

Physico-chemical character, sensory quality and storage behaviour of rose apple squash blended with *Jamun*

■ RAVISHANKAR M. PATIL, K.S.THIPPANNA, S. J. PRASHANTH AND V. CHIKKASUBBANNA

SUMMARY : Rose apple pulp extract was used for making flavoured beverage by blending with *Jamun*. The prepared product was stored under ambient temperature up to 90 days. The product was subjected to physico chemical analysis at 30 days interval. During storage TSS, pH, total sugars, reducing sugar content was increased. While, acidity, ascorbic acid and non- reducing sugar content were found to be decreased. In organoleptic score the beverage contained 25 per cent pulp, 45 per cent TSS and 1 per cent acidity recorded highest score *i.e.* 4.60 after 90 days of storage.

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Rose apple (*Syzygium jambos* Alston) is one of the underutilized fruit, belongs to family Myrtaceae. Fruit contains protein- 0.7g, fat- 0.2g, and fibre-1.2 g, minerals like calcium-10 mg, magnesium-4 mg, phosphorus-13 mg and iron-0.5 mg per 100g of pulp. It also contains vitamin-A, thiamine, riboflavin, nicotinic acid and vitamin-C. Crisp fleshed and rose scented fruits are like small apple.

In India fruit is regarded as a tonic for the brain and liver. An infusion of fruit acts as a diuretic. This is also employed against diarrhea, dysentery and also beneficial against diabetes. The seeds also have an antiseptic property.

EXPERIMENTAL METHODS

The research was carried out at the Undergraduate Processing Laboratory at the Department of Horticulture, Gandhi Krishi Vigyan Kendra, University of Agricultural Sciences, Bangalore.

For rose apple juice, selected fruits were washed with clean water and boiled for five minutes with an equal amount of water; it was added to reduce enzymatic browning of juice. The pulp was then fed into a warring

blender for mashing into fine texture using the same boiled water. *Jamun* fruits were thoroughly washed in clean water. Pulp was extracted by squeezing the fruits manually and outer skin was removed. The squeezed pulp was diluted with the water in 1:1 ratio and mixed thoroughly and the juice was filtered by squeezing through the muslin cloth. Thus, the extracted pulp was used for preparation of products.

For squash recipes were prepared using 25 per cent pulp with three different proportions of juices of rose apple and *Jamun i.e.*, 75:25, 50:50 and 25:75, respectively with TSS of 40 and 45 per cent and 1.0 per cent acidity.

Preparation of products and chemical analysis :

Rose apple squash blended with Jamun:

The squash was prepared by blends of rose apple and *Jamun* juices in 3 different proportions.

Sugar syrup of 40^oB and 45^oB total soluble solids were prepared by dissolving sucrose into warm water and the required amount of blended juice was added to two sets of these solutions as per the experimental details. TSS values were re-adjusted by addition of sucrose while acidity was adjusted by adding citric acid. Sodium benzoate was added as a preservative to the product. Then the final product was filtered with muslin cloth and(600 ppm per litre) was filled into pre-sterilized glass bottles of 200 ml capacity each. The bottles were corked using crown corking machine followed by pasteurization by holding them in boiling water and later were stored at room

MEMBERS OF RESEARCH FORUM

Author for Correspondence :

RAVISHANKAR M. PATIL, Division of Horticulture, University of Agricultural Sciences, G.K.V.K., BENGALURU (KARNATAKA) INDIA

Coopted Authors :

K.S.THIPPANNA, S. J. PRASHANTH AND V. CHIKKASUBBANNA, Division of Horticulture, University of Agricultural Sciences, G.K.V.K., BENGALURU (KARNATAKA) INDIA

temperature.

The products were tested for chemical parameters i.e. pH, TSS, titratable acidity, ascorbic acid and sugars just after preparation and subsequently at thirty days interval up to ninety days. Sensory evaluation of the products was done according to five scale hedonic ratio scale (Ranganna, 1977).

Treatments :

- S₁T₁: 25% juice (75 % rose apple: 25 % Jamun), 40% TSS and 1.0acidity.
- S₁T₂: 25% juice (75 % rose apple: 25 % Jamun), 45% TSS and 1.0 acidity.
- S₂T₁: 25% juice (50 % rose apple: 50 % Jamun), 40% TSS and 1.0 acidity.
- S₂T₂: 25% juice (50 % rose apple: 50 % Jamun), 45% TSS and 1.0 acidity.
- S₃T₁: 25% juice (25 % rose apple: 75 % Jamun), 40% TSS and 1.0 acidity.
- S₃T₂: 25% juice (25 % rose apple: 75 % Jamun),

45% TSS and 1.0 acidity.

EXPERIMENTAL FINDINGS AND ANALYSIS

Increasing trend of total soluble solids content was noticed in the product during storage. Maximum increase (2.4%) was observed in treatment S₂T₁ (50: 50 per cent blended juice of rose apple and Jamun, respectively and 40% TSS). This increase might be due to hydrolysis of polysaccharides. Similar observation was recorded by Shreelakshmi (1999) in Kokum blended simarouba squash. pH of the prepared product showed an increasing trend during storage (Table 1). After 90 days of storage the highest pH of 5.06 was found in the treatment S₁T₂ (75: 25 per cent blended juice of rose apple and Jamun, respectively and 45% TSS). This might be due to a corresponding decrease in acidity. Similar observation was recorded in passion fruit – pine apple squash (Babu, 2000).

Acidity of the prepared product significantly during storage. Maximum change was observed in case of treatment

Table 1: Changes in total soluble solids (%), pH, ascorbic acid (mg/100g) and acidity (%) in rose apple squash blended with Jamun during storage

| Factors | TSS (%) | | | | pH | | | | Ascorbic acid(mg/100g) | | | | Acidity (%) | | | |
|----------------------------------|---------|---------|---------|---------|-------|---------|---------|---------|------------------------|---------|---------|---------|-------------|---------|---------|---------|
| | Fresh | 30 Days | 60 Days | 90 Days | Fresh | 30 Days | 60 Days | 90 Days | Fresh | 30 Days | 60 Days | 90 Days | Fresh | 30 Days | 60 Days | 90 Days |
| Juice (25%) (Rose apple : Jamun) | | | | | | | | | | | | | | | | |
| 75:25 (S ₁) | 42.50 | 43.61 | 43.95 | 44.60 | 4.51 | 4.68 | 4.78 | 4.94 | 29.54 | 26.78 | 23.43 | 20.00 | 1.00 | 0.79 | 0.59 | 0.43 |
| 50:50 (S ₂) | 42.50 | 43.73 | 44.09 | 44.59 | 4.38 | 4.50 | 4.60 | 4.73 | 30.09 | 27.20 | 24.33 | 20.33 | 1.00 | 0.82 | 0.68 | 0.49 |
| 25:75(S ₃) | 42.50 | 43.80 | 44.19 | 44.66 | 4.31 | 4.39 | 4.45 | 4.56 | 30.53 | 27.65 | 24.65 | 20.80 | 1.00 | 0.84 | 0.70 | 0.52 |
| F test | | * | * | NS | * | * | * | * | * | * | * | * | * | * | * | * |
| SEm ± | 0.00 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.10 | 0.05 | 0.05 | 0.06 | 0.00 | 0.00 | 0.01 | 0.00 |
| CD @ 5% | 0.00 | 0.07 | 0.07 | 0.07 | 0.06 | 0.05 | 0.05 | 0.07 | 0.28 | 0.15 | 0.14 | 0.17 | 0.00 | 0.01 | 0.02 | 0.01 |
| TSS (%) | | | | | | | | | | | | | | | | |
| 40 (T ₁) | 40.00 | 41.68 | 41.98 | 42.38 | 4.27 | 4.42 | 4.52 | 4.66 | 28.74 | 26.32 | 22.99 | 19.25 | 1.00 | 0.86 | 0.70 | 0.52 |
| 45 (T ₂) | 45.00 | 45.75 | 46.17 | 46.85 | 4.53 | 4.63 | 4.70 | 4.83 | 31.36 | 28.10 | 25.28 | 21.50 | 1.00 | 0.78 | 0.61 | 0.44 |
| F test | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| SEm ± | 0.00 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.02 | 0.08 | 0.04 | 0.04 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 |
| CD @ 5% | | 0.06 | 0.06 | 0.06 | 0.05 | 0.04 | 0.04 | 0.05 | 0.23 | 0.12 | 0.11 | 0.14 | 0.00 | 0.01 | 0.01 | 0.01 |
| Interaction | | | | | | | | | | | | | | | | |
| S ₁ T ₁ | 40.00 | 41.53 | 41.83 | 42.38 | 4.40 | 4.61 | 4.74 | 4.83 | 28.43 | 26.05 | 22.38 | 19.00 | 1.00 | 0.82 | 0.65 | 0.49 |
| S ₁ T ₂ | 45.00 | 45.70 | 46.08 | 46.83 | 4.61 | 4.75 | 4.83 | 5.06 | 30.65 | 27.50 | 24.48 | 21.00 | 1.00 | 0.76 | 0.53 | 0.38 |
| S ₂ T ₁ | 40.00 | 41.73 | 41.98 | 42.40 | 4.25 | 4.38 | 4.51 | 4.69 | 28.88 | 26.10 | 23.10 | 19.10 | 1.00 | 0.87 | 0.71 | 0.52 |
| S ₂ T ₂ | 45.00 | 45.73 | 46.20 | 46.78 | 4.52 | 4.61 | 4.68 | 4.77 | 31.30 | 28.30 | 25.55 | 21.55 | 1.00 | 0.78 | 0.65 | 0.46 |
| S ₃ T ₁ | 40.00 | 41.78 | 42.15 | 42.38 | 4.15 | 4.25 | 4.31 | 4.45 | 28.93 | 26.80 | 23.50 | 19.65 | 1.00 | 0.88 | 0.74 | 0.54 |
| S ₃ T ₂ | 45.00 | 45.83 | 46.23 | 46.95 | 4.46 | 4.52 | 4.59 | 4.67 | 32.13 | 28.50 | 25.80 | 21.95 | 1.00 | 0.80 | 0.67 | 0.49 |
| F test | - | * | * | * | NS | * | * | * | * | * | * | * | - | * | * | * |
| SEm ± | 0.00 | 0.03 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.03 | 0.13 | 0.07 | 0.07 | 0.08 | 0.00 | 0.00 | 0.01 | 0.01 |
| CD @ 5% | 0.00 | 0.10 | 0.10 | 0.10 | | 0.07 | 0.07 | 0.09 | 0.40 | 0.21 | 0.19 | 0.24 | 0.00 | 0.01 | 0.02 | 0.02 |

* indicates significance of value at p=0.05, NS. Non- significant

Table 2: Changes in total sugars (%), reducing sugar (%) and non reducing sugar (%) in rose apple squash blended with Jamun during storage

| Factors | Total sugars (%) | | | | Reducing sugar (%) | | | | Non reducing sugar (%) | | | |
|---|------------------|---------|---------|---------|--------------------|---------|---------|---------|------------------------|---------|---------|---------|
| | Fresh | 30 Days | 60 Days | 90 Days | Fresh | 30 Days | 60 Days | 90 Days | Fresh | 30 Days | 60 Days | 90 Days |
| Juice (25%) (Rose apple: <i>Jamun</i>) | | | | | | | | | | | | |
| 75:25 (S ₁) | 38.51 | 38.90 | 39.20 | 39.62 | 11.33 | 19.12 | 27.15 | 31.23 | 27.55 | 19.78 | 12.02 | 8.39 |
| 50:50 (S ₂) | 38.64 | 39.04 | 39.28 | 39.76 | 11.48 | 19.21 | 27.27 | 31.35 | 27.17 | 19.83 | 12.10 | 8.40 |
| 25:75(S ₃) | 38.79 | 39.18 | 39.44 | 39.86 | 11.63 | 19.33 | 27.33 | 31.47 | 27.17 | 19.85 | 12.10 | 8.39 |
| F test | * | * | * | * | * | * | * | * | NS | NS | NS | NS |
| SEm ± | 0.02 | 0.02 | 0.02 | 0.03 | 0.01 | 0.02 | 0.02 | 0.01 | 0.23 | 0.03 | 0.03 | 0.03 |
| CD @5% | 0.07 | 0.07 | 0.06 | 0.09 | 0.04 | 0.05 | 0.05 | 0.04 | 0.68 | 0.08 | 0.07 | 0.08 |
| TSS (%) | | | | | | | | | | | | |
| 40 (T ₁) | 36.86 | 37.25 | 37.55 | 38.00 | 11.25 | 18.92 | 27.08 | 31.24 | 25.85 | 18.33 | 10.52 | 6.75 |
| 45 (T ₂) | 40.44 | 40.82 | 41.07 | 41.50 | 11.70 | 19.52 | 27.41 | 31.46 | 28.74 | 21.30 | 13.63 | 10.03 |
| F test | * | * | * | * | * | * | * | * | * | * | * | * |
| SEm ± | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.19 | 0.02 | 0.02 | 0.02 |
| CD @ 5% | 0.06 | 0.05 | 0.05 | 0.07 | 0.03 | 0.04 | 0.04 | 0.04 | 0.55 | 0.06 | 0.06 | 0.06 |
| Interaction | | | | | | | | | | | | |
| S ₁ T ₁ | 36.78 | 37.08 | 37.48 | 37.93 | 11.06 | 18.88 | 26.95 | 31.11 | 26.43 | 18.20 | 10.53 | 6.81 |
| S ₁ T ₂ | 40.25 | 40.73 | 40.93 | 41.31 | 11.59 | 19.36 | 27.34 | 31.36 | 28.66 | 21.36 | 13.52 | 9.96 |
| S ₂ T ₁ | 36.88 | 37.24 | 37.54 | 38.04 | 11.27 | 18.90 | 27.15 | 31.28 | 25.61 | 18.34 | 10.51 | 6.73 |
| S ₂ T ₂ | 40.41 | 40.83 | 41.03 | 41.49 | 11.69 | 19.52 | 27.38 | 31.43 | 28.73 | 21.32 | 13.68 | 10.06 |
| S ₃ T ₁ | 36.94 | 37.44 | 37.63 | 38.03 | 11.43 | 18.97 | 27.15 | 31.32 | 25.51 | 18.47 | 10.51 | 6.71 |
| S ₃ T ₂ | 40.65 | 40.91 | 41.25 | 41.69 | 11.82 | 19.69 | 27.51 | 31.61 | 28.83 | 21.23 | 13.68 | 10.08 |
| F test | * | * | * | * | * | * | * | * | NS | * | * | * |
| SEm ± | 0.03 | 0.03 | 0.03 | 0.04 | 0.02 | 0.02 | 0.02 | 0.02 | 0.32 | 0.04 | 0.04 | 0.04 |
| CD @5% | 0.10 | 0.09 | 0.09 | 0.12 | 0.06 | 0.07 | 0.06 | 0.06 | 0.96 | 0.11 | 0.11 | 0.11 |

*indicates significance of value at p=0.05, NS. Non- significant

S₁T₂ (75: 25 per cent blended juice of rose apple and *Jamun*, respectively and 45% TSS) where it decreased from 1.0 per cent to 0.38 per cent during 90 days of storage (Table 1). This might be due to acid hydrolysis of polysaccharides. Analogous results were reported in amla juice (Gajanana, 2002). The ascorbic acid content decreased during the entire storage period. However, treatment S₃T₂ (75:25 per cent blended juice of *Jamun* and rose apple, respectively and 45% TSS) recorded maximum ascorbic acid content of 32.13 mg/100 g initially, which declined to 21.95 mg/100 g after 90 days of storage. This might be due to the effect of storage temperature and catalytic activity of fructose (Brock *et al.*, 1998).

After 90 days of storage maximum increment in total sugars and reducing sugar content was found in treatment S₂T₁ and S₁T₁, respectively (Table 2). Similar results were reported by Gajananan (2002) in aonla juice. There was a continuous reduction in non-reducing sugar content of squash throughout the storage period; the maximum reduction (5.43%) of non-reducing sugar content was noticed in treatment S₁T₁ (75: 25 per cent blended juice of rose apple and *Jamun*, respectively and 40% TSS). This increase in reducing, total sugars and decrease in non reducing sugars is due to acid hydrolysis of

polysaccharides.

The prepared product was subjected to organoleptic evaluation after 90 days of storage (Table 3). Highest score of 4.60 was observed in treatment combination S₃T₂ (25: 75 per cent blended juice of rose apple and *Jamun*, respectively and 45% TSS). This might be due to better consistency and sugar acid blend. Gajanna (2002) made similar observation in amla value added products.

Table 3 : Mean sensory scores of rose apple squash blended with *Jamun*

| Treatments | Appearance | Aroma and flavour | Taste | Overall acceptability |
|-------------------------------|------------|-------------------|-------|-----------------------|
| S ₁ T ₁ | 4.13 | 4.16 | 4.07 | 4.10 |
| S ₁ T ₂ | 4.21 | 4.22 | 4.15 | 4.23 |
| S ₂ T ₁ | 4.72 | 4.54 | 4.36 | 4.46 |
| S ₂ T ₂ | 4.84 | 4.63 | 4.45 | 4.51 |
| S ₃ T ₁ | 5.0 | 4.40 | 4.29 | 4.33 |
| S ₃ T ₂ | 5.0 | 4.51 | 4.45 | 4.60 |

S₁T₁: 25% juice (75 % rose apple: 25 % *jamun*) and 40% TSS
 S₁T₂: 25% juice (75 % rose apple: 25 % *jamun*) and 45% TSS,
 S₂T₁: 25% juice (50 % rose apple: 50 % *jamun*) and 40% TSS,
 S₂T₂: 25% juice (50 % rose apple: 50 % *jamun*) and 45% TSS,
 S₃T₁: 25% juice (25 % rose apple: 75 % *jamun*) and 40% TSS,
 S₃T₂: 25% juice (25 % rose apple: 75 % *jamun*) and 45% TSS.

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