Studies on Qualitative Traits and Effect of Annatto Colour on Beverages of Guava Pulp cv. Lucknow-49

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Abstract

The present study was conducted to know the quantity of chemical characteristics of guava pulp cultivar, Lucknow-49 and sensory evaluation of beverages (RTS and squash) prepared from the pulp. The present study revealed that, total soluble solids (12.80°Brix), acidity (0.44 %) vitamin C, (220.00mg/100g pulp), reducing sugars, non-reducing sugar and total sugars of the pulp 6.47 per cent, 3.08 per cent, and 9.55 per cent respectively. Sensory traits revealed that treatment of RTS and squash dyed with annatto colour obtain from 0.8g and 2.0g seeds/litre respectively, rated “Like Very Much” with highest point as compared to other treatments. Total soluble solids, acidity, reducing sugars and total sugars and non-reducing sugar of annatto colour enriched guava RTS did not change up to 3 month and squash up to 4 month of storage after that increased slightly up to end of experiment. Ascorbic acid in annatto colour enriched guava RTS and squash declined with the progress of storage period.

Keywords
Lucknow-49, Pulp, Quality traits and Beverage

Introduction

The fruit occupies an important place in the total fruit production of our nation and rank fourth with respect to area and production after banana, mango and citrus. It is commercially cultivated in different states, viz. Uttar Pradesh, Bihar, Punjab, Andhra Pradesh, Karnataka, Gujarat, Maharashtra, West Bengal, Madhya Pradesh and Tamil Nadu.

Total guava production in India is 3,997 thousand MT from 268 thousand hectares area (Annonymous, 2018). Uttar Pradesh is leading guava producing state. Allahabad district of Uttar Pradesh has its own benchmark in producing best quality guava in the world.

The fruit has about 83% moisture and is excellent source of ascorbic acid and pectin but has low energy and protein content. It
ranks third in vitamin C content after barbados cherry and aonla. The fruit is rich in minerals like phosphorous, calcium, iron as well as vitamins like niacin, pantothenic acid, thiamine, riboflavin, and vitamin A. It is very useful in preparation of various anti-aging skin care products.

Guava is normally consumed fresh as dessert fruit that is pleasantly sweet and refreshing in flavour. Thalamus and pericarp are the edible portion of this fruit. Fruits maybe utilized to make the products like jam, jelly, RTS, squash, toffees etc. There is great demand of red fleshed guava in the world market for beverages making. In general, cultivars with coloured flesh are poorer in vitamin C content than the white fleshed ones (Ali et al., 2014). It is a common experience that 20-25% of the fruit is completely damaged and spoiled before it reaches the consumer. This problem can be overcome by processing of guava fruit into different products like jam, jelly, cheese, canned fruit, RTS, nectar, squash, ice-cream, toffee, leather and candies.

Beverages prepared from white fleshed guava has very good flavour but lacking in attractive colour whereas, pink or red fleshed guava beverages have attractive colour too. Colour found in this group of guava is because of naturally occurring class of organic pigments, called carotenoids. Main constraint in pink or red fleshed guava is their less area of plantation which is not enough to fulfill the demand of guava beverage industries. So on commercial level synthetic colours are used to enhance the eye appeal of guava beverages but nowadays, consumers have become aware of the hazards of synthetic additives in foods and they are looking for foods with natural ingredients.

Materials and Methods

Total Soluble Solids (%): For determining the TSS, a drop of sample (pulp/Squash/RTS) is placed on the prism of hand refractometer. Reading was calibrated at 20°C with the help of reference table and mean value was expressed as per cent total soluble solids.

Acidity (%): Dissolve a 5 ml sample in distilled water and maintain volume 50ml. 5 ml aliquot taken and titrated against standard N/10 NaOH solution using phenolphthalein as an internal indicator. The titrated acidity was expressed as gram citric acid per 100gm of sample. (Rangana, 2010)

\[
\text{Acidity} = \frac{\text{Titrated value} \times \text{Normality of NaOH} \times 64 \times \text{Volume made up}}{\text{Aliquot taken} \times \text{weight of sample taken} \times 1000} \times 100
\]

Ascorbic Acid (mg/100g)

5 ml sample was mixed with 3% metaphosphoric acid (H₃PO₄) and made up the volume 50ml with 3% (H₃PO₄). 5 ml aliquot was titrated against 2, 6 dichlorophenol – indophenol dye solution as described by A. O. A. C. (2000). The end point was observed by appearance of pink colour, which persisted at least for 15 seconds. (Rangana, 2010).

\[
\text{Ascorbic acid (mg/100g)} = \frac{\text{Titrated value} \times \text{Dye factor} \times \text{Volume made up}}{\text{Aliquot taken} \times \text{Weight of sample taken} \times 100}
\]

Reducing sugars (%)

5 ml or 5gm sample was taken in 100 ml volumetric flask and volume made up to 100ml with distilled water. 2 ml aliquot in case of RTS and 1 ml in case of Squash was taken in separate conical flask and 5ml of each Fehling’s solution ‘A’ and ‘B’ were mixed with aliquot. There after the mixture was heated and titrated against1% glucose (Dextrose) solution to the end point of brick colour. A blank sample was also titrated against 1% glucose (Dextrose) solution. Record both value of titration.
Total invert sugar

5 ml sample was taken and volume made up to 100 ml with distilled water. 5 ml aliquot was taken out from 100 ml aliquot prepared sample and mixed with 3 drops HCL and put for overnight. Next day 2-3 drops phenolphthalein indicator was added and neutralised with 30% sodium hydroxide solution or tablet. After adding of 5 ml of each Fehling’s solution ‘A’ and ‘B’ to neutralise aliquot. Then mixture was titrated against 1% glucose (Dextrose) Solution in boiling stage using methyl blue as an indicator till appearance of light brick colour indicating point. Record the reading.

\[
\text{Total invert sugar(\%)} = \left( \frac{\text{Blank titrate value} - \text{samle titrate value}}{\text{Aliquot taken} \times \text{weight of samle taken}} \times \frac{100}{\text{volume made up}} \times 100 \right)
\]

Non-reducing sugar (%)

Non-reducing sugar was calculated by deducing the quality of reducing sugars from total invert sugar and multiplied by factor 0.95. The result was expressed as percent of non-reducing sugar. Non-reducing sugar = Total invert sugar(\%) - Reducing sugar(\%) \times 0.95

Total sugars (%)

Sum of reducing sugars and non-reducing sugar expressed in per cent was total sugars.

\[
\text{Total sugars(\%)} = \text{Reducing sugars(\%)} + \text{Non-reducing sugar}
\]

Results and Discussion

Chemical composition of guava pulp cultivar Lucknow-49 (Table-1) was recorded in terms of total soluble solids, acidity, reducing sugars, non-reducing sugar and total sugars. Total soluble solids of guava pulp cultivar Lucknow-49 was found 12.80%. The result falls in the range, reported by different scientists which is from 11.00 to 17.01° Brix (Nale, 2004, Dubey et al., 2011 and Tiwari et al., 2016). Acidity content of guava pulp cultivar Lucknow-49 was recorded 0.44 per cent. Several workers observed acidity in guava pulp cultivar Lucknow-49 varied from 0.19-0.47 per cent (Nale, 2004, Nema and Jain, 2007 and Tiwari et al., 2016). In this study ascorbic acid content of guava pulp cultivar Lucknow-49 was found 220.00mg per 100g pulp however, other scientists have reported 236.00 mg (Nale, 2004), 182.16 mg (Nema and Jain, 2007) and 200.67 mg (Tiwari et al., 2016) ascorbic acid per 100g fruit pulp in guava cultivar Lucknow-49. Reducing sugars in guava pulp cultivar Lucknow-49 was found 6.47 per cent whereas, other authors reported 5.10 per cent (Nale, 2004), 7.12 per cent (Dubey et al., 2011) and 3.68 per cent (Kocher et al., 2011). Non-reducing sugar was found 3.08 per cent in guava pulp cultivar Lucknow-49. Non-reducing sugar content observed by other workers was 2.20 per cent (Nale, 2004) and 9.12 per cent (Dubey et al., 2011) in guava pulp cv. Lucknow-49.

Table 1. Chemical characteristics of guava pulp cultivar Lucknow-49

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Chemical Characters</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>T.S.S. (%)</td>
<td>12.8</td>
</tr>
<tr>
<td>2.</td>
<td>Acidity (%)</td>
<td>0.44</td>
</tr>
<tr>
<td>3.</td>
<td>Vitamin C (mg/100g)</td>
<td>220.00</td>
</tr>
<tr>
<td>4.</td>
<td>Reducing Sugars (%)</td>
<td>6.47</td>
</tr>
<tr>
<td>5.</td>
<td>Non-reducing Sugar(%)</td>
<td>3.08</td>
</tr>
<tr>
<td>6.</td>
<td>Total Sugars(%)</td>
<td>9.55</td>
</tr>
</tbody>
</table>
Table 2 Organoleptic quality of guava RTS, enriched with annatto colour obtained from different amount of seed

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Amount of annatto seed (g/litre)</th>
<th>Organoleptic quality Score</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Nil</td>
<td>7.7</td>
<td>LM</td>
</tr>
<tr>
<td>T2</td>
<td>0.4</td>
<td>7.8</td>
<td>LM</td>
</tr>
<tr>
<td>T3</td>
<td>0.8</td>
<td>8.2</td>
<td>LVM</td>
</tr>
<tr>
<td>T4</td>
<td>1.2</td>
<td>7.5</td>
<td>LM</td>
</tr>
<tr>
<td>T5</td>
<td>1.6</td>
<td>6.9</td>
<td>LM</td>
</tr>
</tbody>
</table>

Total sugar percentage of guava pulp cultivar Lucknow-49 was recorded 9.55 while Nale (2004) and Dubey et al., (2011) reported 7.30 and 16.54 per cent total sugar in guava pulp cultivar Lucknow-49, respectively.

The difference in chemical characters in present find and in reported literature may be attributed due to difference in location, orchard management, climatic conditions, fruit maturity, age of the tree and growing season.

The sensory quality factors that are very important for the guava beverages are colour, flavour, appearance and overall acceptability. The organoleptic data (Table -2) on overall ranking of sensory traits which were obtained by addition of scores awarded to different sensory traits revealed that treatment of RTS and squash dyed with annatto colour obtain from 0.8g and 2.0g seeds/litre respectively, rated “Like Very Much” with highest point as compared to other treatments. Not much work has been done on the application of annatto colour on non-dairy products. Satyanarayana et al., (2006) standardised the levels of norbixin concentrations in different fruits and vegetable products as 12.5 mg/kg for lime squash, 50 mg/kg for orange squash, 150 mg/kg for mixed fruit jam and 50–100 mg/kg tooty-fruity whereas, Balaswamy et al., (2011) found that water soluble annatto dye sugar powder formulation (WSASF) at the concentration of 5 mg/kg and 30mg/kg were optimum to obtain required colour shades of jilebi and jangri respectively.

References


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