTS of Kagzi lime is rich in nutritional quality and the blending pattern surely added value to the processed products.

**Keywords:** RTS, beverages, Kagzi lime, aloe, rose, nutraceutical

**Introduction**

Kagzi lime (*Citrus aurantifolia* L.) belongs to family rutaceae, originated in India. It is commercially grown in tropical and subtropical region of India. *Aloe Vera* is a succulent plant species of the genus *Aloe*. An evergreen perennial, it originates from the Arabian Peninsula but grows wild in tropical climates around the world and is cultivated for agricultural and medicinal uses. The rose is a woody perennial flowering plant of the genus *Rosa*, in the family Rosaceae, having ornamental as well as aromatic and cosmetic value. Beside attractive color, rose and other edible flowers have anti-inflammatory, anti-microbial and anti-mutagenic properties. This research also presents a view on utilizing more edible flowers as nutraceuticals.

There is always a demand from the consumers all over the world for new food products which are nutritious with delicate flavor. Productions of RTS beverages have been increasingly gaining popularity throughout the country due to their health and nutritional benefits, apart from pleasant flavor and taste. Fruit based RTS beverages are not only rich in essential minerals, vitamins and other nutritive factors but also are delicious in taste and have good appeal. Herbal beverages in the form of RTS, squashes, appetizers, health drinks are important from the nutritional point of view. Lemon juices have anti-bacterial and anti-fungal properties and impart refreshing taste and flavor.

**Material and Methods**

The experimental investigations were carried out at Laboratory of the Department of Agriculture, Mata Gujri College, Fatehgarh Sahib (Punjab) during session 2018-2019.

**Collection of Samples**

Kagzi lime fruits were collected from a local lime orchard at Sirhind. Fruits of uniform size, shape and maturity with yellow colour were used for juice extraction. Fresh fully grown Aloe vera leaves of variety *A. indica* were collected from botanical garden, Mata Gujri College, Sri Fatehgarh Sahib. Gel fillets separated from the leaves were used for juice extraction. The fresh calyces of bourbon rose were collected from farmer's field in the district and were used for colour extraction.

**Extraction of Juice**

Lime fruits of uniform colour, size and shape were selected, thoroughly washed in clean water, cut into two halves. The juice was extracted by lime juice extractor and filtered through a fine

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strainer and the extracted juice was used for preparation of products. For aloe juice, fresh leaves were repeatedly washed and were scooped out to separate gel fillet, homogenized in mixer, filtered through muslin cloth and clear juice was used for preparation of products. While the fleshy calyces of rose flowers were separated, repeatedly washed in tap water, crushed into fine pulp and filtration through muslin cloth to obtain clear juice extract. The obtained juice was used to impart pinkish red colour to the products.

#### Recipes for Lime RTS Blended with Aloe vera and Rose

The blended juices were used for the preparation of RTS as per FPO guidelines by mixing lime, aloe and rose juices in the ratio of 50: 30: 20. The recipes of RTS were prepared with three juice concentrations (10, 15 and 20%) with three different total soluble solid contents (8, 10 and 12°B TSS), ameliorated with cane sugar.

#### Preparation of the Products and Their Chemical Analysis

Fruit juice and hot cane sugar syrup were mixed together in the proportion of proposed recipes on the final volume basis and sodium benzoate (750 ppm) was mixed into it after dissolving in little quantity of juice. The prepared products were filled into pre-sterilized glass bottles of 200 ml capacity and sealed with crown caps. The products were then pasteurized in water at 80 °C for 20 minutes, cooled and stored at room temperature. A total of three replications were maintained for all the treatments and qualitative parameters were evaluated for a period of three months in order to assess the keeping quality. The qualitative parameters *viz.* TSS and pH of the product were analyzed by using Erma-hand refractometer and digital pH meter respectively. Titrable acidity, reducing sugars, non-reducing sugars and total sugars and ascorbic acid (vitamin C) were estimated by using the procedures outlined by Ranganna. Organoleptic evaluation of the product was done by a panel of 8 judges by numerical scoring method using hedonic scale. The data obtained were statistically analyzed.

#### Results and Discussion

Nutraceutically rich recipes of RTS were prepared by using lime, aloe and rose juices in the ratio of 50: 30: 20 respectively. The proximate composition of raw lime juice, aloe gel and rose juice showed differences. Lime juice had highest TSS ranging between 7-8°B and also highest ascorbic acid content ranging between 35-40 mg/100 ml. TSS of aloe gel and rose was 1.5 and 6.0°B respectively. The differences in these parameters are due to their inherent biological nature of the produce. The wide range of differences observed for individual characters with in the produce is due to the differences in growth of the plant, location of the tissue (in the plants) were used for analysis.

#### Physio-Chemical Parameters

The data pertaining to TSS level of prepared RTS studied under storage conditions *i.e.* at ambient conditions are shown in Table 1. After 90 days of storage, maximum TSS (11.27°B) was recorded in T<sub>7</sub> *i.e.* 20% juice conc. and 10°B which is

statistically followed by T<sub>5</sub> whereas minimum TSS (8.83) was recorded again in T<sub>1</sub> *i.e.* 10% juice conc. and 8°B stored at ambient conditions. The interaction between storage and treatments found to be significant. The increase in TSS might be due to hydrolysis of polysaccharides into monosaccharide and oligosaccharides. The pH was found to be significantly decreased throughout the storage. The increase in acidity of the drink attributed to the increase in release of hydrogen ions during the storage. Therefore the corresponding decrease was noticed in pH. After 90 days of storage, maximum titrable acidity (0.50%) was recorded in T<sub>7</sub> *i.e.* 20% juice conc. and 10° B which is statistically followed by T<sub>9</sub>, whereas minimum titrable acidity (0.29%) was recorded in T<sub>1</sub> *i.e.* 10% juice conc. and 8° B stored at ambient storage conditions. Increase in acidity might be due to contribution of inherent acid naturally present in the beverage and partially to the citric acid purposely added to the beverage at the time of preparation. After 90 days of storage, maximum total sugar content (12.57%) was recorded in T<sub>9</sub> *i.e.* 20% juice conc. and 15° B which is statistically followed by T<sub>8</sub>. Whereas minimum total sugar content (8.68%) was recorded in T<sub>4</sub> *i.e.* 15% juice conc. and 8° B stored at ambient storage conditions. Increase in TSS of product during storage period also leads to increase in total sugars of the product.

#### Antioxidant Potential

Antioxidants delay the oxidation of oxidizable substrates. Aloe Vera contains high level of polysaccharides and flavonoids. Lime has ant-oxidative properties and bioactive compounds. There were significant differences in ascorbic acid content among the sugar level and juice blends interactions between them. It was observed that the ascorbic acid content of RTS decreased significantly. Among the interaction effects of sugar level and juice blend shows significant decrease in ascorbic acid. Loss of ascorbic acid during storage was attributed to oxidation of ascorbic acid to dehydro ascorbic acid due to the temperature and light exposure.

#### Sensory Evaluation

Sensory evaluation enables the acceptability of prepared product based on appearance, color, aroma, and taste. Three attributes color, taste and aroma were taken for sensory analysis. The organoleptic characters differed for each recipe. The above combinations (20% juice conc. and 10° B and 20% juice conc. and 12° B) were found to be better recipes for juice concentration, TSS and acid to yield better consistency and acceptability as a nutraceutically rich Kagzi lime RTS prepared with blends of aloe and rose juices at 50: 30: 20 respectively.

#### Statistical Analysis

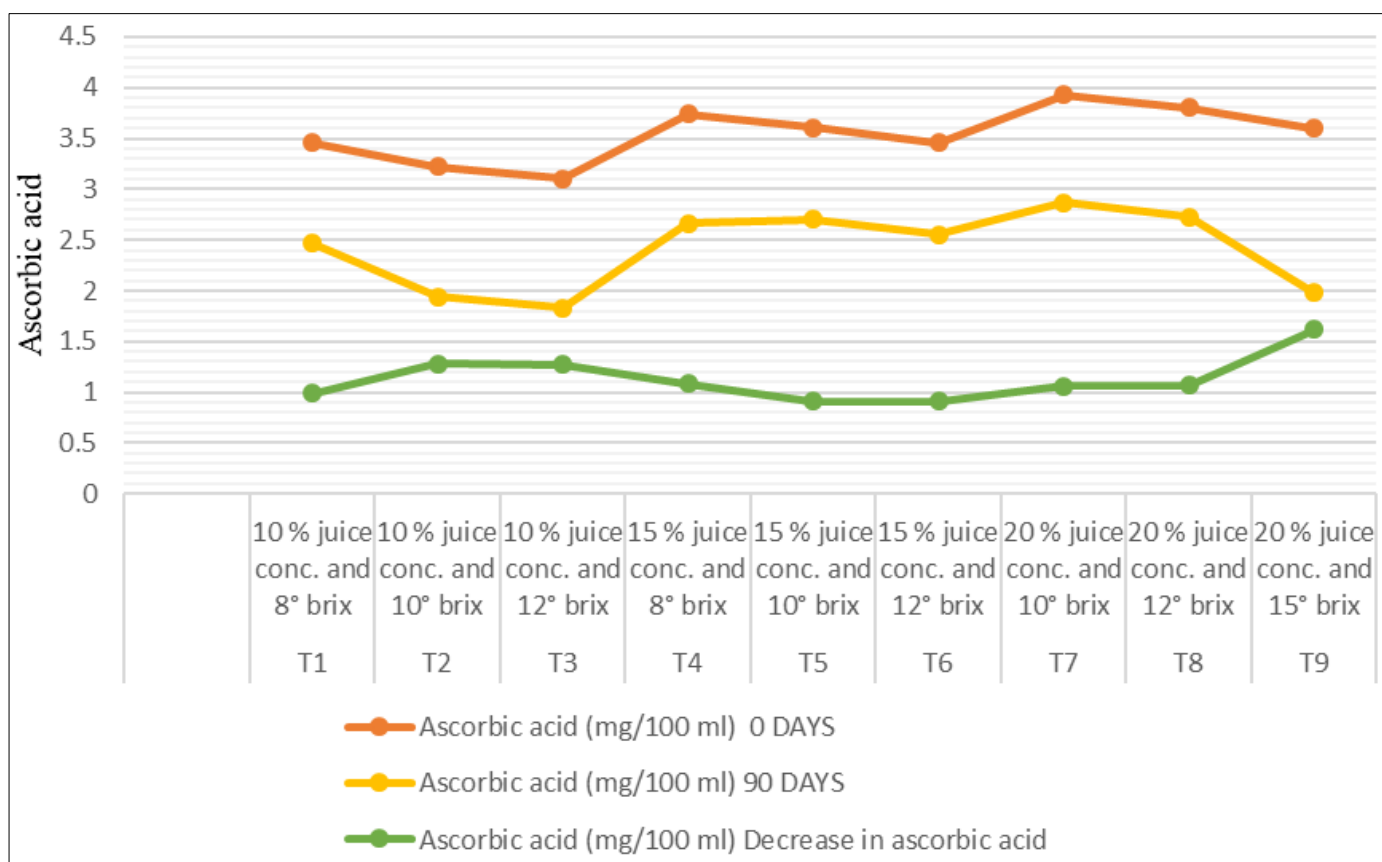
The experiment was laid out in Complete Randomized Design (CRD). The data recorded for chemical, physical and sensory characteristics analyzed statistically using analysis of variance technique of Cochran and Cox (1950). The critical difference at 5 percent was calculated to assess the significance of differences between the treatments.

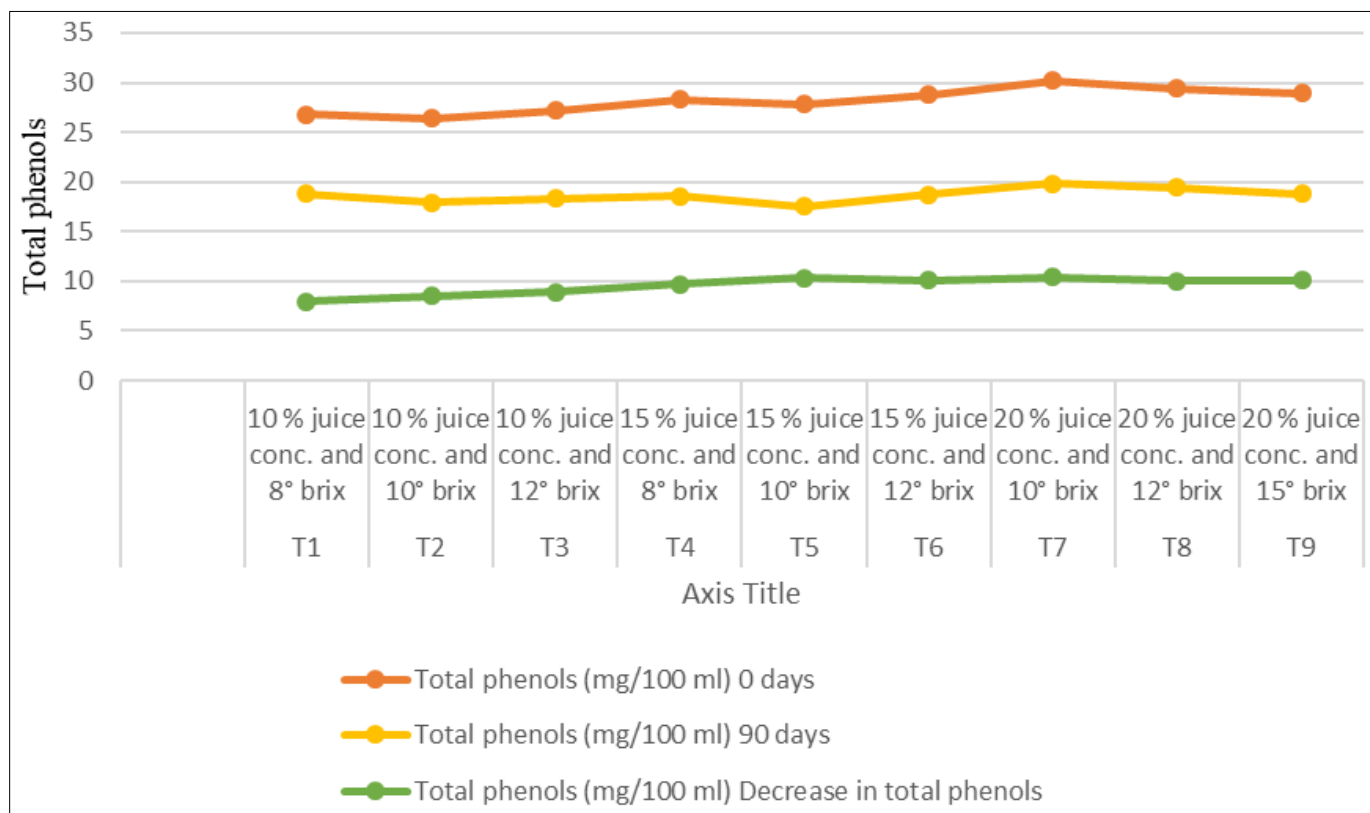
**Table 1:** Physio-chemical changes occurred in the blended RTS during storage period of 3 months

Sr. No.	Treatments	TSS			pH			Titrable acidity			Total Sugars		
		No. of days		Increase in TSS	No. of days		Decrease in pH	No. of days		Increase in titrable acidity	No. of days		Increase in total sugars
		0	90		0	90		0	90		0	90	
T1	10% juice conc. and 8° B	8	8.83	0.8	3.5	2.6	0.93	0.29	0.42	0.13	8.31	9.07	0.76
T2	10% juice conc. and 10° B	10	11.1	1.1	3.5	2.3	1.17	0.35	0.45	0.1	9.85	10.55	0.7
T3	10% juice conc. and 12° B	12	13.1	1.1	3.5	2.43	1.1	0.33	0.43	0.1	10.87	11.58	0.71
T4	15% juice conc. and 8° B	8	9.03	1	3.7	2.37	1.36	0.43	0.54	0.11	7.91	8.68	0.77
T5	15% juice conc. and 10° B	10	11.2	1.2	3.6	2.57	1	0.45	0.55	0.1	8.98	9.71	0.73
T6	15% juice conc. and 12° B	12	13.1	1.1	3.6	2.4	1.23	0.37	0.46	0.09	10.31	11.02	0.71
T7	20% juice conc. and 10° B	10	11.3	1.3	3.8	2.17	1.6	0.5	0.59	0.09	10.63	11.24	0.61
T8	20% juice conc. and 12° B	12	13.2	1.2	3.6	2.47	1.13	0.47	0.57	0.1	11.48	12.19	0.71
T9	20% juice conc. and 15° B	15	16.1	1.1	3.7	2.47	1.2	0.48	0.6	0.12	12.57	12.92	0.35
Mean	-	11	11.9	1.1	3.6	2.42	1.19	0.41	0.51	0.1	10.14	10.74	10.43
S.E.	-	-	0.08	0.1	0	0.03	0.05	0.005	0.006	0.0048	0.022	0.008	0.026
C.D at 5%	-	-	0.22	0.2	0.1	0.1	0.15	0.014	0.019	0.014	0.065	0.023	0.076

**Table 2:** Sensory evaluation of the product (on the basis of hedonic scale)

	Treatments	Parameters			
		Color	Taste	Aroma/Flavor	Overall acceptability
T1	10% juice conc. and 8° B	6.83	6.17	6.17	6.39
T2	10% juice conc. and 10° B	6.67	7.00	6.17	6.61
T3	10% juice conc. and 12° B	7.00	6.67	6.33	6.67
T4	15% juice conc. and 8° B	6.17	6.67	6.00	6.28
T5	15% juice conc. and 10° B	7.17	6.33	5.33	6.28
T6	15% juice conc. and 12° B	7.33	7.00	6.50	6.94
T7	20% juice conc. and 10° B	7.67	8.00	6.67	7.44
T8	20% juice conc. and 12° B	7.17	6.67	7.33	7.06
T9	20% juice conc. and 15° B	6.33	6.17	6.33	6.28
Mean	-	6.93	6.74	6.31	6.66
S.E.	-	0.27	0.30	0.38	0.21
C.D at 5%	-	0.79	0.90	1.12	0.62

**Fig 1:** Changes occurred in ascorbic acid content of blended RTS during storage of 3 months



**Fig 2:** Changes in total phenol content of the blended RTS during storage period of 3 months

### Conclusion

On the basis of present investigation, it concludes that application of different juice percentage of blending lime, aloe vera and rose with ratio (50:30:20) not only improve the quality and post-harvest life of fruits but also add taste and nutritional value. The present study suggests that RTS with 20% juice and 10 °B showed minimum loss in ascorbic acid as well as maximum increase in total sugars as compared to other treatments. Minimum acidic recipe was 10% juice and 10 °B. RTS with 20% juice and 10 °B awarded as best recipe with best colour and taste. RTS with 20% juice and 12°B had the best aroma/flavour.

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