Research Article

Diversity and comparative account on phytochemical and antioxidant properties of two varieties of *Musa*, Nendran and Kunnan

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Abstract

In this study a comparative analyses on phytochemical and antioxidant properties of two varieties of *Musa* sp. *L.* was conducted. The varieties selected were: variety 1 Nendran and variety 2 Kunnan. Flowers, bracts and peel of unripened fruits of two banana varieties were dried and ground into powder form and extracts were prepared using water and ethanol. Extracts were screened for the phytochemicals both qualitatively and quantitatively. The antioxidant activity of different ethanol extracts were estimated using the DPPH radical scavenging protocol. The results showed the presence of carbohydrate, sugar, proteins, ketose, quinone, cardiac glycoside, terpenoids, flavanoids, phenols and saponins in the extracts of flower, spathe and peel in both the varieties studied. Quantitative estimation of metabolites revealed greater amount of primary metabolites in Kunnan and secondary metabolites in Nendran banana respectively. More antioxidant activity was exhibited by the extracts of Nendran than Kunnan variety.

Keywords: Musa, Nendran, Kunnan, Phytochemical, Antioxidant activity

1. Introduction

Banana is a major food crops globally and are consumed in more than 100 countries throughout the tropics and sub-tropics. The banana plant is a tall arborescent monocotyledon with a false stem consisting of leaf sheaths and an underground true stem(corm) that is able to produce suckers by which the plant can reproduce vegetatively. Each pseudostem produces a single inflorescence of the female flowers of which give rise to the banana fruits and coloured bract or spathes. Different parts of this plant possess medicinal properties. Flowers are used to treat dysentery, ulcers and bronchitis. Cooked flowers are considered as a good food for diabetics. Sap is used to treat a wide variety of ailments, including leprosy, hysteria, fever, digestive disorders, hemorrhage, epilepsy and insect
bites. Roots and seeds treat digestive disorders. Peel and pulp scientifically shown to have both antifungal and antibiotic components. Fruit contain antioxidants-vitamin C, vitamin E and neutralize the acidity of gastric juice. Ripe banana paste is used for the treatment of burns and wounds. Different cultivating varieties of banana belong to three species viz. Musa paradisiaca acuminata, Musa paradisiaca balbisiana and Musa paradisiaca -hybrid between Musa paradisiaca acuminata and Musa paradisiaca balbisiana. The current study aims at qualitative and quantitative estimation of phytochemicals and determination of anti-oxidant properties in two varieties of Musa: Nendran and Kunnan with an objective to determine nutritive and medicinal value of these two banana varieties.

2. Materials and methods
2.1. Collection and preparation of dried plant material

Different plant parts like flower, bracts, and fruit peel of Nendran and Kunnan banana varieties were collected. After removing dust and debris from the plant parts, these were chopped into pieces. Plant materials were subjected to microwave oven dry at 50°C. Dried material was ground to fine powder and stored in containers.

2.2. Ethanol extraction
Ten gram of powder was weighed using weighing balance and added to the 100 mL ethanol in conical flask. These were left to continuous stirring for 3 days a magnetic stirrer. After 3 days, ethanol extract were obtained by sieving to separate the neat extract from the residue.

2.3. Aqueous extraction
Fifteen gram of powder weighed using weighing balance and added to the 100 mL distilled water in conical flask. These were left to stand for 1 day in a magnetic stirrer. After 1 day, aqueous extract were obtained by sieving to separate neat extract from the residue.

2.4. Phytochemical analysis
The qualitative analysis was performed on different aqueous and ethanolic extracts for the presence of alkaloids, glycosides, flavonoids, steroids, tannins, carbohydrates, proteins etc. by adopting the phytochemical methods described by Harborne (1984).

2.5. Quantitative estimation
Quantitative estimation was carried out for protein by Lowry’s method (Lowry et al., 1951), total sugar by anthrone method, total flavonoids by Aluminium chloride colorimetric method (Quettier et al., 2000) and total phenolic content by spectrophotometric method (Singleton et al., 1999).

2.6. Antioxidant activity
The antioxidant activity of the plant extracts were estimated using the DPPH radical scavenging protocol (Tekao et al., 1994). The decrease in absorbance of light by DPPH solution on addition of test samples in relation to the control was used to calculate the antioxidant activity,a s percentage inhibition of DPPH radical.

3. Results and discussion
Both the varieties of Musa studied, revealed the presence of various phytochemicals like carbohydrate, sugar, proteins, ketose, quinone, cardiac glycoside, terpenoids, flavonoids, phenols and saponins in aqueous and ethanolic extracts of flower, bracts and peel. Fats, phlobatannin and tannins were absent in all extracts. In all the parts analysed, the content of secondary metabolites
were found to be more in variety 1-Nendran than in Kunnan. Sugar content was found to be more in variety 2- Kunnan than Nendran (Table 1). Comparatively higher amount of protein content was noticed in flowers and fruit peels of Kunnan than that of Nendran, while Nendran showed more protein content in bracts than Kunnan. Results advocate more nutritional value to Kunnan than to Nendran banana in terms of sugar and protein content. It may be the reason for its wide spread use as baby food in Kerala.

### Table 1. Quantitative estimation of various metabolites in Nendran and Kunnan.

<table>
<thead>
<tr>
<th>Plant part</th>
<th>Flavonoid (µg/mL)</th>
<th>Phenol (µg/mL)</th>
<th>Glucose (µg/mL)</th>
<th>Protein (µg/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V1 V2</td>
<td>V1 V2</td>
<td>V1 V2</td>
<td>V1 V2</td>
</tr>
<tr>
<td>Flower</td>
<td>53.2 53</td>
<td>46 40</td>
<td>100 104</td>
<td>72 92</td>
</tr>
<tr>
<td>Spathes</td>
<td>42.5 36</td>
<td>45 39.5</td>
<td>74 80</td>
<td>78 71</td>
</tr>
<tr>
<td>Fruit peel</td>
<td>53.2 53</td>
<td>64 56</td>
<td>70 90</td>
<td>82 54</td>
</tr>
</tbody>
</table>

**V1-Nendran, V2-Kunnan**

Free radicals are associated with etiology and progression of diseases and ageing in human beings (Moskovitz et al, 2002). Antioxidants can neutralize the free radicals and oxygen radicals produced in biological system. Ethanolic extracts of both the varieties showed antioxidant properties which was higher in the extracts of Nendran (table 2). The ethanolic extract of fruit peel of Nendran has profound reducing activity against stable free radicals with 69.5% inhibition. Antioxidant property is due to the presence of phytochemicals like phenolics and flavonoids. In the current investigation more phenolics and flavonoid content were observed in Nendran than Kunnan that attribute to its higher antioxidant property than the latter. Antioxidant based drug formulations are useful for the prevention and treatment of complex diseases like atherosclerosis, stroke, diabetes, Alzheimer’s disease and cancer. The results obtained from the study advocate the intake of various parts of nendran as a free radical scavenger for the protection of body tissues from the damage caused by harmful materials in the system.

### Table 2. Antioxidant activity of ethanolic extracts of Nendran and Kunnan.

<table>
<thead>
<tr>
<th>Concentration</th>
<th>Ethanolic extract of Nendran</th>
<th>Ethanolic extract of Kunnan</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>% inhibition of DPPH Flower</td>
<td>% inhibition of DPPH Flower</td>
</tr>
<tr>
<td>20</td>
<td>26.89 15.76</td>
<td>24.65 13.95</td>
</tr>
<tr>
<td>40</td>
<td>30.89 23.98</td>
<td>30.43 20.76</td>
</tr>
<tr>
<td>60</td>
<td>42.09 30.44</td>
<td>38.98 32.95</td>
</tr>
<tr>
<td>80</td>
<td>53.06 36.78</td>
<td>47.76 37.21</td>
</tr>
<tr>
<td>100</td>
<td>67.54 49.32</td>
<td>57.59 46.78</td>
</tr>
</tbody>
</table>

### 4. Conclusion
Both nendran and kunnan varieties of Musa showed the presence of carbohydrate, sugar, proteins, ketose, quinone, cardiac glycoside, terpenoids, flavanoids, phenols and saponins in aqueous and ethanolic extracts of flower, bracts and peel. Fats, phlobatannin and tannins were absent in all extracts. The content of primary metabolites was more in kunnan. Nendran showed higher amount of secondary metabolites than kunnan. More antioxidant activity was exhibited by the extracts of nendran than that of kunnan.

**Conflict of interest statement**
We declare that we have no conflict of interest.
References


