Ethnobotanical Potential and Phytochemical Screening of *Bombax ceiba* L.

Parth Depani¹, Kamlesh Gadhvi¹ and Suhas Vyas¹*

¹Department of Life Sciences, Bhakta Kavi Narsinh Mehta University, Junagadh, India.

Authors’ contributions

This work was carried out in collaboration among all authors. Authors PD and KG designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors KG and SV managed the analyses of the study. Author SV managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/EJMP/2019/v29i430163

(1) Dr. Naseem A. Qureshi, National Center of Complementary and Alternative Medicine, Riyadh, Saudi Arabia.
(2) Prof. Marcello Iriti, Professor of Plant Biology and Pathology, Department of Agricultural and Environmental Sciences, Milan State University, Italy.

Reviewers:
(1) Debarshi Kar Mahapatra, Dadasaheb Balpande College of Pharmacy, India.
(2) Bagiu Radu-Vasile, “Victor Babes” University of Medicine and Pharmacy, Romania.
(3) Rosa Elva Norma del Río Torres, Universidad Michoacana de San Nicolás de Hidalgo, Mexico.

Complete Peer review History: https://sdiarticle4.com/review-history/52201

ABSTRACT

Traditional knowledge of medicinal plants is showing important and significant values to society. One of the important trees growing in the Panchmahal region, *Bombax ceiba*, has immersed medicinal values sited in few kinds of literature. Local populations utilizing various parts of *Bombax ceiba* as medicines are to be known scientifically through traditional inputs. The present study was undertaken to emphasis the secondary metabolites present in different parts of *B. ceiba* growing region in Panchmahal, district. Traditional information about plant/tree in generally available related to leaves, trunk, root, fruits etc. the current study deals with knowledge of flowers along with thereof *B. ceiba* growing in Panchmahal district. Investigation for qualitative analysis of thorn, petals, and androecium was carried out for the tree *B. ceiba* growing in Panchmahal district.

Keywords: *Bombax ceiba*; traditional uses; phytochemical; thorn; petals; androecium.

*Corresponding author: E-mail: vsuhas.13@gmail.com;
1. INTRODUCTION
Herbal practitioners are one of the important custodians of indigenous knowledge on the utilization of medicinal plants. Moreover, as a result of their experience they are skilled and have a great talent for locating and identifying correct plant species amongst many plant species growing in and around region. Central Gujarat covers district Panchmahal, Dahod, Mahisagar, Chhotaudepur, and Vadodara. In one of study of GEER (Gujarat ecological education and research) foundation [1] in which recorded that highest numbers of plant species (1048) were noted in the state which is about 80% of the entire medicinal species diversity of the state. *Bombax ceiba* is a deciduous tree, with grey glabrous bark, and leaves crowded ends of branches, petiolate, digitately. It has 6-8 cm or more across, sessile crowded, at ends of leafless branches. The interesting part of tree, taken for the current study is its flower which used as an astringent and is good for skin pimples, splenomegaly and haemorrhoids. *Bombax ceiba* is used in medicinal as well as economic purposes in the region. Tribal community use *Bombax ceiba* plant to treat various kinds of disease. There is literature available for bark of *Bombax ceiba* which shows its medicinal utility in dysentery, stomachache, and vomiting. Leaves of *Bombax ceiba* are extensively used in various treatments for debility and anemia. Flowers of *Bombax ceiba* are being also used in treating the cancerous as well as paralysis [2].

Qualitative analysis of flower revealed that flower contains terpenoids, phenolic compounds, tannins, flavanoid, saponins, glycosides, and carbohydrates by using water extract, ethanol, and acetone. Total 13 phytochemicals were screened, out of which 11 were observed by using different solvents for extraction. Phytochemicals found in flower extract of *Bombax ceiba* indicates their potentiality as a supply of herbal medicine. The results from the ash value, acid insoluble ash, and water-soluble ash values suggested that the flower contains demonstrable quantity of inorganic salts [3].

Preliminary analysis of bark shows the presence of many secondary metabolites such as Alkaloids, Carbohydrates, Tannins, Steroids, Saponins, Flavonoids, Glycerides, Phenols, Amino acids, and proteins using methanolic extraction. The rich source was tannin and flavonoid compound which plays an important role in preventing diseases [4]. The preliminary phytochemical investigation on *Bombax ceiba* extracts revealed that the presence of various secondary metabolites such as carbohydrates, flavones and flavanones, tannins and phenolic compounds, saponins, sterols, and triterpenoids in all the extracts. Carbohydrates, glycosides, flavones and flavanones are found when petroleum ether, ethanol and aqueous extraction are used but alkaldoid, fixed oils, fats, gums and mucilages are totally absent when these extractions are used [5]. Polysaccharide which is found from flowers has a continuous backbone of 4(1-4)- β-linked D-galactopyranose and 2 (1-3)- β-linked L-arabinopyranose units with β-linked D-galactose and α-linked rhamnose and L-arabinose units as end groups. From *Bombax ceiba* stem bark Shaminicin,(3, 4- di hydroxyphenyl)-3, 4-dihydro-3, 7- dihydroxy-5-O-xylopyranosyloxy- 2H-1-benzopyran along with lupeol were isolated [6,7,8-13,14-23,21,24,25].

2. MATERIALS AND METHODS

2.1 Study Area
The field survey was conducted in Panchmahal district in the year 2018. For the data collection interviewed local people were in regional languages and it was conducted with traditional healers and farmers. Twelve villages were taken for surveying during field visit.

Plant Sample Collection was carried out in Nasipur village (Godhra taluka, Panchmahal district) GPS location is 22°50' 24" N 73°38' 25" E, during March 2019. Samples of thorn, petals, and androecium were collected & dried for further used in phytochemical analysis [26-35, 36-38].

2.2 Sample Preparation
Extraction of thorns, petals, & androecium of *Bombax ceiba*. Were prepared in two different solvents, viz. (i) Chloroform extract (CE) and (ii) Acetone water(1:1) extract (AWE). Plant part was crushed by mortar pestle ground to powder. The powders were used for preparing extract in chloroform and acetone:water (1:1). 10 gm. Powder of plant part was subjected to 50 ml of solvent for 24 hrs. After which it was filtered using Whatman filter paper-no 1. The sample prepared were analyzed for different phytochemical qualitative analysis of various parameters like steroids, Terpenoids, Amino acids, proteins [39], tannin, Phenolic compounds, coumarin [40], Phytostetol, Glycerides, Reducing sugar, carbohydrates [41], flavonoids, and phlobatannins [42].
3. RESULTS AND DISCUSSION

Traditional uses reflect that *Bombax ceiba* is used in various ways. Thorn and flower petals are used for skin related problems, and androecium has different potential uses as food material, it reveals important whereas chemical components present in androecium.

3.1 Phytochemical Analysis

The results of the phytochemical analysis showed that *Bombax ceiba* has good source of steroid, carbohydrate and phlobatannins in both solvent extracts. In this study three parts of *Bombax ceiba* viz., petals, androecium and thorn were taken for phytochemical analysis.

3.1.1 Qualitative analysis of phytochemical parameters in acetone: water extract

The results of the qualitative analysis in the acetone: water extract showed that the presence of steroids, phlobatannins, flavonoids, carbohydrates, reducing sugars, and phenol compounds were noted to be present in all the three parts viz., thorn, petals, and androecium. The compounds phytosterol, tannin, amino acids, protein and glycosides were found to be absent in thorns of the plant, they were observed in other two parts (petals and androecium). Tannin and protein compounds showed their presence only in androecium and petals, respectively.
whereas, terpenoids were observed in thorns and androecium.

Total phytochemical in acetone: water extract, thorn 07, where 10 in petals and 11 present in androecium.

The results of the qualitative analysis in the chloroform extract showed that the presence of steroids, coumarins, phlobatannins, and carbohydrates compounds were noted to be present in all the three parts viz., thorn, petals and androecium. The compounds phytosterol, tannin, flavonoids, reducing sugar, amino acid, protein, terpenoids, phenols compound, and glycosides were found to be absent in thorns of the plant, some of them observed in other two parts (petals and androecium). Tannin and amino acid compounds showed their presence only in androecium and petals whereas, terpenoids were observed in thorns and androecium.

Table 1. Traditional uses of *Bombax ceiba* L.

<table>
<thead>
<tr>
<th>Useful part</th>
<th>Traditional uses</th>
<th>Preparation method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thorn</td>
<td>Curing pimples</td>
<td>Take fresh thorn and crush it with water, this mixture directly applying on pimple infected skin.</td>
</tr>
<tr>
<td>Petals</td>
<td>Soft and bright skin (during marriage season in the tribal area, particularly after Holi festival)</td>
<td>Fresh or dry Petals remove from the flowers, crush with a little amount of turmeric powder and water, this mixture used on face.</td>
</tr>
<tr>
<td>Androecium</td>
<td>As a food material in the summer season</td>
<td>Cooking dry androecium and used as food.</td>
</tr>
</tbody>
</table>

![Chart 1. Phytochemicals in acetone:water extract](image1)

![Chart 2. Phytochemicals in chloroform extract](image2)
Table 2. Qualitative analysis of phytochemical para phytochemical parameters in acetone:
water extract

<table>
<thead>
<tr>
<th>Sr.no</th>
<th>Phytochemical compound</th>
<th>Thorn</th>
<th>Petals</th>
<th>Androecium</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Steroid</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>2.</td>
<td>Phytosterol</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3.</td>
<td>Tannin</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>4.</td>
<td>Coumarins</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5.</td>
<td>Phlobatinins</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>6.</td>
<td>Flavonoids</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>7.</td>
<td>Carbohydrate</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>8.</td>
<td>Reducing sugar</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>9.</td>
<td>Amino acids</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>10.</td>
<td>Protein</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>11.</td>
<td>Glycosides</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>12.</td>
<td>Terpenoids</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>13.</td>
<td>Phenols compounds</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Total compound: 07 10 11

Table 3. Qualitative analysis of phytochemical para phytochemical parameters in Chloroform extract

<table>
<thead>
<tr>
<th>Sr.no</th>
<th>Qualitative phytochemical test</th>
<th>Thorn</th>
<th>Petals</th>
<th>Androecium</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Steroid</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>2.</td>
<td>Phytosterol</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3.</td>
<td>Tannin</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>4.</td>
<td>Coumarins</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>5.</td>
<td>Phlobatinins</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>6.</td>
<td>Flavonoids</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>7.</td>
<td>Reducing sugar</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8.</td>
<td>Amino acids</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>9.</td>
<td>Protein</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10.</td>
<td>Glycosides</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11.</td>
<td>Terpenoids</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>12.</td>
<td>Phenols compounds</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>13.</td>
<td>Carbohydrates</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Total compound: 04 07 08

Chart 3. Total number of phytochemicals present in particular extracts

(CE; Chloroform extract, AWE; Acetone:water extract (1:1)
Result shows that in thorn steroid, coumarins, phlobatannins, flavonoids, carbohydrate, reducing sugar, terpenoids, and phenols compounds were present, where, analysis of petals reflect steroid, phytosterol, tannin, coumarins, phlobatannins, flavonoids, carbohydrate, reducing sugar, amino acids, protein, glycosides and phenols compounds, only terpenoids is not present in petals. Total twelve compounds were present in petals out of thirteen compounds. The phytochemical analysis of androecium is show, steroid, phytosterol, tannin, coumarins, phlobatannins, flavonoids, carbohydrate, reducing sugar, amino acids, glycosides, terpenoids, and phenols compounds, here protein is not present with respective tests. Petals and androecium have good source of phytochemicals.

**4. CONCLUSION**

The present study shows the interrelation of traditional uses and plants chemical compound. Thorn, petals, and androecium having good source of phytochemicals, which is widely used in traditional medicine system and as food material. The present investigation gives the strong relationship between the traditional medicinal importance and the presence and absence of secondary metabolites especially phytochemical compounds observed in three different parts (Thorn; petals and androecium) of the same plant species. Considering the numbers of phytochemicals observed in acetone: water extracts, it showed variation in phytochemical compounds presence of 07 in thorns; 10 in petals and 11 in androecium.

Furthermore, maximum phytochemicals were observed in androecium of *Bombax ceiba*. Moreover, the chloroform extract of *Bombax ceiba* showed less number of phytochemicals in all the three parts of plant species. Thorns of the plant in chloroform extract showed only presence of four phytochemicals whereas, nine phytochemicals were observed in chloroform extract of petals & androecium.

Considering the presence of these secondary metabolites, all three parts are used as a food source as well as medicine. Hence, the plant *Bombax ceiba* is considered to be important ethnomedicine and traditional plant.

**CONSENT**

It is not applicable.

**ETHICAL APPROVAL**

It is not applicable.

**COMPETING INTERESTS**

Authors have declared that no competing interests exist.

**REFERENCES**


20. Kumar NS, Madhurambal G. Quercetagetin glycoside from the flowers of Bombax ceiba. AJRC. 2010;3(1):78.


