Physico-chemical and preliminary phytochemical screening of roots of some species of *Dashmoola*

**Jaywant Pardeshi, Dr. MV Katariya, Kirti Amolik, Bhavna Sane and Aniket Mahapure**

**Abstract**

Alkaloids, tannins, saponins, flavonoids, steroids, triterpenoids, proteins, fats, carbohydrates, phlobatannins and resin in the tree species of Dashmoola belongs to the different families were investigated and compared. The medicinal plants investigated are *Aegle marmelos, Stereospermum chelonoides, Gmelina arborea*. The samples are collected from eighteen months old plant. The plant extract is gone through the several qualitative analysis test to find out active constituents which are important in various ailments and drug development. The analysis of crude methanolic extract revealed the presence of flavonoids in all the extracts. The alkaloids are present in *A. marmelos, S. chelonoides*, while absent in *G. arborea*. The steroids, triterpenoids and saponins were not found in all the extracts. The significance of these plants in *Ayurvedic* medicines and the importance of chemical constituents were discussed with respect to the role in Dashmoolarist.

**Keywords:** dashmoola, medicinal plants, phytochemicals, flavonoids

**Introduction**

The Medicinal plants have been considered as important therapeutic aid for alleviating ailments of human being and these plants have been used for treatment of various ailments since immemorial time (Jain, 1991). Besides the rapid development of methods of organic synthesis in laboratory, medicinal plants continue to play a significant role in modern medicine due to their distinct biological and chemical properties. In nature, a plant is able to synthesize complex molecules namely alkaldoids, terpenoids, tannins, saponins, glycosides etc. collectively called secondary metabolites, (Harborne, 1973) from simple one to through highly specific reaction mechanism, that they use for defense and communication. It is difficult and expensive to duplicate such synthesis in laboratory. The compound synthesized by the plant play an important role as medicinal and pharmaceutical agents and not only as purified isolates and extractives but also led compound for synthesis optimization. Nature is still mankind’s greatest chemist and many compound that remain undiscovered in plants are beyond the imagination. These secondary metabolites show potent biological activity against most of bacteria, viruses, ailments, endoparasites etc. It is rather difficult and expensive to prepare these phytochemicals in laboratories. Such compounds synthesized by plant naturally play an important role as medicinal and pharmaceutical agents. These phytochemicals are found in roots, stem, stem bark, leaves, fruits etc. (Debela, 2002).

Medicinal plants are of great importance to the health of individuals and communities (Edeoga et al., 2005). Many of these indigenous plant species are used as *Ayurvedic* medicine. *Dashmoola* (Ten roots) species comprises five tree species (Perennial / Brihat Panchamool) and five weed species (Seasonal / Laghu Panchamool) viz. *Aegle marmelos, Stereospermum chelonoides, Gmelina arborea, Premna obtusifolia, Oroxylum indicum, Tribulus terrestris, Solanum indicum, Solanum xanthocarpum, Desmodium gangeticum, Utraria picta*. The roots of these species are used in preparation of *Ayurvedic* drug namely Dashmoolarist (Herbal liquid), Dashmoola Kwath i.e. decoction, Dashmool Kadha, sweet preparation with jaggery, Dashmoola oil, Dashmoola Medicated Ghee, Dashmoola Haritaki (Combined with Hirda). These formulations are used in various disorders such as Pyrexia (different types of fever), acute and chronic asthma, all types of vata disorders etc. The drugs of Dashmoola are used in the treatment of various diseases of almost all the systems of body specifically works on the Respiratory, Gastro-intestinal and Central nervous system. Dashmoola are considered as immunomodulator, general restorative tonic.

The traditional medicinal uses of tree species are reviewed in Table 1. Despite extensive applications of these plant species in Ayurveda medicine, little information is available on
their phytochemical constituents. For preparation of Dashmoolarist the roots of Dashmoolaa plant species have huge demand in India as well as in the world market. Considering all these facts the present investigation is designed to find out phytochemicals in the root samples of perennials/ Brihat panchamoolaa of eighteen months old plants.

Materials and Methods
Selection and authentication of plants
The three tree species of eighteen months old viz. Aegle marmelos, Stereospermum chelonoides, Gmelina arborea, were selected for present study on the basis of literature (Kapoor et al., 1969) and indigenous traditional knowledge (Cohen et al., 1991). The plants are authentified by Plant Introduction Officer and Asst. Prof. (Botany) Department of Agricultural Botany, Mahatma Phule Krishi Vidyapeeth, Rahuri.

Preparation of Plant extract
The crude plant extract was prepared by Soxhlet extraction method (Kokate and Verma, 1971). About 50 gm of powdered material were packed in to filter paper and run in soxhlet extractor. The extraction of phytoconstituents was carried out with methanol for about 6 cycles. The extract is filter and evaporate to get concentrated extract.

Physico-chemical analysis
All the samples were analyzed for their physico chemical parameters. The results are tabulated in table no. I

Table 1: Physico-chemical parameters of Roots of Dashmoola tree species (Brihat panchmoolaa)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Test performed</th>
<th>A. marmelos</th>
<th>S. chelonoides</th>
<th>G. arborea</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Loss on drying @ 110 °C (%)</td>
<td>0.85</td>
<td>0.206</td>
<td>0.062</td>
</tr>
<tr>
<td>2</td>
<td>Acid insoluble matter (%)</td>
<td>0.54</td>
<td>1.68</td>
<td>1.11</td>
</tr>
<tr>
<td>3</td>
<td>Ash content (%)</td>
<td>6.24</td>
<td>9.05</td>
<td>5.45</td>
</tr>
<tr>
<td>4</td>
<td>Water soluble extractive (%)</td>
<td>12.16</td>
<td>15.84</td>
<td>11.47</td>
</tr>
<tr>
<td>5</td>
<td>Alcohol soluble Extractive (%)</td>
<td>9.24</td>
<td>22.0</td>
<td>21.18</td>
</tr>
<tr>
<td>6</td>
<td>Thin Layer Chromatography</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Phytochemical analysis of crude extract
The crude extract were tested for the presence of active principles such as Alkaloids, tannins, saponins, flavonoids, steroids, triterpenoids, proteins, fats, carbohydrates etc. The following standard procedures were used. The results are tabulated in Table II.

Test for Alkaloids
Mayers test: 1.0 ml crude extract was mixed with 0.5 ml Mayers reagent (Potassium mercuric iodide solution) in test tube. The formation of cream colour precipitate indicate the presence of alkaloids.

Test for Tannins
For testing of tannins Ferric chloride test was followed as describe by Trease and Evens, 1983; Kokate, 1994. 1.0 ml crude extract was mixed with 0.5 ml ferric chloride in test tube. The appearance of blue green colour to the mixture, suggests the presence of tannins.

Test for Saponins
Froth test as suggested by Trease and Evens, 1983; Kokate, 1994; Sofowara, 1982 was followed for presence of saponins. 1.0ml crude extract was shaken vigorously with in 1.0 ml distilled water in a test tube. Formation of froth was taken as positive test for presence of saponins.

Test for Flavonoids
For detection of flavonoids, Alkaline reagent test prescribe by Trease and Evens, 1983; Ayoola et al., 2008 was used. 1.0 ml crude extract was mixed with few drops of sodium hydroxide solution. An intense yellow colour was form. Yellow colour turned to colourless on addition of few drops of diluted acid, marked the presence of flavonoids.

Test for steroids and Triterpenoids
Salkowski test was used for presence of steroids and triterpenoids. 1.0ml crude extract was mixed with chloroform and a few drops of conc. Sulphuric acid, shake well and allowed to stand for some time. Red colour at the lower layer indicated the presence of steroids and formation of yellow coloured layer indicates the presence of triterpnoids.

Test for proteins
Protein analysis was carried out by using Ninhydrin test.1.0 ml crude extract was boiled with 0.2 % Ninhydrin solution (Indane 1, 2, 3, trione hydrate). A violet colouration indicates the presence of amino acids and proteins.

Test for Fats
Saponification test was carried out for the detection of fats. In a small quantity (about 1.0 ml) of crude extract few drops of 0.5 N alcoholic potassium hydroxide were added to which a drop of phenolphthalein was added separately and heated in a
Test for carbohydrates
Fehlings test as suggested Kokate, 1994 was followed. Equal volume of Fehling A (copper sulphate in distilled water) and Fehling solution B (Potassium tartarate and sodium hydroxide in distilled water) reagents were mixed with few drops of crude extract and boiled, a brick red precipitate of cuprous oxide forms, indicate the presence of reducing sugar.

Table 2: Chemical constituents of crude methanolic extract of Roots of Dashmoola tree species (Brihat panchmoolaa).

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Plant extract</th>
<th>Alkaloids</th>
<th>Tannins</th>
<th>Saponins</th>
<th>Flavonoids</th>
<th>Steroids</th>
<th>Triterpenoids</th>
<th>Proteins</th>
<th>Fats</th>
<th>Carbohydrates</th>
<th>Phlobatannins</th>
<th>Resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A. marmelos</td>
<td>√</td>
<td>×</td>
<td>×</td>
<td>√</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>2</td>
<td>S. chelonoides</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>3</td>
<td>G. arborea</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
</tbody>
</table>

√: Presence of Phytoconstituent, ×: Absence of Phytoconstituent

Results
The physic-chemical parameters of the five perennial species are presented in Table 2. The results reveals that the A. marmelos recorded higher percentage loss (0.85%) while G. arborea recorded lower (0.062%) after drying @110°C. The acid insoluble matter was lower in A. marmelos (0.54%). S. chelonoides contain higher ash percentage (9.05%) while G. arborea was 3.62%. The water and alcohol soluble extractive was higher in S. chelonoides and lower in A. marmelos.

Discussion
The results confirm the presence of constituent which are known to exhibit Medicinal as well as physiological activity (Sofowora, 1993) \[13\]. From all above analysis of methanolic extracts of roots of Brihat panchmoolaa shows the presence of different phytoconstituents showing different biological activities.

Test for Phlobatannins
Presence of Phlobatannins was estimated by using the procedure suggested by Edeoga et al., 2005 \[16\]. About 2 ml of aqueous extract was added to 2 ml of 1% HCl and the mixture was boiled. Development of a red precipitate was taken as an evidence for the presence of Phlobatannins.

Test for Resin
5 ml of distilled water was added to extract and observe for turbidity.

Conclusion
The results reveal the presence of medicinally active constituents in the five tree species (Brihat Panchmoolaa) of Dashmoolaa. The phytochemical compounds identified in this study have earlier been proved to be bioactive. The presence of some of these compounds have been confirmed by previous workers to have medicinal as well as physiological activity and therefore could be said to be responsible for the efficacy of the parts of the plants studied in treatments of different ailments. The plant extracts could therefore be seen as a potential source for (Dashmoolalarist) important drug in Ayurveda. The continued traditional medicinal use of these plants is therefore encouraged while it is suggested that further work should be carried out to isolate, purify and possibly characterize the active constituents responsible for the activity of these plants. Also additional work should be embarked upon with a view to elucidate the possible mechanism of action of these extract

References


