Short Communication

PHYTOCHEMICAL STUDY OF AN ETHNO MEDICINAL PLANT
LIMNOPHILA RUGOSA ROTH. (MERR) (SCROPHULARIACEAE)
WHOLE PLANT

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Abstract

Limnophila rugosa Roth. (Merr) (Scrophulariaceae) is used as a botanical source of Bhringaraja by the traditional practitioners of Balangir and Baragarh district of Odisha. The present study was carried out to screen the preliminary phytochemical constituents of ethanol & aqueous extracts of the whole parts of L. rugosa including High Performance Thin Layer Chromatography. The extracts were subjected to various chemical tests in order to identify the main phytoconstituents of the plant. The study revealed that the ethanol extract contains glycosides, little amount of alkaloids and flavonoids while the aqueous extract is rich in glycosides.

Key Words : Limnophila rugosa, Phytochemistry, Bhringaraja, Gandhamardana hills

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Introduction

In India, plants are utilized as therapeutic agents, since time immemorial, in organized (Ayurveda, Siddha and Unani) and unorganized (folk, tribal and native) form. In these systems of medicines the plant based drugs are described either in Sanskrit or vernacular languages. Classical texts of Ayurveda describes three types (white, yellow and blue) of Bhringaraja, a drug of herbal origin, claimed to be usefull in many disease conditions\(^{(1,2)}\). The botanical identity of white and yellow variety, based on their flowers, has been confirmed as Eclipta alba (L.) Hassk. (Asteraceae) and Wedelia chinensis (Osbeck) Merrill. (Asteraceae) respectively and has been extensively studied regarding their pharmacognostical and phytochemical characters\(^{(3)}\). The botanical identity of blue variety of Bhringaraja is yet to be established. An ethnomedicinal plant, Limnophila rugosa Roth. Merr. (Scrophulariaceae), having blue colour flowers is being known and used as Bhringaraja by the traditional practitioners of surrounding areas of Gandhamardan hill region of Odisha and not reported for its preliminary phytochemical characters except its leaf\(^{(4,5)}\).

Hence, the present study has been planned to evaluate the preliminary phytochemical characters of the whole plant.

Materials and Methods :

Collection and authentication of plant material:
The plant known as Bhringaraja, growing in Gandhamardana hill ranges, Balangir of Odisha district of India\(^{(6)}\) was identified as Limnophila rugosa Roth. Merr. of family Scrophulariaceae by studying the morphological characters of various parts of the plant and comparing them with the various characters mentioned in various floras\(^{(6,7,8)}\). A herbarium specimen was prepared (Herbarium No. 6003) and was stored in Pharmacognosy department, of the institute, for further documentation. The remaining plants were dried under the shade and then were subjected for 60\# powdering for further study.

Physicochemical parameters:
Determination of loss on drying at 110\(\degree\) C, total ash, acid insoluble ash, water and alcohol soluble extractive values were carried out by following various parameters mentioned in Ayurvedic Pharmacopoeia of India.\(^{(9)}\)

Preparation of extract
5 g of L. rugosa powder extracted with methanol (100ml), keeping it for overnight with initial occasional shaking up to 6 hrs, and then set aside. After 24 hours it was filtered and alcoholic extract was collected. Similarly water extract were prepared and collected.\(^{(9)}\)
Qualitative tests

Tests for Alkaloids, Flavonoid, Steroids, Protein, Tannins, Carbohydrate, Chlorophyll (Phase test) and Cyanogenic glycosides was carried out following standard parameters.\(^{10}\)

Chromatographic study

Methanol extract of *Limnophila rugosa* whole plant were used for the study. The solvent system used was Chloroform : Methanol : Acetic acid in the ratio (8:2:1). The application mode was Camag Linomat V and the development Chamber used was Camag twin trough chamber. The plates used were precoated silica gel GF254 plates. The chamber saturation duration, development time and development distance was 30 min, 30 min and 8 cm respectively. The scanner used was Camag scanner III. For detection deuterium lamp and Tungsten Lamp were used. Win cats software was used. After the scanning done by the Camag Scanner III, the area under the curve of methanol extract of *Limnophila rugosa* whole plant was studied\(^{11}\).

Result and Discussion

The physico-chemical parameters of the whole plant viz. foreign matter, loss on drying, total ash, acid insoluble ash were found to be nil, 5.9 \% w/w, 9.00 \% w/w and 2.0 \% w/w respectively. The percentage of alcohol extractive was 0.150 \% w/w and ether soluble extractive value was 0.061 but the percentage of water extractive was found to be significantly higher i.e. 0.181 \%.

For the detection of functional groups, various chemical tests were performed with aqueous and alcohol extract of the sample. Functional groups like alkaloid, tannin, triterpenoids (Steroid), flavonoid, Protein, carbohydrate, glycosides and phenols were found to be present in the sample. (Table 1)

Detection of HPTLC plate after spraying with Vanillin-Sulphuric acid reagent, 14 spots were detected at 366 nm & 18 spots were detected at 254 nm in *L. rugosa* whole plant methanol extract. (Figure 1) (Table 2)

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Qualitative tests</th>
<th>L. rugosa whole plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Test for Alkaloids</td>
<td>+ve</td>
</tr>
<tr>
<td></td>
<td>1) Dragendorff’s reagent</td>
<td>+ve</td>
</tr>
<tr>
<td></td>
<td>2) Mayer’s reagent</td>
<td>+ve</td>
</tr>
<tr>
<td></td>
<td>3) Hager’ reagent</td>
<td>+ve</td>
</tr>
<tr>
<td></td>
<td>4) Wagner’s reagent</td>
<td>+ve</td>
</tr>
<tr>
<td>2.</td>
<td>Test for Tannins</td>
<td>+ve</td>
</tr>
<tr>
<td>3.</td>
<td>Test for triterpenes (steroids)</td>
<td>+ve</td>
</tr>
<tr>
<td>4.</td>
<td>Test for saponins</td>
<td>-ve</td>
</tr>
<tr>
<td>5.</td>
<td>Test for fixed oil</td>
<td>-ve</td>
</tr>
<tr>
<td>6.</td>
<td>Tests for cynogenic glycosides / sugars Molisch’s test</td>
<td>+ve</td>
</tr>
<tr>
<td>7.</td>
<td>Test for flavonoids / Shinoda’s test</td>
<td>+ve</td>
</tr>
<tr>
<td>8.</td>
<td>Test for carbohydrates</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1) Molish’s test</td>
<td>+ve</td>
</tr>
</tbody>
</table>
2) Fehling’s test -ve
3) Pentose sugar +ve
4) Hexose sugar +ve
5) Non reducing +ve
9. Test for phenols / neutral FeCl₃ +ve
10. Test for amino acids -ve
11. Test for proteins
   1) Conc. H₂SO₄ +ve
   2) CuSO₄ +ve
   3) HgCl₂ +ve
   4) Lead acetate +ve
   5) Ammonium Sulphate +ve
11. Test for resin -ve
12. Test for gum -ve

Table 2- Results of HPTLC study for Rf value under long and short UV

<table>
<thead>
<tr>
<th>Track</th>
<th>Rf Value Long UV</th>
<th>Rf Value Short UV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limnophila rugosa whole plant methanol</td>
<td>0.01, 0.12, 0.18, 0.21, 0.27,</td>
<td>0.01, 0.07, 0.10, 0.17, 0.21, 0.25, 0.30, 0.37, 0.40, 0.48, 0.54, 0.64, 0.67, 0.72, 0.81, 0.85</td>
</tr>
<tr>
<td>extract</td>
<td>0.30, 0.37, 0.40, 0.48, 0.54,</td>
<td>0.30, 0.39, 0.41, 0.48, 0.52, 0.54, 0.60, 0.64, 0.67, 0.72, 0.81, 0.85</td>
</tr>
<tr>
<td></td>
<td>0.64, 0.73, 0.80, 0.90</td>
<td>0.64, 0.67, 0.72, 0.81, 0.85</td>
</tr>
</tbody>
</table>

Conclusion:

Limnophila rugosa whole plant shows the presence of different types of functional groups like alkaloid, tannin, triterpenoids (Steroid), cyanogenic glycoside, flavonoid, carbohydrate and protein. In Chromatography, HPTLC method, after spray with vanillin sulphuric acid reagent, 14 spots were detected under long UV and 18 spots were detected under short UV, at different Rf, indicating presence of various chemical groups in the plant sample.

References:

Acharya R et al.: Phytochemical Study of an Ethno Medical Plant


Sourse of Support : Nil
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