

# Studies on ready to serve (RTS) beverage from dragon fruit

■ Virendra Foke\*, Amit Zambare, Dipak M. Gaikwad and Nikhil Alhat

Shriram College of Agricultural Engineering, Paniv, Solapur (M.S.) India

Email : virendrafoke@gmail.com

\*Author for Correspondence

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## SUMMARY :

The present study attempted to develop a RTS beverage using dragon fruit. Preliminary investigations were carried out based on the standards specified for RTS fruit drinks to develop a suitable recipe. RTS beverages were prepared containing four levels of dragon fruit juice (8%, 10%, 12% and 14%), citric acid (0.2%, 0.3%, 0.4% and 0.5%) with 12 per cent sugar and 0.01 per cent potassium Meta bisulphite. Sensory evaluation was conducted using 25 untrained panelists to determine the best juice concentration to develop the RTS. Proportion with 12 per cent dragon fruit juice and 0.4 per cent citric acid was selected as the best level for the development of dragon fruit ready to serve beverage. Storage study for analysis of acidity, TSS, ascorbic acid and pH from 0 to 50 days was investigated for the prepared beverage at a regular interval of ten days. A slight increase in acidity and TSS and decrease in pH and ascorbic acid in samples stored at room temperature was observed.

**KEY WORDS :** Dragon fruit, RTS, TSS, Acidity, pH, Room temperature

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**D**ragon fruit (*Hylocereus undatus*) is a non-climacteric fruit belongs to one of the cactus species. It is also known as Pitaya and it is dark red to pink in colour with green overlapping on the surface. It is well recognized as an ornamental plant, as blooming large scented flowers and now-a-days it is also spreading worldwide for its fruits. The fruit, having high antioxidant activity is the rich source of potassium, serum protein, fibre, vitamins and minerals which are major needs of human diet.

The most valuable and commonly used edible part of dragon fruit is the fruit flesh which constitutes 70-80 per cent (w/w) of the fruit, sweet and white in colour having numerous black seeds that can be consumed with

the flesh. Flesh is firm and crispy in texture, with lingering flavour (Hoa *et al.*, 2006). The fruit is consumed as a flesh or in the form of juice, jellies, marmalades, jam, wine and beverages (Kirti *et al.*, 2018). Consumption of the dragon fruit juice has health benefits and contributes to lower the blood cholesterol level and to neutralize the toxic elements in the blood, it improves the blood circulation of body. It also helps to prevent colon cancer, diabetes, control sugar level and promote dental health (AOAC, 2000). Considering the functional importance, nowadays this fruit has gained significant economic value in the market (Sharma *et al.*, 2008). Keeping in view of the above facts, the present study was therefore formulated to prepare a ready to serve beverage using

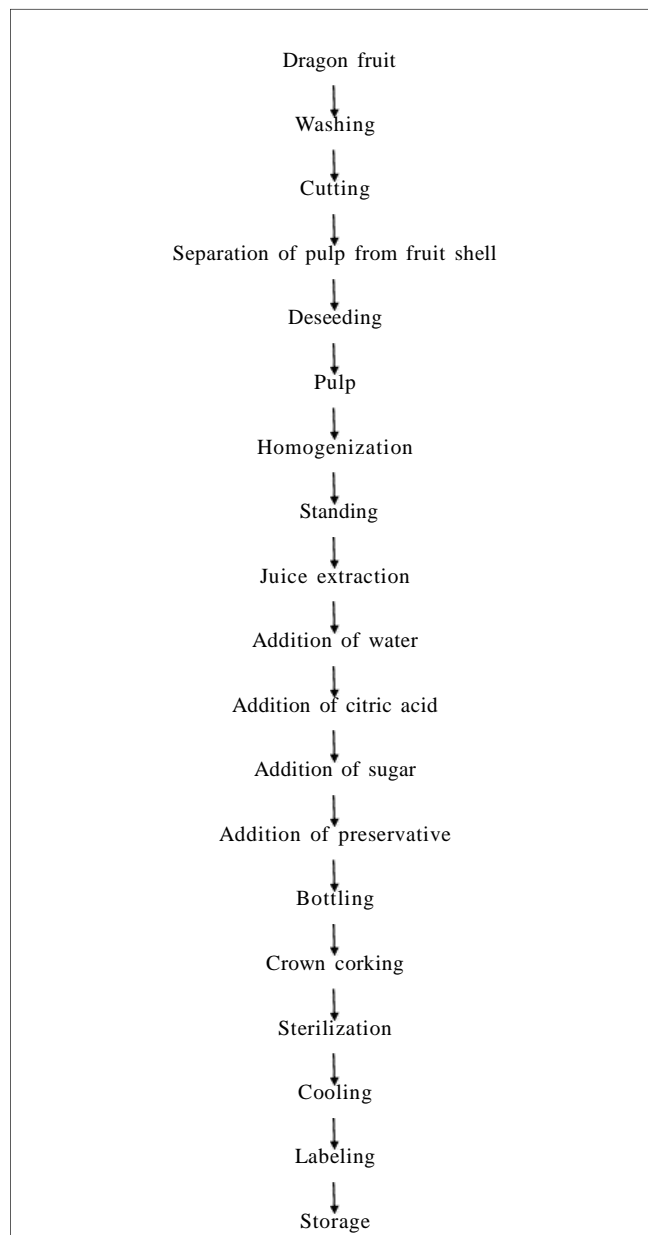
dragon fruit juice and evaluate the quality of beverage during storage at room temperature. This will improve the overall utilization and value addition aspects of dragon fruit.

### EXPERIMENTAL METHODS

The various proportion for the preparation of RTS beverage with four levels of juices (8%, 10%, 12% and 14%), citric acid (0.2%, 0.3%, 0.4% and 0.5%) with 12 per cent sugar and 0.01 per cent potassium meta bisulphite was implemented. Fresh, fully ripened, uniform sizes dragon fruit were procured from local market of Akhuj (MH). Dragon fruit free from disease and insect infections were selected for the investigation. Other raw materials included sugar, glass bottles, chemicals and preservatives used for sample preparation. Procured dragon fruits were washed, halved in to two portions and pulp was removed from outer shell. The seeds from pulp were removed by press filtration through muslin cloth and then pulp was homogenized into mixer for 05 min. The uniformly homogenized liquid pulp was allowed to stand for 30 min to get liquid juice by removing upper foam layer and again strained through muslin cloth. RTS beverage by mixing the juice with required quantity of sugar syrup prepared from sugar, citric acid, preservative and water with gentle heating (Deka *et al.*, 2005). Experiments were conducted at Agricultural Processing and Food Engineering Lab (Shriram College of Agricultural Engineering, Paniv, Malshiras (M), Solapur (MH)). The best recipe was evaluated by sensory analysis with hedonic rating test as given in Table A by 25 untrained panelists. RTS beverage prepared from best proportion level was used for storage study to evaluate the quality of beverage at 0,

10, 20, 30, 40 and 50 days of storage. RTS sample were packaged in glass bottles of 200 ml size by using crown corking machine with leaving head space of 2 cm. All bottles were sterilized in autoclave at 121°C for 05 min and cooled in cold water (Ravani and Joshi, 2011). The process flow chart is represented in Fig. A. All samples were stored at room temperature for storage study. The pH, TSS, ascorbic acid and acidity of samples were analyzed as recommended.

Rating(s)	Score
Like extremely	09
Like very much	08
Like moderately	07
Like slightly	06
Neither like nor dislike	05
Dislike slightly	04
Dislike moderately	03
Dislike very much	02
Dislike extremely	01



**Fig. A: Process flow chart for preparation of dragon fruit RTS beverage**

**Overall acceptability:**

A hedonic rating test method was used for the evaluation of best proportion level recommend by Tiwari (2000). A panel consisting of member of different age and different eating habit was constituent to evaluate the quality through properly planned experiment. The panelists were selected from the staff and student of the department. Sample were served to the panelist, they were asked to rate the overall acceptability of the product through the sense of organs. Overall acceptability based as the average data of colour, texture, flavour and taste of the products evaluated the panelist. The hedonic rating scale ranged from extremely like (09) to extremely dislike (01). A test performa was also prepared and given to panelist before evaluation recommended by Tiwari (2000).

**Total soluble solid:**

TSS (°Brix) of carrot and orange RTS beverages was measured by refractrometer of range of 0-32 °Brix and for measuring TSS of dragon fruit juice and beverage was used (Srivastava and Kumar, 2002). A drop of sample was placed on the prism and the observation was taken in front of sun light.

The visible scale showed a dark line indication measuring TSS in degree °Brix.

**Acidity:**

The acidity of RTS beverage was estimated a method described by Srivastava and Kumar (2002). 5ml sample was placed in 100ml distilled water, placed for heating for some period and a shake well and filtrate. Filtrate volume of aliquot was taken and was titrated with 0.1N NaOH using phenolphthalein as indicator. The endpoint was denoted by the appearance of pink colour. The titration was repeated thrice and the average value was recorded.

$$\% \text{ acidity} = \frac{(\text{Titre} \times 0.1 \times 0.064 \times 100)}{(\text{Wt. of sample taken} \times 1000)}$$

**pH:**

pH is the measurement of the logarithm of inverse of hydrogen ion concentration in the solution. The electronic pH meter was calibrated using 7 pH and 4 pH standard buffer solutions. Then electrode was dipped in the test solution and the temperature knob was adjusted to temperature of test solution. The function selector switch was set to pH and reading of digital display was allowed to stabilize (AOAC, 2000).

$$\text{pH} = -\log (\text{H}^+)$$

where, (H<sup>+</sup>) = Hydrogen ion concentration (g/lit).

**Ascorbic acid:**

AOAC (2000) methods were employed for analysis of ascorbic acid (Method 967.21). In this method vitamin C concentration is determined by redox titration using iodine. As iodine is added during titration, the ascorbic acid is oxidized to dehydroascorbic acid, while iodine is reduced to iodine ion.

**EXPERIMENTAL FINDINGS AND ANALYSIS**

The effect of proportion of dragon fruit juice, citric acid and storage period at room temperature on overall acceptability, TSS, pH, acidity and ascorbic acid of RTS beverage were analyzed and discussed below.

**Overall acceptability:**

Overall acceptability in based on the consumer acceptability of four levels which includes the recommended data of colour, taste, texture and flavour. The data for overall acceptability for RTS beverage are given Table 1. The study revealed overall acceptability was recorded highest for sample number 11 beverage with 12 per cent juice and 0.5 per cent citric acid. This sample was used for further storage study at room temperature. Deka *et al.* (2005) also interpreted similar proportion of mango RTS beverage.

**Effect on total soluble solid and acidity:**

The study revealed that the TSS (°Brix) and acidity (%) increased from 14.2 per cent to 14.9 per cent and 0.051 per cent to 0.070 per cent, respectively during storage period from 0 to 50 days shown in Table 2. The increased in TSS may be due to the fact that the dragon fruit juice has more TSS initially. It is clear that the room temperature accelerated the biochemical reaction takes place in the beverage during storage and increased the acidity of the samples. Similar trends were reported by Kumar *et al.* (2013) and Yadav *et al.* (2012).

**Effect on pH and ascorbic acid:**

The study revealed that the pH (%) and ascorbic acid (%) decreased from 2.50 to 2.08 and 8.3 to 3.6 mg/100 ml, respectively during storage period from 0 to 50 days shown in Table 2. The reduction in pH and ascorbic

**Table 1: Average overall acceptability data from panelist for various dragon fruit beverage samples**

Sr. No.	Level		Colour	Texture	Taste	Flavour	Overall acceptability
	Juice (%)	Citric acid (%)					
Sample No. 01	8	0.2	6.8	5.8	3.1	3.0	4.67
Sample No. 02	10	0.2	6.7	6.2	3.2	3.1	4.80
Sample No. 03	12	0.2	6.8	6.4	5.8	5.9	6.22
Sample No. 04	14	0.2	6.9	6.2	6.9	6.4	6.60
Sample No. 05	8	0.3	7.2	5.9	3.2	2.8	4.77
Sample No. 06	10	0.3	7.2	5.8	4.6	3.5	5.27
Sample No. 07	12	0.3	6.9	6.1	7.3	6.3	6.65
Sample No. 08	14	0.3	6.9	6.4	7.1	6.7	6.77
Sample No. 09	8	0.4	6.2	6.0	4.2	4.0	5.10
Sample No. 10	10	0.4	6.1	6.0	6.4	5.7	6.05
Sample No. 11	12	0.4	6.9	6.3	7.9	6.4	6.87
Sample No. 12	14	0.4	6.3	6.2	8.0	6.2	6.67
Sample No. 13	8	0.5	6.1	6.1	5.5	4.9	5.65
Sample No. 14	10	0.5	6.0	6.1	7.0	6.0	6.27
Sample No. 15	12	0.5	6.2	6.2	7.7	7.1	6.80
Sample No. 16	14	0.5	6.1	6.3	7.3	6.9	6.65

**Table 2 : Variation in qualitative parameters of RTS beverage sample**

Storage period (Days)	TSS (°Brix)	Acidity (%)	pH	Ascorbic acid (mg/100ml)
0	14.2	0.051	2.50	8.3
10	14.3	0.057	2.41	6.9
20	14.6	0.059	2.30	5.2
30	14.7	0.063	2.22	4.0
40	14.9	0.069	2.10	3.7
50	14.9	0.070	2.08	3.6

acid of beverage may be due to increasing the acidity of beverage due to biochemical reaction takes place. Similar trends were reported by Sharma *et al.* (2008) and Yadav *et al.* (2012).

### Conclusion:

Results of study concluded that the dragon fruit based RTS beverage with 12 per cent juice, 0.4 per cent citric acid, 12 per cent sugar and 0.01 per cent KMS preservative at room temperature storage condition were acceptable upto 50 days. During storage, acidity and TSS of sample increased with increase in the storage period. This increase in the acidity may be due to the fact of more vitamin C in juice. The pH and ascorbic acid of RTS beverage decreased slightly during storage period may be due to increased acidity due to biochemical reaction

taking place inside beverage.

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