PRELIMINARY PHYTOCHEMICAL ANALYSIS OF BAMBOO SEED

R. Gowri Manohari¹, M.D. Saravanamoorthy², T. Poongodi Vijayakumar³ and B. Vijayan⁴

¹Research Scholar in Dept. of Food Science and Nutrition, Periyar University, Salem.
²Assistant Professor in Botany PG & Research Department of Botany, Arignar Anna Govt. Arts College, Musiri, Tiruchirappalli District.
³Professor in Dept. of Food Science and Nutrition, Periyar University, Salem.
⁴PG Student in Botany PG & Research Department of Botany, Arignar Anna Govt. Arts College, Musiri, Tiruchirappalli District.

ABSTRACT
The utility of bamboo rice collected from the seeds of flowered bamboos has become a major source of income for tribal peoples with resemblance to paddy rice and wheat-like taste, bamboo rice is comparatively much richer in protein. Not only tribes but local people here also consider it as a good substitute for rice. The objective of the present study was to investigate the presence of various phytochemicals in Bambusa arundinacea (Retz. ) Wild. from the aqueous extract. The seed extract revealed the presence of phytochemicals such as Tannins, Phlobatannins, Flavonoids, Cardiac glycosides, Reducing sugar, Phenols. Remarkably Saponins, Alkaloids, Terpenoids and Anthraquinines were not present. The generated data from the extract of seeds provided the basis for its wide uses in the traditional & folk medicines.

KEYWORDS: Ayurvedic, Bambusoideae, Bamboo seed, Primary and Secondary metabolites, Phytochemicals.

INTRODUCTION
Bamboo is a member of grass family (Poaceae: Bambusoideae). There are about 88 genera and 1400 recorded species of bamboo in the world, 34 genera and 534 species of which are in China. Bamboo is found in an area of more than 14 million ha throughout the tropics,
subtropics and temperate zones of the world and it plays manifold role in day-to-day rural life or broadly speaking human life. Phytochemicals are bioactive chemicals of plant origin. They are regarded as secondary metabolites because the plants that manufacture them may have little need for them. They are naturally synthesized in all parts of the plant body; bark, leaves, stem, root, flower, fruits, seeds, etc. i.e. any part of the plant body may contain active components (Tiwari et al, 2011). *Bambusa arundinacea* (Retz. ) Wild. (*Mulmunkilin* Tamil and *Bams, Kantabamsin* Hindi) is a tall thorny tree widely distributed in India. It belongs to the family Graminae, is an ayurvedic medicinal tree commonly known as Bamboo. Tall woody bamboo, stems are thorny and numerous, tufted and grow up to 40 m; branches numerous, internodes of 30–45 cm long, leaves thin, linear, up to 20 cm long and it flowers only once in its lifetime (Muniappan and Sundararaj, 2003). Bamboo rice collected from the seeds of flowered bamboos and it has a nutrient quality slightly greater than rice and wheat (Kiruba et al, 2006). Bamboo rice is not a specific varietal of rice, but is rather a short-grained white rice that has been treated with the juice of young bamboo plants. While milling the rice, the chlorophyll from the bamboo is added. This process causes the rice to be high in vitamin B, and gives it a flavor and aroma much like that of a Jasmine green tea. Bamboo rice can also be served as an Asian-style risotto, or a side dish when the cook wants to add a striking note of color to a meal. After it is cooked, the rice is usually moist and sticky. Some Asian markets carry this variety, and it can also be ordered from mail-order food catalogs or specialty food stores (www.wisegeek.com). There is no evidence that bamboo seed contains the toxic secondary compounds normally found in tropical tree seeds (Watt, 1889). Plants are now occupying important position in allopathic medicine, herbal medicine, homoeopathy and aromatherapy. Medicinal plants are the sources of many important drugs of the modern world. Many of these indigenous medicinal plants are used as spices and food plants they are also sometimes added to foods for medicinal purposes (Okwu, 1999 and Okwu, 2001). Therefore, the aim of this study was to assess the phytochemical in *Bambusa arundinacea* (Retz. ) Wild seeds that may be useful in its application as an industrial and pharmaceutical base.

**MATERIALS AND METHODS**

**Plant specimen and collection**

Bamboo seed is an underutilized species in India, especially bamboo rice or seed species offer enormous potential for contributing to the achievement of the Millennium Development Goal (MDGs), particularly in combating hidden hunger and offering medicinal and income.
generation options. They are also closely tied to cultural traditions and therefore have an important role in supporting social diversity. The bamboo seed verity of *Bambusa arundinacea* (Retz.) Wild. Seed was procured from Tamil Nadu Agriculture University, Coimbatore, Tamil Nadu, India. The procured seeds were ground in to flour and used for analysis.

**Qualitative Phytochemical Screening of Bamboo Seed**

Qualitative tests were carried out on the aqueous extract and powdered sample of the *Bambusa arundinacea* (Retz.) Wild. Sample using standard procedures described by (Sofowora, 1993), (Trease and Evans 1989), (Harborne, 1973), (Obadoni et al, 2001).

**Steroids**

A 0.5 g portion of the Ethanolic extract each bamboo seed variety was mixed with 2 ml of acetic anhydride followed by 2 ml of Sulphuric acid. The colour changed from violet to blue or green in some samples indicated the presence of steroids (Sofowora, 1993).

**Terpenoids (Salkowski test)**

A 5 ml portion of each variety bamboo seed extract was mixed in 2 ml of chloroform followed by the careful addition of 3 ml of concentrated H$_2$SO$_4$. A layer of reddish brown colouration was formed at the interface thus indicating a positive result for the presence of Terpenoids (Trease and Evans, 1989).

**Flavonoids**

A portion of powdered seeds in each case was heated with 10 ml of Ethyl Acetate in a test tube over a steam bath for 3 minutes. The mixture was filtered and 4 ml of the filtrate was shaken with 1 ml of dilute Ammonia solution. Yellow coloration was observed that indicated the presence of Flavonoids (Harborne, 1973; Sofowora, 1993).

**Tannins**

A 0.5 g portion of the dried powdered of each variety of bamboo seed sample was boiled in 20 ml of distilled water in a test tube and filtered. 0.1% ferric chloride (FeCl$_3$) solution was added to the filtrate. The appearance of brownish green or a blue-black colouration indicates the presence of tannins in the test samples (Harborne, 1973).
Phlobatannins
Aqueous fraction of the extract of each sample was boiled with 1% aqueous Hydrochloric acid; the formation of red precipitate thus indicated the presence of Phlobatannins (Harborne, 1973; Sofowara, 1993).

Cardiac glycosides (Keller-Killani test)
A 5 ml portion of each bamboo seed powder extract was mixed with 2 ml of glacial acetic acid containing one drop of ferric chloride (FeCl₃) solution, followed by the addition of 1 ml of concentrated Sulphuric acid. Brown ring formed at the interface indicates a Deoxy sugar characteristic of Cardenoloides. A violet ring may appear beneath the brown ring, while in the acetic acid layer, a greenish ring may also form just gradually throughout the thin layer (Harborne, 1973).

Saponins
A 2.0 g portion of the powdered sample was boiled in 20 ml of distilled water in a test tube in boiling water bath and filtered. 10 ml of the filtrate was mixed with 5 ml of distilled water and shaken vigorously to form a stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigorously for the formation of emulsion characteristic of saponins (Obadoni et al, 2001).

Anthraquinones (Borntrager’s test)
A 0.5 g portion of the both variety of seed extract was shaken with 5 ml of chloroform. The chloroform layer was filtered and 5.0 cm³ of 10% ammonia solution was added to the filtrate. The mixture was shaken thoroughly and the formation of a pink/violet or red, yellow colour in the ammoniacal phase indicates the presence of Anthraquinones (Harborne, 1973).

Reducing Sugar (Benedict test)
A 0.5 g portion of seed extract was mixed thoroughly with 3 cm³ of distilled water and filtered. 3 drops of the filtrate was added to 3 cm³ of Benedict reagents and placed in a boiling water bath for 5 minutes. The formation of a brick red precipitate indicates reducing sugar (Harborne, 1973).

Alkaloids
A 0.5 g portion of the seed extract of was stirred with 5 cm³ of 1% aqueous HCl on a steam bath. Few drops of picric acid solution was added to 2 cm³ of the extract. The formation of a
reddish brown precipitate was taken as a preliminary evidence for the presence of alkaloids (Trease and Evans, 1989; Harborne, 1973).

III. RESULTS AND DISCUSSION

Table 1: Phytochemical constituent of Bambusa arundinacea (Retz.) Willd. seeds

<table>
<thead>
<tr>
<th>Chemical category</th>
<th>Bambusa arundinacea (Retz.) Willd. seed variety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tannins</td>
<td>+</td>
</tr>
<tr>
<td>Phlobatannins</td>
<td>+</td>
</tr>
<tr>
<td>Saponins</td>
<td>-</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>-</td>
</tr>
<tr>
<td>Alkaloids</td>
<td>-</td>
</tr>
<tr>
<td>Terpenoids</td>
<td>-</td>
</tr>
<tr>
<td>Phenols</td>
<td>+</td>
</tr>
<tr>
<td>Cardiac glycosides</td>
<td>+</td>
</tr>
<tr>
<td>Anthraquinones</td>
<td>-</td>
</tr>
</tbody>
</table>

Phytochemical analysis conducted on the seed of Bambusa arundinacea (Retz.) Wild. revealed the presence of constituents which are known to exhibit medicinal as well as ayurvedic property. Analysis of the seed by aqueous extract revealed the presence of phytochemicals such as Tannins, Phlobatannins, Flavonoids, Cardiac glycosides, Reducing sugar, Phenols. Remarkably, Saponins, Alkaloids, Terpenoids and Anthraquinones were not present. The phenolic compounds are one of the largest and most ubiquitous groups of plant metabolites (Singh et al, 2007). They possess biological properties such as antiapoptosis, antiaging, anticarcinogen, antiinflammation, antiatherosclerosis, cardiovascular protection and improvement of endothelial function, as well as inhibition of angiogenesis and cell proliferation activities (Han et al, 2007). Several studies have described the antioxidant properties of medicinal plants which are rich in phenolic compounds (Brown et al, 1988 and Krings et al, 2001). Natural antioxidants mainly come from plants in the form of phenolic compounds such as flavonoid, phenolic acids, tocopherols etc. (Ali et al, 2008). Tannins bind to proline rich protein and interfere with protein synthesis and flavonoids are hydroxylated phenolic substances known to be synthesized by plants in response to microbial infection and they have been found to be antimicrobial substances against wide array of microorganisms invitro. Their activity is probably due to their ability to complex with extracellular and soluble proteins and to complex with bacterial cell wall (Marjorie, 1996). They also are effective antioxidant and show strong anticancer activities (Salah et al, 1995, Del-Rio, 1997 and Okwu, 2003). Phlobatannins have been reported for its wound healing properties, these are anti-inflammatory and analgesic (Ayinde et al, 2007) and cardiac glycosides are used for
ulcer and diabetic treatment (Karunyadevi et al, 2009). The presence of some of these compounds has also been confirmed to have antimicrobial activity. Hence it could be inferred that the seed extracts of *Bambusa arundinacea*(Retz.) Willd. could be a source for the industrial manufacture of drugs useful in the chemotherapy of some microbial infection and also might be responsible for the potent antioxidant capacity and it would be helpful to lead the strategic development of underutilized crops for sustainable food and nutrition security.

**CONCLUSION**

Bamboo seeds and flower are rare and individual flowers are small but borne in longitudinal inflorescences and seeds of most bamboos are about the size of grain and there is lack of information about the uses and phyto chemical properties of bamboo seeds. The presence of phyto constituents make the plant useful for treating different ailments and have a potential of providing useful drugs of human use and bamboo seed flour can be an alternative product, they go waste during the seasonal glut. So, the seed flour can be an alternative product, which can be stored and utilized, for value addition. This study helps in promoting increased consumption of bamboo seeds offers opportunity to enhance the biodiversity.

**REFERENCES**