

## Quantitative Phytochemical Analysis of *Bambusa arundinacea* Seeds

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### ABSTRACT

The medicinal properties of plants are due to some chemical substances that produce certain definite physiological action on the human body. These non-nutritive components are called phytochemicals. The qualitative analysis as well as quantification of phytochemicals of a medicinal plant is regarded as vital step in any kind of medicinal plant research.

*Bambusa arundinacea* belongs to family Poaceae, seeds which has long been used by some tribal people of Tamilnadu as food and to treat several diseases. Young shoots and seeds are eaten as vegetable especially by the Kani tribe with wild pork based on the strong believe that it enhance fertility. The present study was carried out to estimate the total phenol and flavanoids in the seed extract. Phytochemical analysis of the seed extract of *Bambusa arundinacea* revealed the presence most of the phytochemicals tested for such as flavanoid, tannin, Steroids and phenol. The total phenolic content of the methanolic seed extract is found to be 15.5mg/100g and the total flavonoid contents of the seed extract is found to be 10.52 mg/100g. The presence of various phytochemicals in the tested plant reveals that this plant may be a good source for production of new drugs for various ailments.

**keywords:** *Bambusa arundinacea*, Phytochemical analysis, Total Phenols, Flavonoids.

### INTRODUCTION

Phytochemicals are naturally occurring biochemicals in plants that give plants their color, flavour, smell and texture. Preliminary phytochemical screening of medicinal plants is a useful method for qualitatively determination of different metabolite in crude sample. Many primary metabolites lie in their impact as precursors or pharmacologically active metabolites in pharmaceutical compounds such as antipsychotic drugs<sup>1</sup>. There are hundreds of medicinal plants that have a long history of curative properties against various diseases and ailments. Furthermore, an increasing reliance on the use of medicinal plants in the industrialized societies has been traced to the extraction and development of several drugs and chemotherapeutics from these plants as well as from traditionally used rural herbal remedies. Medicinal plants are of great interest to the researchers in the field of biotechnology as most of the drug industries depend, in part, on plants for the production of pharmaceutical compounds. Plants have formed the basis of sophisticated traditional medicine systems among which are Ayurvedic, Unani, and Chinese. These systems of medicine have given rise to some important drugs which are still in use<sup>2</sup>. *Bambusa arundinacea* family Graminae is highly reputed ayurvedic medicinal tree commonly known as the Bamboo. Thorny tree, stems many, tufted on a stout root-stock, grows upto 30 meter high; Inflorescence, enormous panicles often occupying the

whole stem (fig-1). Caryopsis (grain) oblong, 5-8 mm long, grooved on one side (fig-2) Flowering and Fruiting Once in life time, often during September – May<sup>3,4</sup>. various parts of the plant such as the leaves, root, shoot and seeds possess anti-inflammatory, anti-diabetic, anthelmintic, anti ulcer, antioxidant and astringent activity. seeds are acrid, laxative and said to be beneficial in strangury and urinary discharge<sup>5,6</sup>. The present study was carried out to quantify the phytochemicals such as the phenol, flavanoids, tannin and steroids.

### MATERIALS AND METHOD

#### *Plant Collection and Identification*

Dried seeds of *Bambusa arundinacea* (Retz) Roxb. Were purchased from Suresh Forestry Network, Chickballapur, Karnataka. Care was taken to select quality seeds. The seeds and plants were authenticated by Prof. Dr. Jayaraman. PhD., Director Plant Anatomy Research Institute, Thambaram, Chennai. A Voucher specimen were kept in the Pharmacology museum, ACS Medical College for future reference.

#### *Methanol extraction*

10 g of each plant powder was added to 100 ml of methanol in a conical flask and plugged with cotton wool. After 24 hours the supernatant was collected and the solvent was evaporated to make the crude extract and stored at 4 °C.



Figure 1: Bambusa arundinacea tree



Figure 2: Bambusa arundinacea seeds

Table 1: Quantitative analysis of phytochemicals

NO	Phytochemicals	Composition (mg/100g)
1	Flavonoids	10.52 mg
2	Phenols	15.5 mg
3	Steroids	5.77 mg
4	Tannins	1.45 mg
5	Quinones	0.565 mg

#### Quantitative phytochemical analysis

The phytochemicals which are present in the methanol seed extracts of *Bambusa arundinacea* were determined and quantified by standard procedures.

#### Estimation of Total Phenol

Phenol content in the plant extract was determined by Folin-Ciocalteu reagent method with slight modifications (Adedapo *et al.*, 2009; Koncic *et al.*, 2001; McDonald *et al.*, 2001 and Nabavi *et al.* 2008). One gram of the sample was extracted with 10 ml of 80% methanol. The homogenate was centrifuged at 10,000 rpm for 20 minutes. The supernatant was collected and evaporated to dryness. Methanolic solution of the extract in the concentration of 1 mg/ml was used in the analysis. The reaction mixture was prepared by mixing 0.5 ml of methanolic solution of extract, 2.5 ml of 10% Folin-Ciocalteu's reagent dissolved in water and 2.5 ml 7.5% NaHCO<sub>3</sub>. Blank was concomitantly prepared, containing 0.5 ml methanol, 2.5 ml 10% Folin-Ciocalteu's reagent dissolved in water and 2.5 ml of 7.5% of NaHCO<sub>3</sub>. A standard curve was prepared using gallic acid. Several dilutions of gallic acid in 80% methanol were prepared viz. 20, 40, 60, 80, 100 µg/ml (Lin. and Tang, 2005). One ml aliquot of each dilution was taken in a test tube and diluted with 10 ml of distilled water. After this 2.5 ml Folin-Ciocalteu's reagent was added. This was followed by the addition of 2.5 ml of 7.5 % NaHCO<sub>3</sub> in each test tube. The resulting mixture was left to stand for 30 minutes at room temperature. Absorbance of the standard was measured at 765 nm using UV/VIS spectrophotometer against blank. Quantification was done on the basis of a standard curve of gallic acid. Based on the measured absorbance, the concentration of phenolics was read (mg/ml) from the calibration line; then the content of phenolics in extracts

was expressed in terms of gallic acid equivalent (mg of GA/g of extract). Total phenol content =  $GAE \times V \times D / m$ , where GAE is the gallic acid equivalence (mg/mL); V is the volume extract (mL), D is dilution factor and m is the weight (g) of the pure plant extract.

#### Estimation of Total Flavonoid

Flavonoid content was determined by spectrophotometric method (Quettier *et al.*, 2000). To 1 ml of methanol solution of the extract (concentration of 1 mg/ml) was added 1 ml of 2% AlCl<sub>3</sub> solution (prepared in methanol). The samples were incubated for an hour at room temperature. The absorbance was determined using spectrophotometer at 415 nm. The same procedure was repeated for the standard solution of Quercetin of different concentration and the standard curve was constructed<sup>8</sup>. Based on the measured absorbance, the concentration of flavonoids was read (mg/ml) on the calibration line; then, the content of flavonoids in extracts. was expressed in terms quercetin equivalent (mg of quercetin /g of extract).

Flavonoids content =  $QE \times V \times D / W$ ,

where QE – quercetin equivalent (µg/ml),

V - total volume of sample (ml), D - dilution factor, W - sample weight (g).

#### Estimation of Steroid

Into a glass - stoppered, 50 ml, conical flask pipette 20.0 ml of the test solution. Into two similar flasks pipette 20.0 ml of the standard solution and 20.0 ml of aldehyde - free ethanol (Blank) respectively. To each flask add 2.0 ml of blue tetrazolium solution and mix; to each flask add 2.0 ml of the mixture of 10 volumes of tetranethylammonium hydroxide solution (10%) and 90 volumes of aldehyde - free ethanol, mix and allow to stand in the dark a temperature between 25 and 35C . At the end of exactly 90 minutes add to each flask 1.0 ml of glacial acetic acid and mix. Measure the absorbences of the solutions obtained from the test solution and the standard solution at about 525 nm against the blank. The quantity in mg, of the steroid in the 20-ml aliquot of the test solution is given by the expression

$At / As \times Cs$

Where At = absorbance of the test solution;

As = absorbance of the standard solution;

Cs = quantity, in mg, of the reference substance in the 20-ml aliquot of the standard solution.

Calculate the quantity of the steroid in the substance being examined on the basis of the aliquot the test solution taken for the determination and from the declared content of the steroid in the appropriate reference substance.

#### Determination of total tannins

500 mg of the sample was weighed into a 50 ml plastic bottle. 50 ml of distilled water was added and shaken for 1 h in a mechanical shaker. This was filtered into a 50 ml volumetric flask and made up to the mark. Then 5 ml of the filtered was pipetted out into a test tube and mixed with 2 ml of 0.1 M FeCl<sub>3</sub> in 0.1 N HCl and 0.008 M potassium ferrocyanide<sup>9</sup>. The absorbance was measured at 120 nm within 10 min.

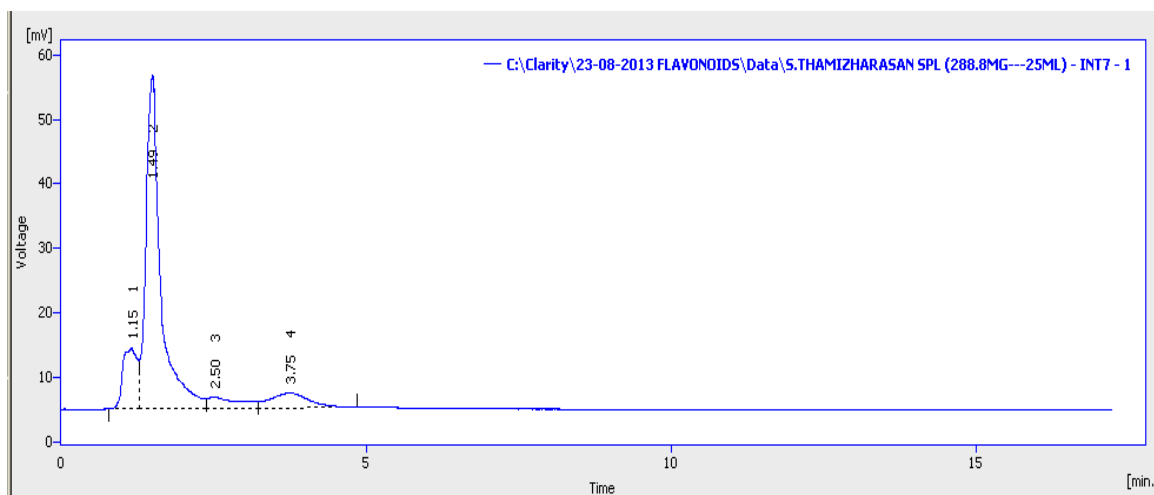


Figure 3: Quantification of flavonoids using chromatograph

## RESULT AND DISCUSSION

The amount of polyphenols, tannins, flavonoids and steroids were quantified as per the methods described and the values are expressed. It is evident from the results (Table I) that the seed extract has very good sources of polyphenols, tannins and flavonoids. Bambusa extracts contained 10.52mg of flavonoids, 15.5 mg of phenols, 5.77mg of steroids, 1.45 mg of tannins, 0.565mg of quinines (fig.3). Extracts showed different amount of phytochemicals. Among the five components flavonoids and phenol content was highest. The amount of tannins and quinones was very low. Phenolic compound have been shown to exhibit cellular defense mechanism in atherogenesis and cancer. Polyphenols are a major group of antioxidative compounds, more powerful than vitamin E after it becomes oxidized. They offer protection against LDL oxidation and inhibition of platelet aggregation. A wide array of phenolic substances present in dietary and medicinal plants has been reported to possess powerful antimutagenic activity apart from the antioxidant property.

Recently increasing evidences support the hypothesis that the phenolic compounds could play an essential health promoting role. The pharmacological effects of flavonoids include CNS activity, cardioprotective, lipid lowering, antiulcer, hepatoprotective, anti-inflammatory, antineoplastic, antimicrobial antioxidant and hypoglycemic activity. Dietary intake of flavonoids containing foods potentially lowers the risk of certain free radical related pathophysiology. Certain tannins stimulate glucose uptake. They exhibit insulin like activity acting as glucose transport activators of fat cells.

## CONCLUSIONS

In the present study the Bambusa seed extracts showed the presence of flavonoids, phenols, steroids, tannin and quinines. This study also leads to the further research in the way of isolation and identification of the active compound from the seed extract using chromatographic and spectroscopic techniques.

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