The Pharma Innovation Journal 2022; 11(7): 2308-2317

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(7): 2308-2317

www.thepharmajournal.com
Received: 12-03-2022
Accepted: 21-06-2022

Mujahid Shagiwal
Research Scholar, Department of Fruit Science, College of Horticulture & Forestry Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Bhagwan Deen
Professor and Head, Department of Post-Harvest Technology, Department of Fruit Science, College of Horticulture & Forestry Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Corresponding Author:
Mujahid Shagiwal
Research Scholar, Department of Fruit Science, College of Horticulture & Forestry Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Studies on development of ready-to-serve (RTS) beverage from strawberry (*Fragaria ananassa* Duch), ginger (*Zingiber officinale* Rosc) and aloe vera (*Aloe barbadensis* Miller) blend

Mujahid Shagiwal and Bhagwan Deen

Abstract
The present investigation was carried out at Post Graduate Laboratory, Department of Fruit Science and Department of Post-Harvest Technology, College of Horticulture & Forestry, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya-224229, U.P. India during 2021. Strawberry (*Fragaria ananassa* Duch), ginger (*Zingiber officinale* Rosc.) and aloe vera (*Aloe barbadensis* Miller) have nutritional, spicy, medicinal and therapeutic values. In the present studies, strawberry pulp, aloe vera gel and ginger juice were blended in different ratios *viz.*, 100:0:0 (T_1), 0:100:0 (T_2), 0:0:100 (T_3), 33.33:33.33:33.33 (T_4), 40:30:30 (T_5): 50:25:25 (T_6), 60:20:20 (T_7), 70:15:15 (T_8), 80:10:10 (T_9) and 90:5:5 (T_{10}) for the preparation of RTS. Results appears that the treatment no. 7 containing 60% strawberry pulp + 20% aloe vera gel + 20% ginger juice was found to be best over other treatments for the preparation of palatable quality of RTS blend beverages. Therefore 10% blend comprising 60% strawberry pulp, 20% aloe vera gel and 20% ginger juice with 13% Total soluble solids, 0.30% acidity and incorporated with 70 ppm SO_2 can be used to obtain quality palatable RTS beverages. During the storage period TSS, acidity, reducing sugars, total sugars and browning increased whereas, ascorbic acid (vitamin-C), non-reducing sugar, pH and organoleptic quality decreased with the advancement of storage period. The variation in organoleptic quality of treatments is obvious because combinations of raw materials influence the sensory quality of products. The RTS beverage was stored at ambient (22.8-34.0 ^oC) as well as low (4-6 ^oC) temperatures. The beverage was organoleptically acceptable upto 4 months of storage in case of both ambient and low temperatures. The present study indicated that strawberry; aloe vera and ginger can be utilized for palatable RTS making which can be beneficial for the consumers in term of taste, colour, flavour, nutritional, medicinal and therapeutic properties.

Keywords: RTS, Strawberry pulp, Aloe vera gel, Ginger juice, Blend combination, Storage, Ambient and Low temperatures, Organoleptic quality

Introduction
Fruit pulp and juice are commonly used for the preparation of different types of blend beverages. The extraction of juice from fruits will differ depending on the structure and composition of fruits (Shah and Nath, 2006) [17]. Incorporation of natural compounds in the fruits, rhizomes, vegetables such as phyto-chemicals, flavonoids, anti-oxidants and vitamins together without harmful to human consumption is one of the new product development strategy in functional beverage industry to attract customer; the development of such health beneficial beverage is a demand of time (Bhuiyan *et al.*, 2012) [2].

Strawberry is an important fruit crop which belongs to family Rosaceae. It is characterized by fruity, sweet and tart flavor and is widely appreciated for its characteristic aroma, bright red fruit color and juicy texture (Mehriz *et al.*, 2013) [24]. It is monoecious, short day, non-climactric, aggregate, temperate type fruit. The ediable portion of strawberry is succulent thalamus of the flower which include receptacle with numerous achenes (Salaria and Salaria, 2009) [33]. Quality of strawberry fruits depends mainly on their appearance, firmness, and chemical composition (Gunness *et al.*, 2009) [10]. Whole fruit of strawberry contains 89.9% moisture, 0.7% protein, 0.5% fat, 5% total sugars, 1.3% crude fiber and energy value of 37 Kcal per 100 g of fruits. It has 0.52 to 2.26% acidity (as citric acid) and it contains 0.5% total minerals (Chavan, 2015) [4]. The losses can be reduced by developing techniques for the preparation of different value added products either in the form of whole fruit or pulp during peak harvesting season (Durrani *et al.*, 2010; Jain *et al.*, 2011; Sakhale *et al.*, 2012) [8, 14, 32].

Ginger is one of the important medicinal crops belongs to the family Zingiberaceae. Ginger is a valued spice known for its taste, aroma, flavour and medicinal value. It is originated in the Indo-Malayan region, is now widely distributed across the tropics of Asia, Africa, America and Australia. It was domesticated in India and China, which represent the centre of origin of the species. The Arabs introduced ginger to East Africa in the 13th century CE (common or current era) and the Portugese spread it to West Africa and the Pacific islands for commercial cultivation. (Kizhakkayil and Sasikumar, 2011; Ravindran *et al.*, 2006; Mukherjee *et al.*, 2014) [18, 27, 30]. 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) [23]. Ginger is herbaceous aromatic perennial plant which possesses medicinal properties due to its bioactive compounds (Sanwal *et al.*, 2010) [35].

Aloe vera is perennial, drought resistant succulent plant commonly known as 'Ghrit-kumari' and 'Gheegwar'. It belongs to the Asphodelaceae or Liliaceae family, which historically has been used for a variety of medicinal purpose (Ramachandra and Rao, 2008) [29]. The aloe gel is transparent slippery mucilage containing bioactive polysaccharides, mainly partially acetylated glucomannans in addition to desired vital nutrients (Rodriguez *et al.*, 2010) [31]. Aloe vera leaf contains 95-98 per cent of water, 75 nutrients, 200 active compounds, 20 minerals, 18 amino acids, 12 vitamins and 92 enzymes. It can be used as the source of vitamins like A, B_1, B_2, B_6, B_{12}, C, E, folic acid, niacin etc. Owing to its succulent properties, it is a rich source of nutrients and essential minerals (Basmatker *et al.*, 2011) [1]. It can be utilized as a valuable ingredient for food application due to its biological activities and functional properties (Kojo and Qian, 2010) [19]. Aloe vera juice is also used as a flavoring component and preservative in some foods (Christaki and Florou-Paneri, 2010) [5].

The blend beverages can be prepared from blends of different fruits and extracts of plants having medicinal, nutritional and therapeutic values with acceptable palatability. The development of beverages from the blends of strawberry, ginger and aloe vera would provide the opportunities for best use of these perishable raw materials with less post harvest loss and simultaneously availability of palatable drinks of medicinal values to the consumers. The consumers are becoming health conscious and more careful to their health and fitness subsequently demands for natural beverages with medicinal properties over synthetic one increasing in the market. The availability of palatable recipes, processing methods storage life for drinks rich in nutritional and medicinal properties is one of the major constraints before the beverages processing industries.

Materials and Methods

Raw materials

Strawberry (var. Wenter dawn) purchased from farmer field Faizabad, ginger (Local variety) purchased from local market Kumarganj and aloe vera (IC-285629) purchased from Horticultural Main Experiment Station, Department of Medicinal and Aromatic Plants, Acharya Narendra Deva University of Agriculture & Technology, Narendra Nagar Kumarganj and were used for the preparation of RTS.

Extraction of strawberry pulp, aloe vera gel and ginger juice

The methods which are used for the extraction of strawberry pulp, aloe vera gel and ginger juice are shown in Fig.-1, Fig.-2, and Fig.-3, respectively.

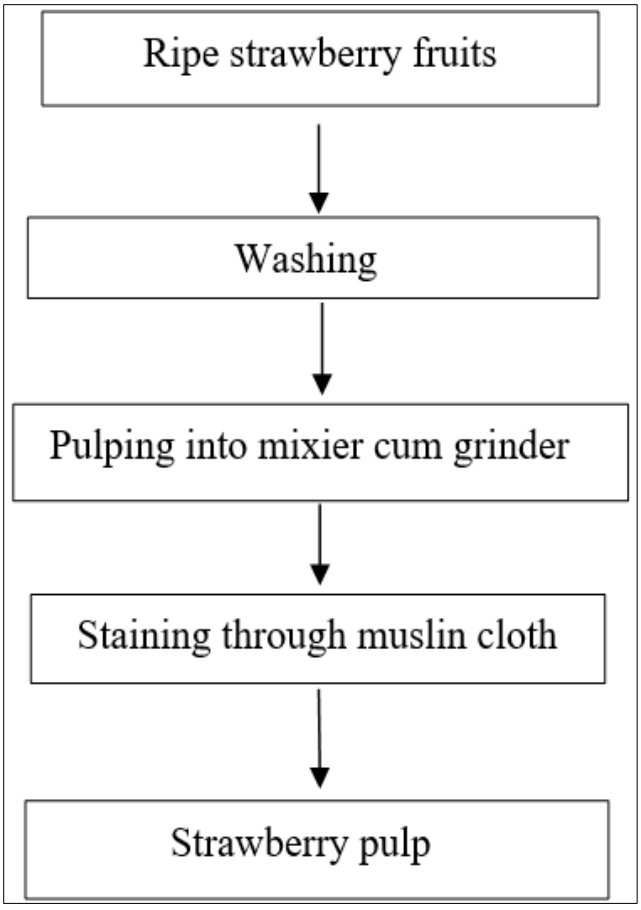

Fig 1: Flow chart of pulp extraction from strawberry fruits

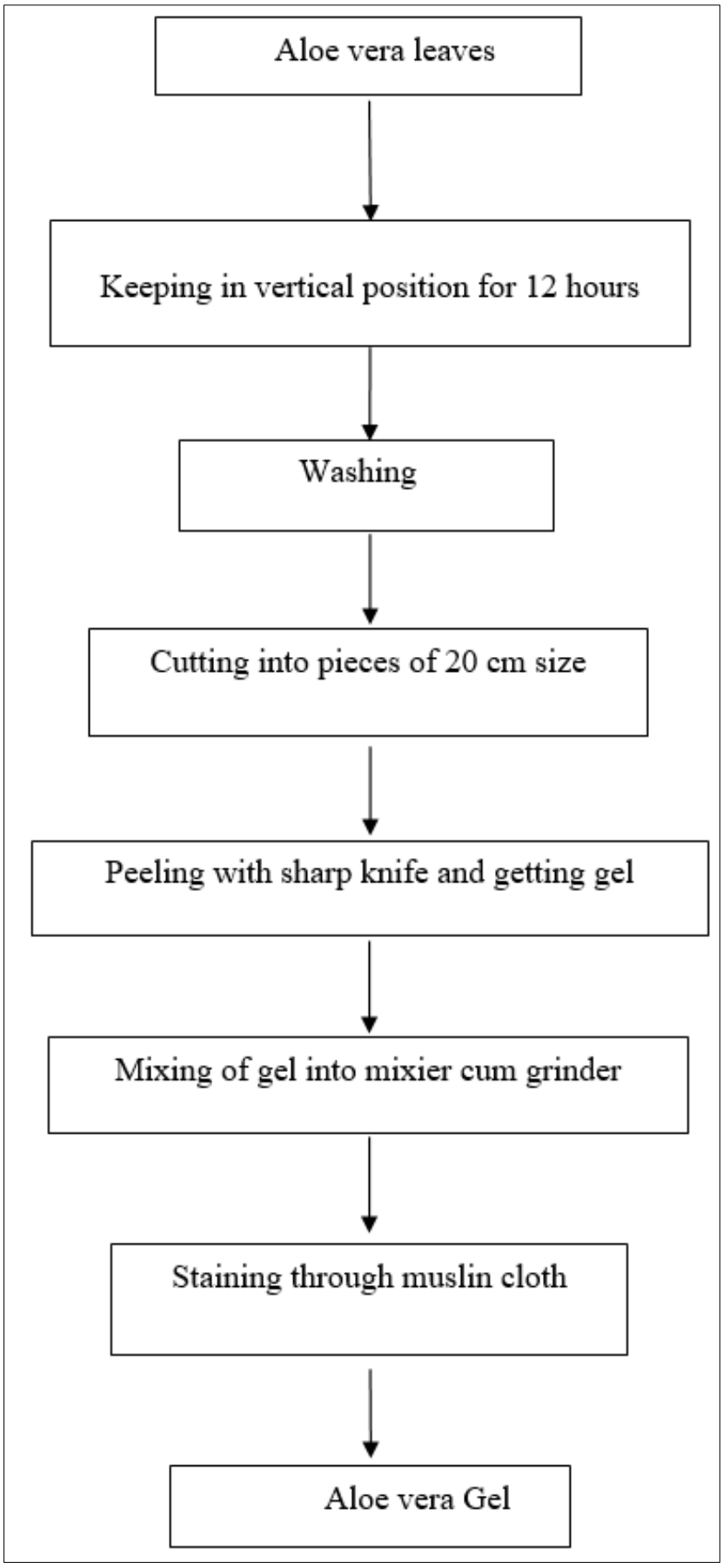

Fig 2: Flow chart of aloe vera gel extraction

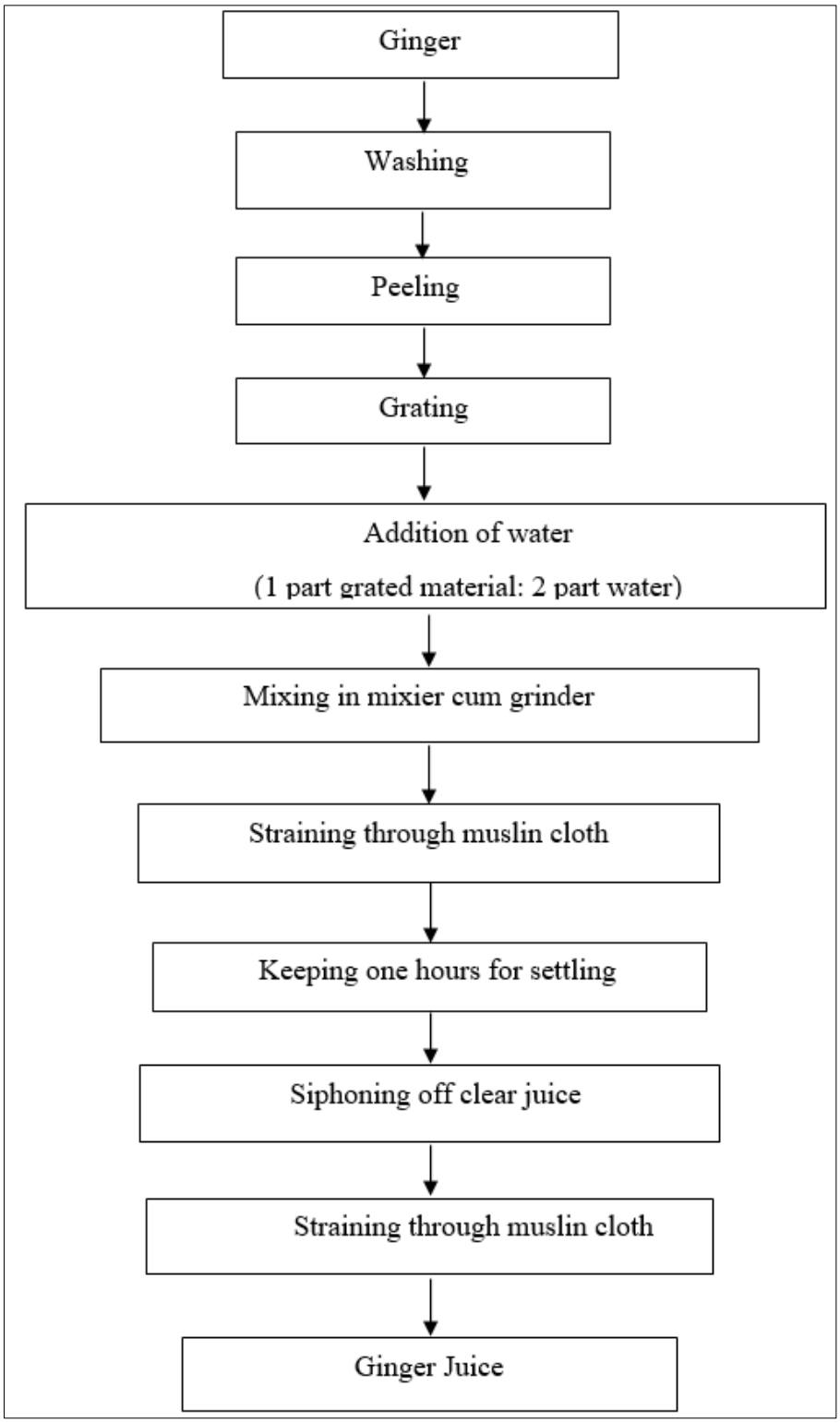

Fig 3: Flow chart of ginger juice extraction

Standardization of blends for RTS:
The RTS containing 10% blends, 13% TSS, 0.3% acidity and 70 ppm SO_2 were prepared from each combination (Treatment) of strawberry pulp, aloe vera gel and ginger juice to obtain best combination for palatable RTS beverages:
T_1 - 10% blend comprising 100% strawberry pulp + 0% aloe vera gel + 0% ginger juice with 13% TSS, 0.3% acidity and 70 ppm SO_2.
T_2 - 10% blend comprising 0% strawberry pulp + 100% aloe vera gel + 0% ginger juice with 13% TSS, 0.3% acidity and 70 ppm SO_2.
T_3 - 10% blend comprising 0% strawberry pulp + 0% aloe vera gel + 100% ginger juice with 13% TSS, 0.3% acidity and 70 ppm SO_2.
T_4 - 10% blend comprising 33.33% strawberry pulp + 33.33% aloe vera gel + 33.33% ginger juice with 13% TSS, 0.3% acidity and 70 ppm SO_2.
T_5 - 10% blend comprising 40% strawberry pulp + 30% aloe vera gel + 30% ginger juice with 13% TSS, 0.3% acidity and 70 ppm SO_2.

T_6 - 10% blend comprising 50% strawberry pulp + 25% aloe vera gel + 25% ginger juice with 13% TSS, 0.3% acidity and 70 ppm SO_2.
T_7 - 10% blend comprising 60% strawberry pulp + 20% aloe vera gel + 20% ginger juice with 13% TSS, 0.3% acidity and 70 ppm SO_2.
T_8 - 10% blend comprising 70% strawberry pulp + 15% aloe vera gel + 15% ginger juice with 13% TSS, 0.3% acidity and 70 ppm SO_2.
T_9 - 10% blend comprising 80% strawberry pulp + 10% aloe vera gel + 10% ginger juice with 13% TSS, 0.3% acidity and 70 ppm SO_2.
T_{10} - 10% blend comprising 90% strawberry pulp + 5% aloe vera gel + 5% ginger juice with 13% TSS, 0.3% acidity and 70 ppm SO_2.

Preparation of RTS

For the preparation of palatable RTS one liter RTS of each combination of blend containing 10% blend, 13% TSS, 0.3% acidity and 70 ppm SO_2 were prepared and organoleptically evaluated by the panel of nine semi trained judges to find out the excellent combination of strawberry pulp, aloe vera gel and ginger juice blends. Fig.-4 shown the flow chart followed in RTS preparation.

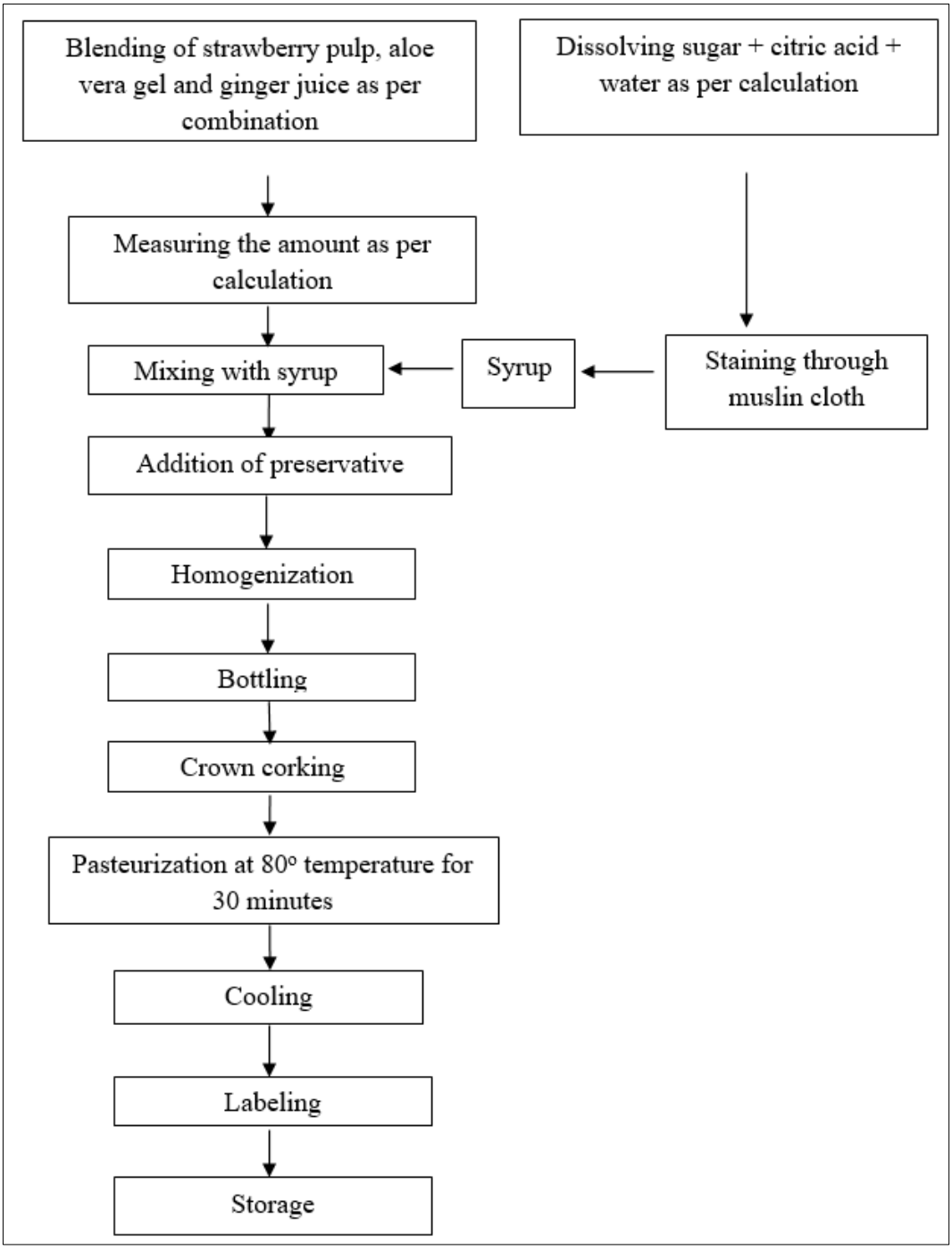

Fig 4: Flow chart of strawberry, aloe vera and ginger blended RTS preparation.

Storage studies

At end for the storability of the product 5 liters from the best combination of RTS blend was prepared, filled into 200 ml capacity of RTS bottles, left 2.5 cm head space, crown

corked, pasteurized and kept under ambient (22.8 - 34.0° C) and low (4-6ºC) temperatures. During storage observation on changes in TSS, acidity, ascorbic acid (vitamin-C), reducing sugars, non-reducing sugar, total sugars, pH, browning and organoleptic quality were recorded at monthly intervals during five months of storage and are described as follows.

The TSS of the sample was determined by using hand refractometer (Erma Inc. Tokyo Japan, 0-32% and 28-62%) in terms of percentage. The values of TSS recorded at ambient and low temperatures were corrected to 20º C with the help of reference table and the mean value of the sample was expressed as per cent TSS content. The acidity was estimated by titrating known quantity of sample against standard N/10 NaOH solution using 2-3 drops of phenolphthalein indicator and expressed in per cent anhydrous citric acid. Ascorbic acid (vitamin-C) content was determined by preparing sample in 3% HPO_3 (metaphosphoric Acid) solution then determined by 2, 6-dichlorophenol indophenol dye solution till the appearance of light pink colour. The reducing, non-reducing and total sugars were estimated by using Fehling's solution A and B and methyl blue as an indicator in boiling stage. For the measurement of pH, INSIF digital pH meter model (IE-702) was used, which was standardized and calibrated with different buffers of pH 4.0 and pH 7.0. To determine the non-enzymatic browning sample was taken and mixed with 30 ml 60% alcohol thoroughly then centrifuged for 15 minutes at 1500 rpm, filtered through whatman filter paper No. 1 to obtain clear solution. Thereafter the absorbance of sample was recorded on "Igene Labserve" model UV vis Double Beam spectrophotometer at 440 nm wave length using 60% aqueous alcohol as blank. The increase in O.D. of a sample at 440 nm was expressed as non-enzymatic browning. For the evaluation of organoleptic quality of RTS a semi trained panel of 9 judges was conducted, who scored on the 9.0 point Hedonic Rating Scale to assess the colour, flavour and texture of the beverages.

Statistical analysis

The experiments were conducted in 3 replications and the observations were recorded at monthly intervals. The statistical analysis of the data was done by computer software with completely randomized design (CRD) that described by Panse and Sukhatne (1985) [28].

Results and Discussion

Chemical attributes of strawberry pulp, aloe vera gel and ginger juice

The data on the chemical attributes of strawberry pulp, aloe vera gel and ginger juice recorded and presented in Table-1 observed that TSS, acidity, vitamin-C, reducing sugars, non-reducing sugar, total sugars, and pH of strawberry pulp used in RTS making comprised 7.00 per cent, 1.28 per cent, 56.87 mg/100g, 3.15 per cent, 2.70 per cent, 5.85 per cent and 3.40, respectively. Similarly Hossain *et al.* (2015) [13] considered that strawberries pulp contains 8.50% TSS, 1.02% acidity, 61.65 mg/100g ascorbic acid, 3.37% total sugars and 3.44 pH. Aloe vera gel contained 1.83% TSS, 0.20% acidity, 2.44 mg/100g vitamin-C, 0.49% reducing sugars, 1.11% non-reducing sugar, 1.60% total sugars and 4.48 pH, respectively. Whereas Lavanya *et al.* (2018) [22] noticed that aloe vera contains 2.14±0.09% TSS, 0.02±0.003% acidity, 2.00±0.41 mg/100g ascorbic acid, 0.34±0.04% reducing sugars, 0.29±0.02% non-reducing sugar, 0.59±0.03% total sugars and 4.00±0.05 pH. Ginger juice contained 2.22% TSS, 0.28% acidity, 1.97 mg/100g ascorbic acid, 0.60% reducing sugars, 1.14% non-reducing sugar, 1.74% total sugars and 5.65 pH, respectively. Whereas, Chandra *et al.* (2018) [3] noticed that ginger contains 3±0.22% TSS, 0.8±0.46% acidity, 1.38±0.32 mg/100g vitamin-C and 5.4±0.05 pH.

Standardization of blends for RTS

Results appears that the treatment no. 7 containing 60% strawberry pulp + 20% aloe vera gel + 20% ginger juice was found to be best over other treatments for the preparation of palatable quality of RTS blend beverages. Therefore 10% blend comprising 60% strawberry pulp, 20% aloe vera gel and 20% ginger juice with 13% TSS, 0.30% acidity and incorporated with 70 ppm SO_2 can be used to obtain quality palatable RTS beverages. The variation in organoleptic quality of treatments is obvious because combinations of raw materials influence the sensory quality of products (Table-2). Harendra and Deen (2021) [11] observed that 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 for the preparation of RTS. Gill *et al.* (2020) [9] found that ready to serve (RTS) beverage prepared from 50% kagzi lime juice, 30% aloe vera gel and 20% rose juice with 20% blend, 10% TSS and 0.50% acidity was stood best in the organoleptic quality followed by RTS with 20% blend, 12% TSS and 0.47% acidity. Sherzad *et al.* (2017) [38] perceived that RTS prepared from 50:50 (Strawberry: Grape) blends was found to be best based on sensory scores.

Table 1: Chemical attributes of strawberry pulp, aloe vera gel and ginger juice

S. No.	Chemical attributes	Mean values		
		Strawberry pulp	Aloe vera gel	Ginger juice
1.	Total soluble solids (%)	7.00	1.83	2.22
2.	Acidity (%)	1.28	0.20	0.28
3.	Vitamin-C (mg/100 g)	56.87	2.44	1.97
4.	Reducing sugars (%)	3.15	0.49	0.60
5.	Non-reducing sugar (%)	2.70	1.11	1.14
6.	Total sugars (%)	5.85	1.60	1.74
7.	pH	3.40	4.48	5.65

Changes during storage life of prepared squash

Data recorded on biochemical changes of RTS during storage is tabulated in Table3 and Table-4, which observes that TSS of RTS increased continuously under both ambient (22.8-34.0ºC) and refrigerated (4-6 ºC) temperatures from 13.00% to 13.52% and from 13.00% to 13.40%, respectively. The changes in TSS content might be due to inversion or hydrolysis of polysaccharides into simple sugars. The conversion rate was higher in ambient temperature compare to refrigerated temperature, which might be due to temperature effects. The present findings are in agreement with the considerations of prior research worker like Harendra and Deen (2021) [11] on mango, kagzi lime, aloe vera and ginger based blended RTS, Gill *et al.* (2020) [9] on RTS beverage prepared from kagzi lime juice, aloe vera gel and rose juice, Singh *et al.* (2018) [41] on blend RTS prepared from mango and aloe vera, Mishra and Sangma (2017) [26] on aloe vera, ginger, sweet lime and amla RTS drinks and Singh *et al.* (2017) on aloe vera gel and ginger juice ready to serve blend. Acidity content in blended beverages of RTS increased

continuously during storage under both ambient as well as refrigerated temperatures. It was increased from 0.30% to 0.83% and from 0.30% to 0.62%, respectively. An increase in the acidity content might be due to degradation of pectic substances and formation of organic acid (Conn and Stumf, 1976) [6]. The formation of citric acid is more under ambient storage as compare to refrigerated storage conditions which might be because of higher rate of pectic substances degradation under higher temperature storage. Similar results that an increase in acidity content during storage of products were reported by Harendra and Deen (2021) [11] in mango, kagzi lime, aloe vera and ginger based blended RTS beverages, Gill *et al.* (2020) [9] in blended RTS beverage prepared from kagzi lime juice, aloe vera gel and rose juice, Khalid *et al.* (2019) [17] in strawberry and dates blend ready to serve drink, Selvi *et al.* (2018) [36] in guava-lime-ginger RTS beverage, Singh *et al.* (2018) [41] in blend RTS prepared from mango and aloe vera and Mehta *et al.* (2018) [25] in guava, lime and ginger blended RTS. Vitamin-C content of RTS prepared from strawberry, aloe vera and ginger blends gradually decreased up to the end of storage time and content was found to be significantly reduced from 6.10 mg/100ml to 5.65 mg/100ml and 6.10 mg/100ml to 5.80 mg/100ml at ambient as well as low temperatures, respectively. The depletion in ascorbic acid (vitamin- C) content might be due to oxidation of ascorbic acid into dehydro-ascorbic acid by oxygen (O_2) trapped into containers and intramolecular space of the product. The present results on changes in ascorbic acid (vitamin-C) content during storage of beverages are also supported by the findings of Harendra and Deen (2021) [11] on mango, kagzi lime, aloe vera and ginger based blended RTS, Khalid *et al.* (2019) [17] on strawberry and dates blend ready to serve drink, Selvi *et al.* (2018) [36] on guava-lime-ginger RTS beverage and Singh *et al.* (2018) [41] on blend RTS prepared from mango and aloe vera. The decreasing trend of ascorbic acid content shows that ascorbic acid content was more under low temperature conditions that might be due to temperature influence on ascorbic acid oxidation. The reducing sugars content of RTS increased continuously up to the termination of storage period under both ambient and low temperatures and it was increased from 0.40% to 1.06% and from 0.40% to 0.83%, respectively. The increase in reducing sugars of products might be due to conversion of non reducing sugar into reducing sugars. Similar considerations were also reported by the older workers like Harendra and Deen (2021) [11] in mango, kagzi lime, aloe vera and ginger based blended RTS beverages, Gill *et al.* (2020) [9] in blended RTS beverage prepared from kagzi lime juice, aloe vera gel and rose juice, Khalid *et al.* (2019) [17] in strawberry and dates blended ready to serve drink, Mehta *et al.* (2018) [25] in RTS beverages of guava, Mishra and Sangma (2017) [26] in aloe vera, ginger, sweet lime and amla RTS drinks and Singh *et al.* (2017) [40] in ready to serve blended beverages of aloe vera gel and ginger juice. These findings support the results of present investigation. The non-reducing sugar content of RTS showed gradual decreasing trend stored under ambient temperature (From 11.08% to 10.74%) and refrigerated temperature (From 11.08% to 10.87%). Antithesis to reducing and total sugars, reduction in non-reducing sugar might be due to conversion of non-reducing sugar. The results are similar with the prior results of Khalid *et al.* (2019) [17] in strawberry and dates blended RTS, Singh *et al.* (2018) [41] in blend RTS prepared from mango and aloe vera, Mehta *et al.* (2018) [25] in blended RTS of guava, Kumar and Deen (2017) in RTS beverage prepared from wood apple pulp and Kausar *et al.* (2016) [16] in blended RTS of aloe vera and lemon juice. These considerations support are in conformity to present findings on changes in non-reducing sugar content of products during storages. The total sugars content of RTS increased gradually from 11.48% to 11.80 and from 11.48% to 11.70% when stored under ambient as well as low temperatures, respectively. A rise in total sugars of product might be due to inversion of non-reducing sugar into reducing sugars. The present results on increase of total sugars content in RTS is also similar to findings of different fruits-based beverages (Harendra and Deen, 2021; Gill *et al.*, 2020; Khalid *et al.*, 2019; Selvi *et al.*, 2018; Singh *et al.*, 2018 [41] and Mehta *et al.*, 2018) [11, 9, 17, 36, 25]. The pH of RTS decreased continuously up to the termination of storage period under ambient as well as refrigerated conditions from 1.43 to 1.08 and 1.43 to 1.22, respectively. The cause of decrease in pH content is may be due to increasing in acidity of these products. Similar observations were recorded by Gill *et al.* (2020) [9] in kagzi lime juice, aloe vera gel and rose juice blended RTS beverage, Khalid *et al.* (2019) [17] in strawberry and dates blended RTS, Hegde *et al.* (2018) [12] in aonla and giger blended RTS drink and Singh *et al.* (2018) [41] in aloe vera and mango blended RTS. These reports support the observations recorded on pH of RTS beverage in present studies. The browning in RTS increased continuously up to the termination of storage under ambient as well as refrigerated temperatures. It was increased from 0.23 (O.D.) to 0.45 (O.D.) and from 0.23 (O.D.) to 0.36 (O.D.), respectively. An increase in browning of RTS could be mainly due to the non- enzymatic reaction (Millard reaction) in which organic acid reacts with sugars and amino acids and leads to the formation of brown pigments. The browning of beverages stored at low temperature was found to be slow in comparison to ambient storage conditions because low temperature might slowed the Millard reaction. The present findings are also in agreement with the findings of previous research workers like Singh *et al.* (2017) [7] on aloe gel and ginger juice blended RTS, Devra *et al.* (2017) [7] on aonla based blended RTS, Kumar and Deen (2017) on RTS beverage prepared from wood apple pulp, Singh (2016) [39] on phalsa and ginger blended RTS, Tiwari and Deen (2014) [42] on bael and aloe vera blended RTS and Lanjhiyana *et al.* (2010) [21] on lime and ginger blended RTS. The organoleptic quality of RTS reduced continuously with the storage period and it was acceptable up to 4 months of storage under ambient and refrigerated conditions. It was reduced from 8.24 to 7.16 and from 8.24 to 7.29, respectively. It might be cause of temperature, because temperature plays an important role in biochemical changes that leads to development of off flavour as well as discolouration in the beverages. The reduction in organoleptic quality are also reported in previous studies performed by Harendra and Deen (2021) in blended RTS beverages of mango, kagzi lime, aloe vera and ginge, Khalid *et al.* (2019) [17] in strawberry and dated blended RTS, Singh *et al.* (2018) [41] in mango and aloe vera blended RTS, Kumar and Deen (2017) in wood apple RTS beverage, Sangma *et al.* (2016) [34] in aloe vera, sweet lime, amla and ginger blended RTS, Jairajpuri *et al.* (2016) [15] in blended RTS beverage prepared from aloe vera gel and sea buckthorn berry juice.

Table 2: Organoleptic quality of RTS prepared from different blends of strawberry pulp, aloe vera gel and ginger juice

Treatments	Different combination of blends			Organoleptic quality	
	Strawberry pulp (%)	Aloe vera gel (%)	Ginger juice (%)	Score	Rating
T_1	100	Nil	Nil	8.00	Like moderately
T_2	Nil	100	Nil	6.56	Like moderately
T_3	Nil	Nil	100	6.66	Like slightly
T_4	33.33	33.33	33.33	7.42	Like moderately
T_5	40	30	30	7.75	Like moderately
T_6	50	25	25	7.89	Like moderately
T_7	60	20	20	8.24	Like slightly
T_8	70	15	15	7.17	Like moderately
T_9	80	10	10	7.42	Like very much
T_{10}	90	5	5	7.25	Like slightly
S.Em±				0.04	
CD at 5%				0.11	

Table 3: Changes during storage life of prepared RTS under ambient temperature (22.8-34.0ºC)

Storage period (Months)	TSS (%)	Acidity (%)	Vitamin-C (mg/100ml)	Reducing Sugars (%)	Non-reducing sugar (%)	Total sugars (%)	pH	Browning (O.D.)	Organoleptic	
									Score	Rating
0	13.00	0.30	6.10	0.40	11.08	11.48	1.43	0.23	8.24	LVM
1	13.15	0.37	6.01	0.58	11.00	11.58	1.38	0.26	8.01	LVM
2	13.25	0.51	5.88	0.73	10.90	11.63	1.30	0.31	7.76	LM
3	13.38	0.68	5.72	0.91	10.83	11.74	1.21	0.37	7.48	LM
4	13.52	0.83	5.65	1.06	10.74	11.80	1.08	0.45	7.16	LM
S.Em±	0.02	0.02	0.01	0.04	0.02	0.01	0.01	0.03	0.04	
CD at 5%	0.08	0.06	0.04	0.13	0.07	0.04	0.04	0.09	0.13	

LVM: Like very much, LM: Like moderately

Table 4: Changes during storage life of prepared RTS under refrigerated temperature (4-6 ºC)

Storage period (Months)	TSS (%)	Acidity (%)	Vitamin-C (mg/100ml)	Reducing Sugars (%)	Non-reducing sugar (%)	Total sugars (%)	pH	Browning (O.D.)	Organoleptic	
									Score	Rating
0	13.00	0.30	6.10	0.40	11.08	11.48	1.43	0.23	8.24	LVM
1	13.09	0.33	6.04	0.49	11.03	11.52	1.40	0.24	8.10	LVM
2	13.17	0.39	5.96	0.60	10.98	11.58	1.34	0.27	7.90	LM
3	13.29	0.49	5.87	0.69	10.94	11.63	1.29	0.31	7.65	LM
4	13.40	0.62	5.80	0.83	10.87	11.70	1.22	0.36	7.29	LM
S.Em±	0.02	0.01	0.03	0.01	0.02	0.03	0.02	0.01	0.01	
CD at 5%	0.07	0.04	0.08	0.04	0.05	0.09	0.06	0.04	0.04	

LVM: Like very much, LM: Like moderately

Acknowledgement

I have pleasure to express my deep and profound sense of gratitude and heartfelt thanks my Major Advisor Dr. Bhagwan Deen, Professor & Head, Department of Post-Harvest Technology, Associate Professor Department of Fruit Science, ANDUA&T, Kumarganj, Ayodhya, for his best knowledge, wealth of experience, inspiring, learned guidance, constructive criticism, constant encouragement and reasonable scientific advice in carrying out the research and preparation of this manuscript. I am immensely thankful to Department of Fruit Science, College of Horticulture and Forestry, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, U.P. for providing all kinds of support to facilitate this experiment. I am immensely thankful from India government, ICAR and government of Afghanistan to provide me this opportunity to have done my Doctor of Philosophy degree in one of the best universities of India.

Conclusion

It may be concluded from above findings that RTS prepared from 10 per cent of blend consisting 60% strawberry pulp, 20%, 20% aloe vera and ginger juice adjusted to 13 percent TSS and 0.30 per cent acidity with 70 ppm SO_2 (T_7) was found best on Hedonic Scale by the panel of semi trained judges. The TSS, acidity, reducing sugars, total sugars and browning was increased, whereas vitamin-C, non-reducing sugar, pH and organoleptic quality was decreased during storage under both ambient (22.8-34.0ºC) and refrigerated (4-6ºC) temperatures. The squash can be stored with acceptable quality up to 5 months under both ambient as well as refrigerated temperatures.

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