QUALITY ANALYSIS OF CUSTARD APPLE (ANONOSQUAMOSA)

Pratistha Srivastava*, John David* and Hradesh Rajput*

ABSTRACT

Custard Apple is a yellowish green fruit of the family of plant species Annona. The species with an Amazonian origin is recently being cultivated in other countries including India. The fruit has established its medicinal properties for decades. The chemical analysis of Custard apple exhibited moisture levels varying from 74.00 %, fat 0.39 crude fibre from 3.30 %, sugars 22.77, crude protein from 2.80 %, and carbohydrates from 21.50 %, acidity from 0.63 and ash from 1.05 to 0.40. The predominant mineral elements in the custard apple were Ca, Fe, phosphorus, 22.00, 0.43, 25.33 mg/100g respectively. The phytochemical properties revealed that the ascorbic acid and total phenols of custard apple ranged from (52.13, 79.73) mg/100g, respectively. Antioxidant activities were found in custard apple 1815.20 activities.

Keywords: Custard apple, chemical constituents, antioxidant activity, phenolic compounds.

INTRODUCTION

Annona squamosa L. (Custard apple, Sitaphal, Seethapathal, Shreeefa, Sugar apple, Sweetstop) is the most important tropical fruit and widely distributed among the annonaceous fruits. It is hardy and thrives well under adverse climatic conditions. In India, it is most commonly found in Andhra Pradesh, Maharashtra, Tamil Nadu, Orissa, Assam, Uttar Pradesh, Bihar and Rajasthan, Maharashtra (Shete et al., 2009). It is usually eaten as a dessert fruit and finds immense applications in the preparations of beverages and ice creams (Chikhalkar et al., 2000). Fruit has gained considerable importance because of its sweet pulp being medicinally valuable and it is good source of carbohydrates (23.5%), minerals (0.9%) and proteins (1.6%) as reported by (Gopalan et al., 1991). Processed products of custard apple such as jam, jelly, crush etc. has more demand in the market if they have flakes along with pulp. Custard apple pulp has also great demand in ice-cream industry. However retention of flakes is more important during pulp extraction to have good organoleptic properties of processed products. Custard apple is considered as a critical fruit for separating the seeds from pulp-flakes with minimum damage to the flakes. A manual separation of pulp-flakes is very cumbersome, time consuming and unhygienic. It also leads to crushing of flakes to some extent. Further, manual separation has constraints in separation of pulp-flakes on large scale

The pulp of ripe custard apple can be processed into juice or other processed products. By products of custard apple processing are seeds and peels still have many bioactive compounds. Custard apple fruits also have some other uses such as cytotoxic, antitumour, antiparasites, pesticide, and immunosuppressive activity (Alali FQ, 1999). This fruit has a few amino acids such as arginine, glutamine, serine, isoleucine, leucine, methionine, phenilalanine, tyrosine, and triptophan (Priscila et al., 2013). Bark of custard apple has phytochemical compounds such as alkaloid, tannin, protein, saponin, phensolic compound etc. These compounds have antioxidant activity that scavenging free radical and important for pharmacology (Pandey, 2011).

MATERIALS AND METHODS

The present study was conducted in the research laboratory of Warner college of Dairy Technology, Sam Higginbottom Institute of Agriculture, Technology and Sciences (Deemed University), Allahabad.

The material and methods were adopted during this investigation are given below -

- Custard apple fruits were collected from local market, Allahabad.
- All the chemicals used in present study were purchased from S.D. Fine Chemicals Ltd. Mumbai, India

Proximate Composition: The methods of the Association of Official Analytical Chemists (AOAC, 1990), were used for proximate analysis. A custard apple was used for determination of moisture content by weighing in crucible and drying in oven at 105°C, until a constant weight was obtained. Determination of ash content was done by muffle Furnes at 550°C for 4h. The Kjeldah method was used to determine the protein content. The crude fiber content of the samples was determined by digestion method and the fat was done by Soxhlet extraction method. All determinations were done in triplicate.

Custard apple was weighed into a clean ceramic crucible. A blank was prepared with empty crucible. The crucible was placed in a muffle furnace at 500°C for 4hr. The sample was allowed to cool down in the oven after which it was removed carefully. The ashed sample was poured into already labeled 50 ml centrifuge tube. The crucible was rinsed with 5 ml of distilled water into the centrifuge tube. The crucible was rinsed again with 5 ml of aquaregia. This was repeated to make a total volume of 20 ml. The sample was mixed properly and centrifuged (IEC Centra GP8) for 10 min at 301.86 g. The supernatant was decanted into clean vials for mineral determination. The absorbance was read on atomic absorption spectrophotometer at different wave length for each mineral element (Zn-213.9 nm, Ca-422.7nm, Fe-248.3nm, Mg-285.2nm, Na-589nm and K-766.5 nm) AOAC (2005).

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Bioactive compounds:

**Ascorbic acid:** The ascorbic acid content was estimated by visual titration method using 2,4-Dichloro-phenol-Indophenol dye method (AOAC 1990). Results were expressed as milligrams of ascorbic acid/100 g fresh weight.

Ascorbic acid (mg/100gm) = \(\frac{\text{[Titre value × Dye factor × Volume made} ÷ 100]}{\text{(Aliquot taken × sample weight)}}\)

**Total phenolic content:** Total phenolics were estimated according (AOAC 1990), by using photometric method with Folin reagent. The values were reported as mg of gallic acid equivalent (GAE) per 100 gram with reference to gallic acid standard curve.

Total Phenols (mg/100 gm) = \(\frac{\text{[Conc.of phenols from graph} ÷ \text{Final volume} ÷ 100]}{\text{(Wt.of sample × aliquate taken)}}\)

**Antioxidant activity:** Antioxidant activity was determined according to the method described by (Zhang et al., 2004, Shimada et al., 1992) as follows: Five grams of Custard apple different parts were extracted by 100 ml 80% methanol. Different concentrations (0.5 to 1 ml) were used to determine the antioxidant activity using 2, 2 - diphenyl - 1 - picryl hydroxyl (DPPH).

Radical scavenging activity(%) = \(\frac{\text{Absorbance of control} - \text{Absorbance of sample (T reagent)}}{\text{Absorbance of control (T reagent)}}\) \times 100

**Statistical analysis:** Statistical analysis all the experiments were conducted in triplicate and the mean and standard deviation were calculated using MS Excel software.

RESULTS AND DISCUSSION

**Chemical constituents**

The custard apple is a very sweet (up to 28% sugar) and aromatic fruit. It contains significant quantities of vitamin C, iron, calcium, phosphorus, protein, and ascorbic acid and dietary fibres. Despite its high sugar content, the glycemic index of custard apple is low and the glycemic load moderate. Specific chemicals extracted.

Proximate analysis indicates that sugar apple (Annona squamosa L.) fruit has high moisture, minerals, protein, and antioxidants. High moisture content of fruits cause possibility of microbial or fungal growth on fruit during storage. Ash content determines total mineral on fruits (Shardul et al., 2013). Analyses of Fruits Pulp play a crucial role in assessing its nutritional significance (<0.05). The chemical composition of custard apple pulp for their moisture content, Ash, crude protein, ether Fat, total carbohydrates and crude fibre, Acidity and sugars are shown in Table (1). The results of the proximate composition (Table 1) revealed that custard apple contained high amounts of sugar, crude protein, moisture, total carbohydrates and crude fiber, Ash and acidity (22.77%, 2.80% 74.00%, 21.50%, 3.30%, 1.05 and 0.63% respectively and minimum amount of fat content (0.39%). Custard apple is considered as one of the delicious and nutritionally valuable fruit. It contains about 28-55% of edible portion consisting of 73.30% moisture, 1.60% protein, 0.30% fat, 0.70% mineral matter, 23.90% carbohydrates, 0.20% calcium, 0.40% phosphorus, 1.0% iron, 12.4-18.15% sugar, 0.26-0.65% acidity and with calorific value of 105KCal/100g (Kolekar and Tagad, 2012).

The minerals analysis of our samples revealed that high contents of Ca (22.00mg/100g), phosphorus (25.33 mg/100 g), iron (0.43 mg/100 g), was found in custard apple (Table 1).

**Phytochemical analysis**

**Total Phenol:** The total phenolic content of the samples was determined according to the spectrophotometric method based on the ability of the phenolic substances to form blue molybdenum tungstic complex with the reagent Folin-Ciocalteu (Singleton,1965). Concentrations of two natural antioxidants (Total phenolics and antioxidant vitamin C and total antioxidant custard apple are shown in Table (2). The results shown in Table (2) revealed that the ascorbic acid and total phenols of custard apple ranged from (52.13), (26.55) mg/100 g, respectively.

**Total of Antioxidant:** Sugar apple (Annona squamosa L.) fruits have antioxidant activity because it has phenolic acid, phenol, and its derivatives compound (Kumar et al., 2010). Phenolic compound is primary antioxidant and act as free radical terminator (Silva et al., 2014). Antioxidant activities of custard apple as determined by DPPH radical scavenging method are presented in Table 3. Radical scavenging activity of methanolic extracts of custard apple was in the range of 1815.20% activity. It could be observed that the custard apple is rich sources for natural antioxidants and total antioxidant activity (Table 2).

**Table 1. Chemical constituents of custard apple (anona squamosa) pulp (n=3)**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Custard apple</th>
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<tbody>
<tr>
<td>Moisture (%)</td>
<td>74.00 ± 12.16</td>
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<tr>
<td>Ash (%)</td>
<td>1.05 ± 1.00</td>
</tr>
<tr>
<td>Crude Protein (%)</td>
<td>2.80 ± 0.30</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>0.39 ± 0.35</td>
</tr>
<tr>
<td>Carbohydrates (%)</td>
<td>21.50 ± 10.95</td>
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<tr>
<td>Crude fibre (%)</td>
<td>3.30 ± 0.60</td>
</tr>
<tr>
<td>Acidity (%)</td>
<td>0.63 ± 0.31</td>
</tr>
<tr>
<td>Sugar (%)</td>
<td>22.77 ± 1.86</td>
</tr>
<tr>
<td>Calcium (mg/100g)</td>
<td>22.00 ± 2.00</td>
</tr>
<tr>
<td>Phosphorus (mg/100g)</td>
<td>25.33 ± 3.05</td>
</tr>
<tr>
<td>Iron (mg/100g)</td>
<td>0.47 ± 0.30</td>
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</tbody>
</table>

Values of mean ± SD analysed individually in triplicate and expressed as gm/100 gm fresh fruit

**Table 2. Phytochemical analysis Custard Apple n=3**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Custard apple</th>
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<tbody>
<tr>
<td>Ascorbic acid (mg/100g)</td>
<td>52.13 ± 28.10</td>
</tr>
<tr>
<td>Total phenols (mg/100g)</td>
<td>26.55 ± 2.53</td>
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<tr>
<td>TEAC2, μmol TE (% activity)</td>
<td>1815.20 ± 10.71</td>
</tr>
</tbody>
</table>

Values of mean ± SD analysed individually in triplicate and expressed as gm/100 gm fresh fruit

**CONCLUSION**

Custard apple is a fruit of Annona Squamosa is one of the vital multipurpose trees used for medicine, food and few other miscellaneous purposes. The use of Sitaphal has shown success in curing different diseases. Custard apple is primarily consumed fresh, as a dessert fruit. The pulp has an excellent flavor and may be incorporated into ice cream and milk shakes. The fruit contains vitamin C and A.
REFERENCE


