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Preparation and storage of Ready-To-Serve (RTS) beverage from Mango (*Mangifera indica* L.), Citrus (*Citrus aurantifolia* Swingle.), Aloe vera (*Aloe barbadensis* Miller.) and Ginger (*Zingiber officinale* Rosc.) blends

Harendra and Bhagwan Deen

Abstract
The present investigation was carried out at Post Graduate Laboratory of Department of Fruit Science, College of Horticulture and Forestry, A.N.D. University of Agriculture & Technology, Kumarganj, Ayodhya (U.P.) during the year 2019-2020. Mango, citrus (kagzi lime), aloe vera and ginger have nutritional, spicy, medicinal and therapeutic values. 10 percent of blend comprising 55 percent mango pulp, 25 percent kagzi lime juice, 10 percent aloe vera gel and 10 percent ginger juice was found best on 9- point hedonic scale for the preparation of RTS with 13 percent TSS, 0.20 percent acidity and 70 ppm SO_2 than other blend combinations *viz*., 100, 0, 0 and 0 percent (T_1); 0, 100, 0 and 0 percent (T_2); 0, 0, 100 and 0 percent (T_3); 0, 0, 0 and 100 percent (T_4); 25, 25, 25 and 25 percent (T_5); 40, 20, 20 and 20 percent (T_6); 70, 10, 10 and 10 percent (T_7); 20, 40, 20 and 20 percent (T_8) and 50, 20, 15 and 15 percent (T_{10}), mango pulp, kagzi lime juice, aloe vera gel and ginger juice respectively. During the storage period Total Soluble Solids, acidity, reducing sugars and total sugars increased whereas, vitamin-A, vitamin-C, non-reducing sugar and organoleptic score decreased with the advancement of storage period. The RTS was stored into glass and polypet bottles at ambient temperature (20.1-29.4^{0}C). The beverage was organoleptically acceptable upto 4 months of storage in case of both glass and polypet bottles. This study indicated that mango, kagzi lime, aloe vera and ginger can be utilized for palatable RTS beverage making which can be beneficial for the consumers in terms of taste, colour, flavor, medicinal and therapeutic properties.

Keywords: RTS, Mango pulp, Kagzi lime juice, Aloe vera gel, Ginger juice, Blend combination, Glass and Polypet bottles, Storage, Organoleptic quality

Introduction
A beverage is a liquid intended for human consumption, in addition to their basic function of satisfying thirst, beverages play an important role in human culture (Wikipedia, 2019) [7]. Beverages are of two types- unfermented (non-alcoholic) and fermented (alcoholic). Blended beverages with using different fruits, vegetables, spices extract and plants of medicinal values as new food products will definitely attract the consumers in the interpretation of sensory and nutritional characteristics.

Mango is the king among tropical fruits which is botanically known as *Mangifera indica* L. and belongs to the family Anacardiaceae. It is also known as Aam, National fruit of India, Bathroom fruit and Symbol of love. It is originated in South-East-Asia, particularly in Indo-Burma region. On the basis of analysis of different varieties of mango, it is reported that mango fruit contains moisture 73.0 – 86.7%, carbohydrate 11.6 – 24.3%, protein 0.3 – 1.0%, fat 0.1 – 0.8%, fibers 0.8%, minerals 0.3 – 0.7%, Vitamin A 650 – 25940 I.U., Vitamin C 3 – 83 mg/100g, calcium 0.01%, phosphorous 0.02% and iron 4.5 mg/100g (Anon., 1966) [2]. Ripe mango fruits are utilized in preparation of pulp, juice, syrup, squash, jam, jelly, preserve, nectar, canned slices, dried powder, RTS, baby food, mango leather (Aam Papar), toffee, candy and many other products. These conventional type of mango products have been developed to a considerable level and a significant demand has been built up by the processing industry, both for domestic and export market (Sadhu and Bose, 1976; Rameshwar *et al*., 1979; Kalra *et al*., 1981; 1982) [42, 40, 22, 23].

Citrus (*Citrus spp*.) is a genus of flowering trees and shrubs, belonging to the family Rutaceae. Citrus fruits are used extensively in food processing industry to prepare a wide varieties of

products such as RTS, juice, squash, chutney, slices, pickles and cordial. Kagzi lime (*Citrus aurantifolia* Swingle) is said to be originated in India. Vitamin C content is the maximum in acid lime (15-65 mg/100 g). The fruit is very sour because of high quantity of acid; hence fresh fruits are not consumed whereas, fresh juice mixed with water and sugar makes a delicious drink during summer season.

Aloe vera (*Aloe barbadensis* Miller) is perennial, drought resistant succulent plant commonly known as 'Ghrit-kumari' and 'Gheegwar' belongs to the Asphodelaceae or Liliaceae family, which historically has been used for a variety of medicinal purpose. There are 275 species of aloe vera grown all over the world. The most widely used species of aloe vera are *Aloe barbadensis* Miller and *Aloe aborescens* (Ramachandra and Rao, 2008., Dubick and Michsel, 1983) [38, 16]. Aloe vera gel is colorless, transparent and slippery mucilage containing water and bioactive polysaccharides mainly acemannan and glucomannan. Aloe vera gel is used to treat constipation, coughs, ulcers, diabetes, headaches, arthritis, and immune-system deficiencies (Bozzi A. *et al.*, 2007) [8]. In food industry, it has been used as an ingredient for preparation of functional foods and production of gel-containing health drinks, energy drinks and different type of beverages like RTS, squash, syrup, tea, milk, ice-cream and confectionary.

Ginger is an ancient medicinal as well as spicy plant belonging to Zingiberaceae family which is botanically known as *Zingiber officinale* Rosc, and is indigenous to South-Eastern-Asia. Since a very long time ginger is known for its medicinal value as a digestive aid, spiritual beverage, aphrodisiac, antiemetic, anticancer, anti-oxidant, anti-inflammatory and immune stimulating properties (Malhotra and Singh, 2003) [32]. The fresh ginger is widely used in pickles and candies making whereas fresh ginger juice is used in RTS, squash, syrup and nectar beverages preparation while ginger powder, oleoresin, essence, soft drink, non-alcoholic beverages and ginger oil are manufactured from dry ginger. Ginger ale and the ginger beer are two most popular ginger drinks which are carbonated ginger, flavored with soft drinks.

The demands of natural beverages rich in nutrients and having therapeutic as well as medicinal values, are increasing because of changing life style, health consciousness and purchasing capacity of the consumers. The present studies were carried out because the blend beverages of fruits, medicinal plants and spices are rich source of nutrients, medicinal properties and flavors to meet the consumers demand in National and International markets.

Materials and Methods

Raw materials

Mango (var. Dashehari), Kagzi lime purchased from local market, Aloe vera (var. Samsheetal) purchased from National Botanical Research Institute, Lucknow and Ginger (Local variety) purchased from local market were used for the RTS preparation.

Extraction of mango pulp, Kagzi lime juice, aloe vera gel and ginger juice

The methods applied to extract the mango pulp, kagzi lime juice, aloe vera gel and ginger juice are shown as flow sheets in Fig. 1, Fig. 2, Fig. 3 and Fig. 4, respectively.

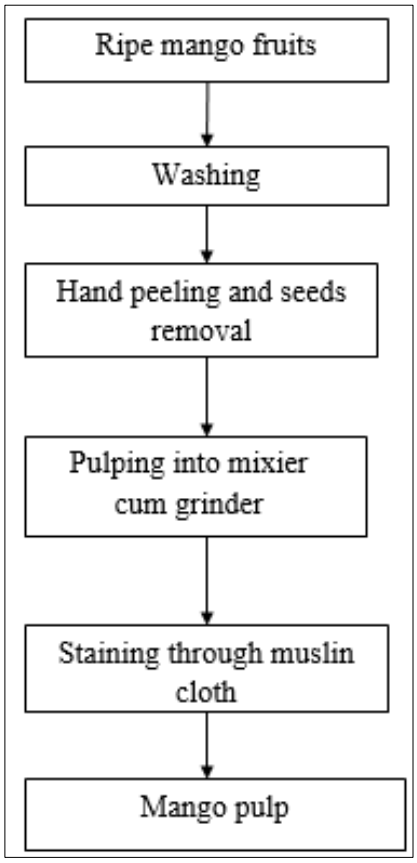

Fig 1: Flow chart for extraction of pulp from mango fruits

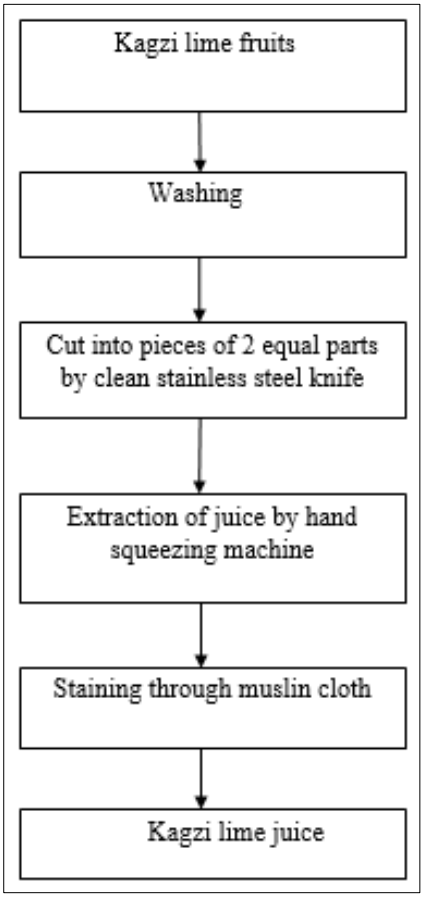

Fig 2: Flow chart for extraction of juice from kagzi lime fruits

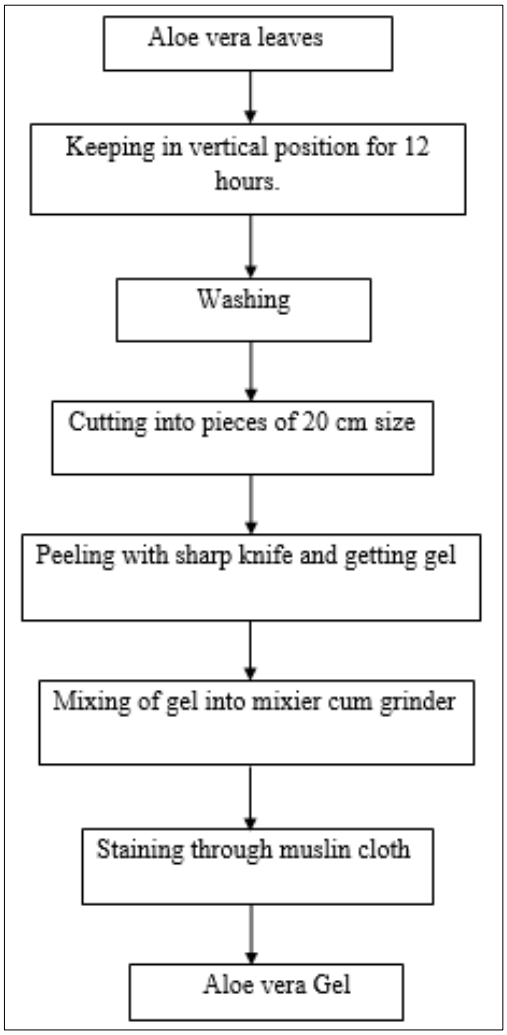

Fig 3: Flow chart for extraction of aloe vera gel

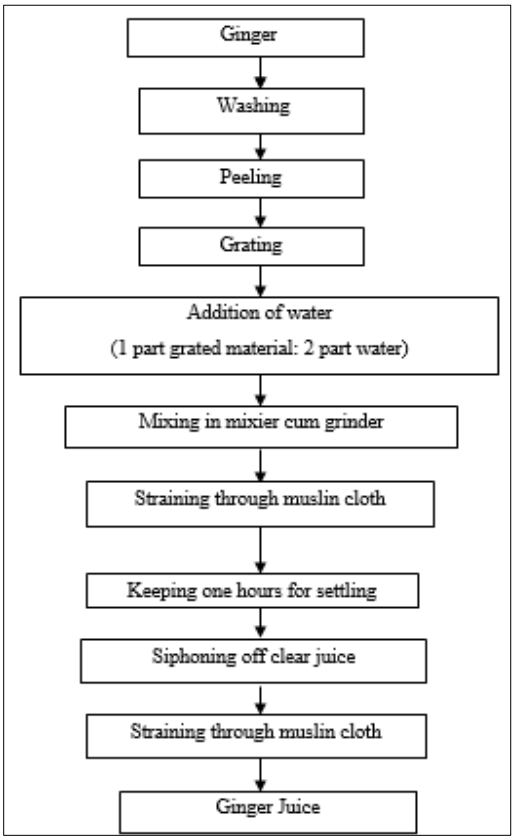

Fig 4: Flow chart for extraction of ginger juice

Standardization of blends for RTS

The following combinations of mango pulp, kagzi lime juice, aloe vera gel and ginger juice were evaluated to standardize the blend for the development of palatable and quality RTS:

T_1 10% blend comprising 100% mango pulp + 0% kagzi lime juice + 0% aloe vera gel + 0% ginger juice and adjusted to 13% TSS, 0.20% acidity and 70 ppm SO_2.

T_2 10% blend comprising 0% mango pulp +100% kagzi lime juice + 0% aloe vera gel + 0% ginger juice and adjusted to 13% TSS, 0.20% acidity and 70 ppm SO_2.

T_3 10% blend comprising 0% mango pulp + 0% kagzi lime juice + 100% aloe vera gel + 0% ginger juice and adjusted to 13% TSS, 0.20% acidity and 70 ppm SO_2.

T_4 10% blend comprising 0% mango pulp + 0% kagzi lime juice + 0% aloe vera gel + 100% ginger juice and adjusted to 13% TSS, 0.20% acidity and 70 ppm SO_2.

T_5 10% blend comprising 25% mango pulp + 25% kagzi lime juice + 25% aloe vera gel + 25% ginger juice and adjusted to 13% TSS, 0.20% acidity and 70 ppm SO_2.

T_6 10% blend comprising 40% mango pulp + 20% kagzi lime juice + 20% aloe vera gel + 20% ginger juice and adjusted to 13% TSS, 0.20% acidity and 70 ppm SO_2.

T_7 10% blend comprising 70% mango pulp + 10% kagzi lime juice + 10% aloe vera gel + 10% ginger juice and adjusted to 13% TSS, 0.20% acidity and 70 ppm SO_2.

T_8 10% blend comprising 20% mango pulp + 40% kagzi lime juice + 20% aloe vera gel + 20% ginger juice and adjusted to 13% TSS, 0.20% acidity and 70 ppm SO_2.

T_9 10% blend comprising 55% mango pulp + 25% kagzi lime juice + 10% aloe vera gel + 10% ginger juice and adjusted to 13% TSS, 0.20% acidity and 70 ppm SO_2.

T_{10} 10% blend comprising 50% mango pulp + 20% kagzi lime juice + 15% aloe vera gel + 15% ginger juice and adjusted to 13% TSS, 0.20% acidity and 70 ppm SO_2.

Preparation of RTS

RTS comprising 10% blend, 13% TSS, 0.20% acidity and 70ppm SO_2 were prepared from different treatments. The prepared RTS were organoleptic ally evaluated on 9-point Hedonic scale to find out the best combination of blend for large scale preparation. The technique used for RTS making is shown in Fig-5.

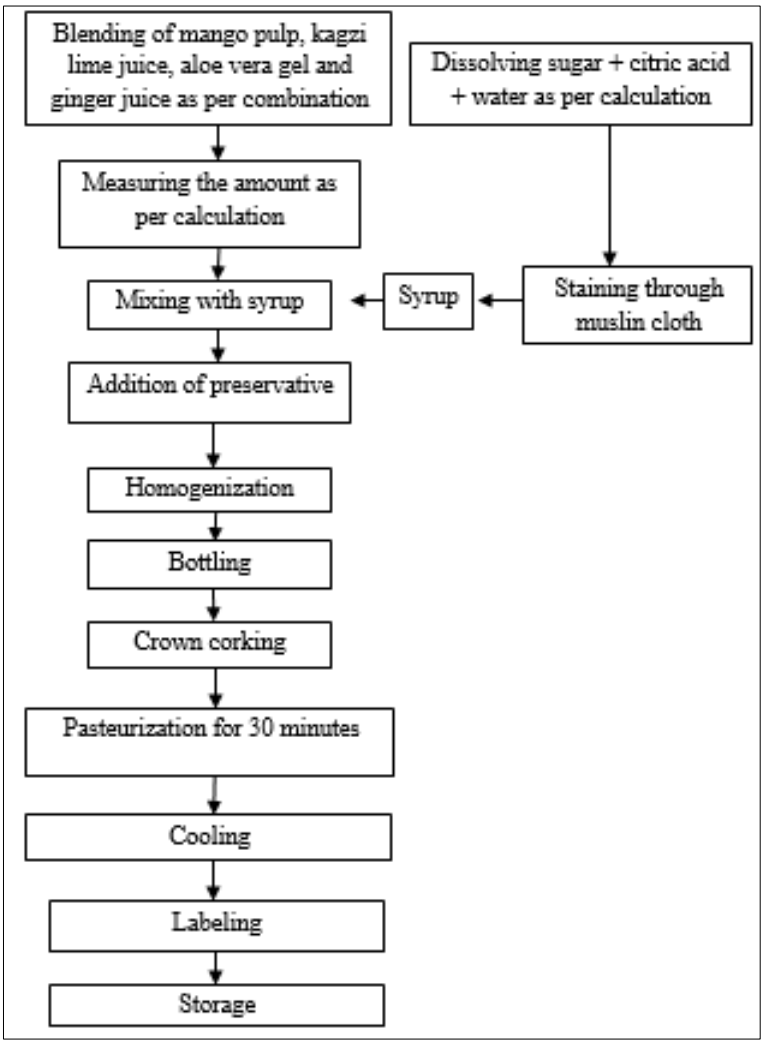

Fig 5: Flow sheet for preparation of mango + kagzi lime + aloe vera + ginger blended RTS.

Storage studies

Finally 5 liters of RTS was prepared with best combination of blend, and filled into 350 ml polypet and glass bottles of 200 ml capacity leaving 2 cm head space, capped, pasteurized and put for storage studies under ambient condition (20.1-29.4^{0}C). During storage observation on changes in TSS, acidity, vitamin-A, vitamin-C, reducing sugars, non-reducing sugar, total sugars and organoleptic quality were recorded at monthly interval. Observations were recorded for changes in TSS, acidity and vitamin-C (Rangana, 2010) [41], vitamin-A (AOAC, 1970) [3], sugars (Lane and Eynone, 1923) [28] and organoleptic quality (Amerine *et al.*, 1965) [1] at monthly

intervals during 4 months of storage period and are described as follows.

The Total Soluble Solids of sample was determined with the help of model (ERMA INC. TOKYO JAPAN) hand refractometer (0-32% and 28-62%) in terms of percentage. The value of TSS recorded at ambient temperature were corrected at 20°C with the help of reference table and the mean value was expressed as per cent TSS content of the sample whereas, the acidity was determined by titrating known quantity of sample against 0.1 N sodium hydroxide solution using phenolphthalein as an indicator and expressed in percent anhydrous citric acid. Vitamin-A determined by preparing sample in acetone, then in petroleum ether and thereafter in sodium sulphate till the appearance of dark yellow-greenish colour and measured the optical density (OD) at 452 nm and 503 nm by Spectrophotometer whereas, Vitamin-C content was estimated by preparing sample in 3 percent metaphosphoric acid solution and titrating against 2, 6 dichlorophenol indophenols dye solution till the appearance of light pink colour. The reducing, non-reducing and total sugars were analysed by using Fehling's solution A and B and methylene blue as an indicator. A panel of 9 semi trained judges evaluated RTS for its colour, flavour, taste, appearance and overall acceptability on 9-point Hedonic scale.

Statistical analysis

The experiments were conducted in 3 replications and the statistical analysis of the data was done by computer software as the method described by Panse and Sukhatne (1985) [36] for CRD experiment.

Results and Discussion

Chemical attributes of fresh mango pulp, kagzi lime juice, aloe vera gel and ginger juice

The data pertaining to chemical attributes of fresh mango pulp, kagzi lime juice, aloe vera gel and ginger juice is presented in Table-1 and revealed that the mango pulp used in RTS making contained 19.00 percent Total Soluble Solids, 1.36 percent acidity, 2650.17 I.U. vitamin-A, 17.33 mg/100g vitamin-C, 4.24 percent reducing sugars, 12.66 percent non-reducing sugar and 16.90 percent total sugars. Similarly Dangi *et al.* (2019) [12] observed 16.12 percent TSS, 0.50 percent acidity, 32.50 mg/100 g vitamin-C, 5.52 percent reducing sugars, 8.44 percent non-reducing sugar and 13.96 percent total sugars in mango pulp. Kagzi lime juice contained 5.00 percent Total Soluble Solids, 7.68 percent acidity, 2.78 I.U. vitamin-A, 59.80 mg/100ml vitamin-C, 1.43 percent reducing sugars, 1.08 percent non-reducing sugar and 2.51 percent total sugars whereas, Thamilselvi *et al.* (2015) [49] revealed 6.00^0B TSS, 4.50 percent acidity, 2.12 pH, 27.60 mg/100ml vitamin-C and 4.50 percent total sugars in kagzi lime juice. Aloe vera gel contained 1.88 percent Total Soluble Solids, 0.24 percent acidity, 0.00 I.U. vitamin-A, 2.53 mg/100g vitamin-C, 0.53 percent reducing sugars, 1.18 percent non-reducing sugar and 1.71 percent total sugars whereas, Lavanya *et al.* (2018) [29] observed 2.14 percent TSS, 0.34 percent reducing sugars, 0.29 percent non-reducing sugar, 0.59 percent total sugars, 0.02 percent acidity, 4.00 pH and 2.00 mg/100g vitamin-C in aloe vera gel. Ginger contained 2.20 percent Total Soluble Solids, 0.26 percent acidity, 0.00 I.U. vitamin-A, 1.90 mg/100g vitamin-C, 0.63 percent reducing sugars, 1.12 percent non-reducing sugar and 1.75 percent total sugars similarly Singh *et al.* (2017) [47] reported 2.40 percent TSS, 0.25 percent acidity, 2.00 mg/100g vitamin-C, 2.30 percent reducing sugars, 3.50 percent non-reducing sugar and 5.80 percent total sugars in ginger.

Standardization of blends for RTS

A quality blended RTS with 10 percent blend comprising 55 percent mango pulp and 25 percent kagzi lime juice, 10 percent aloe vera gel and 10 percent ginger juice with 13 percent TSS, 0.20 percent acidity and 70 ppm SO_2 (T_9) was organoleptically found best for preparation of blend RTS (Table-2). Similarly Sangma *et al.* (2016) [44] found that the RTS containing 60 percent aloe vera gel, 5 percent ginger juice, 20 percent sweet lime juice and 15 percent amla juice has secured maximum organoleptic score. Sharma *et al.* (2017) [45] reported that the RTS prepared from 80:20 (jamun:mango) blends was found superior during organoleptic evaluation. Chandra *et al.* (2018) [9] found that the RTS containing 35 percent amla juice, 40 percent aloe vera gel, 20 percent ginger juice and 5 percent mint juice has secured maximum organoleptic score.

Biochemical changes during storage

Data pertaining to biochemical changes during storage of RTS into glass and polypet bottles is presented in Table-3 and Table-4, respectively which indicates that the Total Soluble Solids of RTS increased gradually after one month of storage from 13.00 percent to 14.00 percent into glass bottles whereas, from 13.00 percent to 15.05 percent into polypet bottles. This change might be due to the conversion or hydrolysis of polysaccharides into simple sugars (monosaccharides and oligosaccharides). The conversion rate was comparatively higher in polypet container than glass bottles which might be due to container effects. Similarly an increasing trend in TSS during storage was reported in mango-aloe vera blended RTS (Chaudhary, 2014) [10], orange based blended RTS beverages (Malav *et al.*, 2014) [31], aloe vera-lemon blend RTS drink (Kauser *et al.*, 2016) [24], aloe vera based RTS drinks (Mishra and Sangma, 2017) [34] and turmeric-orange blend RTS beverage (Mane *et al.*, 2019) [33] which are in agreement of present observations. The acidity of RTS increased gradually during storage period. Total acidity was increased from 0.20 percent at initial day to 0.55 percent at final day of storage into glass bottles while, from 0.20 percent at initial day to 0.60 percent at final day of storage into polypet bottles. Degradation of pectic substances and formation of organic acid have been reported to increase the acidity of fruit products (Conn and Stumf, 1976) [11]. Similarly an increasing trend in acidity during storage was observed by Hirdyani (2015) [20] on kinnow-basil-ginger blend RTS, Tiwari and Deen (2015) [50] on bael and aloe vera blended RTS, Hariharan and Mahendran (2016) [19] on ginger-lime RTS, Mishra and Sangma (2017) [34] on aloe vera based RTS drinks, Sindhumati *et al.* (2017) [46] on papaya-mango RTS and Begum *et al.* (2018) [6] on mixed fruit juice from mango, orange and pineapple. Vitamin-A content was continuously decreased from the first day (262.85 I.U.) to the end of storage (259.93 I.U.) throughout the storage period into glass bottles whereas, from the first day (262.85 I.U.) to the end of storage (259.64 I.U.) throughout the storage period into polypet bottles. This decrease in vitamin-A content might be due to the auto-oxidative degradation during storage and/or due to oxidative breakdown, isomerization or enzymatic destruction of the pigments. The loss of vitamin-A in RTS of different fruits based beverages during storage at ambient temperature was also reported in other studies (Balaswamy *et*

al., 2013; Sindhumati *et al.,* 2017; Divyasree *et al.,* 2018 and Avhad *et al.,* 2019) [5, 46, 14, 4]. Vitamin-C content was continuously decreased from the first day (9.22 mg/100ml) to the end of storage (8.29 mg/100ml) throughout the storage period into glass bottles whereas, from the first day (9.22 mg/100ml) to the end of storage (8.12 mg/100ml) throughout the storage period into polypet bottles. This decrease in vitamin-C content might be due to the oxidation of ascorbic acid into dehydro-ascorbic acid by oxygen. The loss of vitamin C in RTS of different fruits based beverages during storage at ambient temperature was also reported in older studies (Chaudhary, 2014; Bolaji and Akanbi, 2017; Devra *et al.,* 2017; Begum *et al.,* 2018 and Mahnoori *et al.,* 2020) [10, 7, 13, 6, 30]. The reducing sugars and total sugars of blended RTS, increased gradually and it was increased from 0.71 percent to 2.12 percent and 12.05 percent to 12.45 percent, respectively into glass bottles whereas, from 0.71 percent to 2.26 percent and 12.05 percent to 12.36 percent, respectively into polypet bottles. The increase in total and reducing sugars of processed fruit products could be due to inversion of non-reducing sugar into reducing sugars. These finding were supported by Sakhale *et al.* (2012) [43] in blended RTS of whey and mango, Malav *et al.* (2014) [31] in orange based RTS beverages, Priyanka *et al.* (2015) [37] in jamun based RTS beverages, Hamid *et al.* (2017) [18] in Mulberry RTS, Mishra and Sangma (2017) [34] in aloe vera based RTS drinks and Inthuja *et al.* (2019) [21] in cabbage-lime blend RTS beverage. The non-reducing sugar of blended RTS, decreased continuously throughout the entire period of storage and it was decreased from 11.34 percent to 10.33 percent into glass bottles whereas, from 11.34 percent to 10.10 percent into polypet bottles. The decrease in non-reducing sugar of processed fruit products might be due to inversion of non-reducing sugar. This finding was supported by Tiwari and Deen (2015) [50] in bael and aloe Vera blended RTS, Singh *et al.* (2018) [48] in mango and aloe vera blended RTS and Mane *et al.* (2019) [33] in turmeric-orange blend RTS beverage. Organoleptic score of blended RTS decreased gradually with the storage period at room temperature (20.1-29.4^{0}C). The acceptability of RTS was maintained up to four months. The score was significantly decreased from 8.35 at first day to 7.09 at final day of storage into glass bottles whereas, from 8.35 at first day to 7.05 at final day of storage into polypet bottles. The loss in organoleptic quality of beverages after certain period is obvious because of undesirable changes in the products. Temperature plays an important role in biochemical changes that leads to development of off flavour as well as discolouration in the beverages. Reduction in organoleptic quality are also reported in mango, lime and cardamom blended RTS (Ramdevputra *et al.,* 2009) [39], aloe vera, lemon juice and ginger extract blended beverage (Kulthe *et al.,* 2012) [26], kinnow-basil-ginger blend RTS (Hirdyani, 2015) [20], bael and aloe vera blended RTS (Tiwari and Deen, 2015) [50], wood apple RTS (Kumar and Deen, 2017) [27], orange juice (Obasi *et al.,* 2017) [35], jamun based RTS (Khayum *et al.,* 2018) [25] and karonda-beetroot blended RTS beverage (Gupta, 2019) [17]. These reported observations are in the support of the present findings.

Table 1: Chemical attributes of mango pulp, kagzi lime juice, aloe vera gel and ginger juice.

S. No.	Chemical attributes	Mean value			
		Mango pulp	Kagzi lime juice	Aloe vera gel	Ginger juice
1.	Total soluble solids (%)	19.00	5.00	1.88	2.20
2.	Acidity (%)	1.36	7.68	0.24	0.26
3.	Vitamin-A ((I.U.)	2650.17	2.78	0.00	0.00
4.	Vitamin-C (mg/100 g)	17.33	59.80	2.53	1.90
5.	Reducing sugars (%)	4.24	1.43	0.53	0.63
6.	Non-reducing sugar (%)	12.66	1.08	1.18	1.12
7.	Total sugars (%)	16.90	2.51	1.71	1.75

Table 2: Organoleptic quality of RTS prepared from different blends of mango pulp, kagzi lime juice, aloe vera gel and ginger juice.

Treatments (Recipe No.)	Different combination of blends				Organoleptic quality	
	Mango pulp (%)	Kagzi lime juice (%)	Aloe vera gel (%)	Ginger juice (%)	Score	Rating
T_1	100	Nil	Nil	Nil	7.69	Like moderately
T_2	Nil	100	Nil	Nil	7.07	Like moderately
T_3	Nil	Nil	100	Nil	7.39	Like moderately
T_4	Nil	Nil	Nil	100	7.28	Like moderately
T_5	25	25	25	25	7.46	Like moderately
T_6	40	20	20	20	7.61	Like moderately
T_7	70	10	10	10	7.84	Like moderately
T_8	20	40	20	20	7.43	Like moderately
T_9	55	25	10	10	8.35	Like very much
T_{10}	50	20	15	15	8.00	Like very much
S.Em±					0.02	
CD at 5%					0.05	

Table 3: Biochemical and organoleptic changes of RTS during storage into glass bottles.

Storage period (in months)	TSS (%)	Acidity (%)	Vitamin-A (I.U.)	Vitamin-C (mg/100ml)	Reducing sugars (%)	Non-reducing sugars (%)	Total sugars (%)	Organoleptic	
								Score	Rating
0	13.00	0.20	262.85	9.22	0.71	11.34	12.05	8.35	LVM
1	13.40	0.24	262.16	8.90	0.98	11.16	12.14	8.12	LVM
2	13.80	0.33	261.54	8.81	1.26	10.94	12.20	7.78	LM
3	13.90	0.41	260.88	8.55	1.74	10.53	12.27	7.38	LM
4	14.00	0.55	259.93	8.29	2.12	10.33	12.45	7.09	LM

S.Em±	0.02	0.02	0.08	0.03	0.02	0.02	0.02	0.03	
CD at 5%	0.06	0.07	0.26	0.10	0.07	0.07	0.06	0.08	

LVM: Like very much, LM: Like moderately

Table 4: Biochemical and organoleptic changes of RTS during storage into polypet bottles.

Storage period (in months)	TSS (%)	Acidity (%)	Vitamin-A (I.U.)	Vitamin-C (mg/100ml)	Reducing sugars (%)	Non-reducing sugars (%)	Total sugars (%)	Organoleptic	
								Score	Rating
0	13.00	0.20	262.85	9.22	0.71	11.34	12.05	8.35	LVM
1	13.70	0.28	262.18	8.85	1.14	11.10	12.24	8.00	LVM
2	14.10	0.37	261.50	8.71	1.37	10.92	12.29	7.60	LM
3	14.60	0.48	260.73	8.40	1.88	10.45	12.33	7.29	LM
4	15.05	0.60	259.64	8.12	2.26	10.10	12.36	7.05	LM
S.Em±	0.03	0.02	0.07	0.03	0.02	0.02	0.03	0.02	
CD at 5%	0.10	0.07	0.21	0.09	0.07	0.06	0.09	0.07	

LVM: Like very much, LM: Like moderately

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Conclusion
It may be concluded from above findings that RTS prepared from 10 percent blend pulp comprising 55% mango pulp, 25% kagzi lime juice, 10% aloe vera gel and 10% ginger juice containing 13% TSS, 0.20% acidity and 70 ppm SO_2 (T_9) was found best during organoleptic evaluation. The TSS, acidity, reducing sugars, total sugars was increased, whereas vitamin-A, vitamin-C, non-reducing and organoleptic quality was decreased during storage when stored into both glass and polypet bottles. The RTS can be stored up to 4 months at ambient storage temperature (20.1-29.4^{0}C) into glass and polypet bottles with acceptable quality.

References
1. Amerine MA, Pangborn RM, Roessler EB. Principle of sensory evaluation of food. Academic Press, London 1965.
2. Anonymous. Speacial Report Series, No. 4, I.C.M.R., New Delhi 1966.
3. AOAC. Official Methods of Analysis. 11th edn., Association of Official Analytical Chemists, Washington, D.C 1970, 769.
4. Avhad BA, Kotecha PM, Lande SB, Chavan UD. Studies on preparation of fruit bar from papaya and guava. J Pharmacogn. Phytochem 2019;8(4):3219-3223.
5. Balaswamy K, Rao P, Nagender A, Rao N, Sathiya Mala G, Jyothirmayi T *et al.* Development of smoothies from selected fruit pulps/juices. Int. Food Res. J 2013;20(3):1181-1185.
6. Begum S, Das PC, Karmoker P. Processing of mixed fruit juice from mango, orange and pineapple. Fundam. Appl. Agric 2018;3(2):440-445.
7. Bolaji OA, Akanbi CT. Storage stability and the antioxidant activities of optimized Aloe vera-Lemon-Orange blend. FUTA Journal of Research in Sciences 2017;13(3):412-422.
8. Bozzi A, Perrin C, Austin S, Vera FA. Quality and authenticity of commercial Aloe vera gel powders. Food Chem 2007;103(1):22-30.
9. Chandra N, Sarkar S, Sinha R, Sharma B. Development and Evaluation of Ready to Serve Beverage (RTS) from blend of Awala, Aloe-Vera, Mint and Ginger. Int. J Curr. Microbiol. App. Sci 2018;7:3467-3472.
10. Chaudhary M. Studies on beverages from mango (*Mangifera indica* L.) and aloe vera (*Aloe barbadensis* Miller.) blends. M.Sc. Thesis, N. D. Univ. of Agric. & Tech., Faizabad, (U. P.) 2014.
11. Conn EE, Stumf PK. Outlines of Biochemistry, Wiley Eastern Ltd., New Delhi 1976.
12. Dangi DS, Pandey CS, Rangare NR, Kumar B. Standardization and evaluation of blended bael (*Aegle marmelos*) and mango (*Mangifera indica* L.) RTS beverages. Int. J Chem. Stud 2019;7(1):132-137.
13. Devra NS, Kaushik RA, Meena HR. Standardization and Storage Study of Aonla (*Emblica officinalis* Gaertn) based Blended Ready-To-Serve Beverages. Int. J Curr. Microbiol. App. Sci 2017;6(5):1275-1284.
14. Divyasree G, Lakshmi KS, Ramakrishna M, Arunodhayam K. Studies on Physico-Chemical, Sensory Quality of Sweet Orange Based RTS Blends under Refrigerated Storage. Int. J Curr. Microbiol. App. Sci 2018;7(9):1403-1413.
15. Drink-https://en.m.wikipedia.org 2019.
16. Dubick Michale A. Dietary supplements and health aids. A critical evaluation: Part 3: Natural Miscellaneous Products. J Nutr. Educ., (USA) 1983;26(6):259-265.
17. Gupta N. Studies on preparation of blended karonda-beet root ready to serve beverage. Indian J Hort 2019;76(4):735-740.
18. Hamid Thakur NS, Kumar P, Thakur A. Studies on preparation and preservation of Ready-To-Serve (RTS) beverage from underutilized Mulberry (*Morus Alba* L.) fruits and its quality evaluation during storage. Int. J Curr. Microbiol. App. Sci 2017;6(9):1067-1079.
19. Hariharan G, Mahendran T. Physico-Chemical, Sensory and Microbial Evaluation of Ginger-Lime Ready-To-Serve (RTS) Functional Beverage, Sweetened by Palmyra Sugar Candy. Imp. J Interdiscip. Res 2016;2(5):1545-1552.
20. Hirdyani H. Development and Quality Evaluation of RTS (Ready to Serve) Beverages Made from Traditional Indian Medicinal Plants. J Nutr. Food Sci 2015;S13:2-4.
21. Inthuja J, Mahrendran T, Jemziya MBF. Storage stability of functional RTS beverage contrived from headed white cabbage (*Brassica oleracea.* L) and key lime (Citrus × aurantiifolia). Int. Food Res. J 2019;26(3):877-881.
22. Kalra SK, Singh H, Chadha KL. Evaluation of some mango cultivars on the basis of their biochemical composition. Indian J Hortic 1981;38(1, 2):70-73.
23. Kalra SK, Tandon DK, Singh H, Chadha, KL. Assessment of some mango cultivars for nectar preparation. Progress. Hortic 1982;14(4):220-224.

24. Kausar H, Parveen S, Saeed S, Ishfaq B, Ali MA. Development and Standardization of Ready to Serve Aloe vera-Lemon Functional Drink. J Environ. Sci. Toxicol. Food Technol 2016;10(4):47-52.
25. Khayum A, Krishna HC, Gowda APM, Sadananda GK, Shankarappa TH. Formulation and Evaluation of Jamun RTS Blended with Avocado and Nannari – A Nutraceutical Drink. Int. J Curr. Microbiol. App. Sci 2018;7(6):535-542.
26. Kulthe AA, Chalke PR, Khapre AP, Mhalaskar SR. Qualitative evaluation of beverage beverage prepared from Aloe vera blended with lemon and ginger. Green farming 2012;3(5):615-616.
27. Kumar A, Deen B. Study on preparation and storage stability of wood apple RTS beverages. Int. J Pure App. Biosci 2017;5(6):879-886.
28. Lane, Eyenone L. Determination of reducing sugars by means of Fehling solution with methylene blue indicator as an internal indicator. Journal Soc. Chem. India 1923;42:32.
29. Lavanya T, Raj D, Vaghashiya JM. Standardization of formulation for preparation of health drink by blending Aloe vera, Guava and Jamun. Int. J Chem. Stud 2018;6(4):1715-1721.
30. Mahnoori S, Singh J, Gupta N. Studies on processing and storage stability of litchi - beetroot blended RTS beverage. Int. J Chem. Stud 2020;8(4):1966-1970.
31. Malav M, Gupta R, Nagar T. Studies on bio-chemical composition of orange based blended ready-to-serve (RTS) beverages. Biosci. Biotech. Res. Comm 2014;7(1):78-83.
32. Malhotra S, Singh PS. Medicinal properties of Ginger (*Zingiber officinale*), Natural product Radiance 2003, 2(6).
33. Mane RP, Veer SJ, Gaikwad GP. Development of Fresh Turmeris Rhizome Juice-based Orange RTS beverage. Act. Sci. Nutr. Health 2019;3(6):55-60.
34. Mishra LK, Sangma D. Quality attributes, phytochemical profile and storage stability studies of functional ready to serve (RTS) drink made from blend of Aloe vera, sweet lime, amla and ginger. J Food Sci Technol 2017;54(3):761-769.
35. Obasi BC, Whong CMZ, Ameh JB. Nutritional and sensory qualities of commercially and laboratory prepared orange juice. Afr. J Food Sci 2017;11(7):189-199.
36. Panse VG, Sukhatme PV. Statistical Methods for Agricultural Workers. Indian Council of Agricultural Research Publication, 3rd rev. ed 1985.
37. Priyanka N, Dorajeerao AVD, Sudhavani V. Utilization of Jamun juice by making blended RTS beverages. Plant Archives 2015;15(2):1083-1088.
38. Ramachandra CT, Rao SP. Processing of Aloe Vera Leaf Gel. Am. J Agric. Biol. Sci 2008;3(2):502-510.
39. Ramdevputra MV, Paradva DR, Kanzaria DR, Kakade DK, Butani AM. Standardization of physical characteristics of recipe for preparation of ready- to-serve beverage (RTS) from Mango (*Mangifera indica* L.) cv. KESAR. Int. J Agric. Sci 2009;5(2):378-382.
40. Rameshwar A, Kulkarni V, Ahmed MA, Sultan MA, Shri Ramula A. Physico-chemical analysis and keeping quality of mango cultivars at Sangaredy. Paper present at mango workers meeting at Panaji, Goa 2-5th May 1979.
41. Ranganna S. Analysis and quality control for fruit and vegetable products, Tata Mc Graw-Hill Ltd., New Delhi 2010.
42. Sadhu MK, Bose TK. Studies on mango cultivars part I: Morphological and physico- chemical studies of some promising mango cultivars of the district Mursidabad, West Bengal. Indian Food Packer 1976;30(5):24-32.
43. Sakhale BK, Pawar VN, Ranveer RC. Studies on development of soymilk based mango RTS beverage. Elec. J Environ. Agric. Food Chem 2012;11(5):523-528.
44. Sangma CMD, Sarkar S, Mishra LK. Preparation and Evaluation of Ready-to-Serve Drink Made from Blend of Aloe vera, Sweet Lime, Amla and Ginger. Intl. J Food. Ferment. Technol 2016;6(2):457-465.
45. Sharma DS, Kaul RK, Sood M, Gupta N. Studies on stability and quality of Jamun-mango blended ready-to-serve beverage. Indian J. Hort 2017;74(2):299-302.
46. Sindhumathi G, Premalatha MR, Kavitha V. Studies on Therapeutic Value of Naturally Flavored Papaya-Mango Blended Ready-To-Serve (RTS) Beverage. Int. J Curr. Microbiol. App. Sci 2017;6(12):878-887.
47. Singh O, Choro HK, Kanwar J, Dwivedi SK, Singh R. Formulation, nutraceutical profile and storage stability of aloe gel & ginger juice functional beverage blend. The Pharma Innovation Journal 2017;6(12):373-379.
48. Singh PP, Dr Tripathi AD, Rai DC, Kumar N, Singh UP. To study the shelf life of Aloe vera fortified mango RTS with different time and temperature combinations on its organoleptic and functional properties. The Pharma Innovation Journal 2018;7(3):91-97.
49. Thamiselvi C, Krishnakumar T, Amutha S. Preparation and quality evaluation of lime based herbal blended RTS beverage. Asian J Dairy & Food Res 2015;34(1):54-58.
50. Tiwari DK, Deen B. Preparation and Storage of Blended Ready- To-Serve Beverage from Bael and Aloe vera. Int. J Bioscan 2015;10(1):113-116.