STUDIES ON SCREENING AND HISTOCHEMICAL LOCALISATION OF PHYTOCHEMICALS IN THE MEDICINAL PLANT \textit{BARLERIA LUPULINA LINDL} \\

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ABSTRACT

The genus \textit{Barleria lupulina} Lindl. of the family Acanthaceae belongs to the sub tribe Barlerieae of the tribe Justicieae \textit{sensu} Benth & Hook. The present investigation mainly emphasized on the histochemical localization of phytochemicals like alkaloids, starch, tannins, reducing sugars, proteins, flavonoids, amino acids and lignins. These localization were determined through colourization using different reagents like Wagner’s, Iodine Solutions, 10% Lead Acetate, Benedict’s, Lugol’s, 10% NaOH, Fehling’s(A&B), Millon’s, 0.2% Ninhydrin and 1% Phloroglucinol. The active compounds were identified prominently in different locations of the stem, leaf petiole and root of the medicinal plant \textit{B lupulina} under study. It was found that presence of number of phytochemicals in xylem is higher than other tissues.

**Keywords:** Histochemical localization, Phytochemicals, Reagents, Medicinal plant, \textit{B lupulina}.

INTRODUCTION

Ancient Indian literature incorporates a remarkably broad definition of medicinal plants and considers all plant parts to be potential sources of medicinal substances. \textit{Barleria lupulina} Lindl. is a cultivated medicinal plants, an introduced species from Mauritius, now somewhat naturalized besides its cultivation in the garden as ornamental shrub [1]. It is also used for its medicinal importance as the leaf juice is given to stop bleeding when cut and leaf paste is used as poultice to relief pain. It has strong inhibitory effect against acne-inducing bacteria [2]. It is a small shrub, commonly known as Sornomukhi and distributed in South East Asia. The plant is externally used as an anti-inflammatory against insect bites, snake bites, herpes simplex [3]. Compounds found in the leaves of \textit{Barleria lupulina} Lindl. include barlerin, acetylbarlerin, shanzhiside methyl ester, acetylshanzhiside methyl ester, ipolamiidoside and iridoid glucosides [4]. Limited scientific work has been carried out on the histochemical localization of phytochemicals in \textit{B. lupulina}. The objective of the present investigation is therefore, an attempt to evaluate various pharmacognostic standards, characters of phytochemicals and histochemical localization in \textit{B lupulina}.

MATERIAL AND METHODS

Plant material i.e. \textit{Barleria lupulina} Lindl. (family Acanthaceae) for the present study was collected from the medicinal plant garden of Rampurhat College, Rampurhat and Rathindra Krishi Vigyan Kendra, Visva-Bharati, Sriniketan, Birbhum, located in the lateritic belt of West Bengal, India. The plant has been carefully identified with the help of a book on Systematic of Flowering Plants [1]. Localisation of phytochemicals were identified by light microscope with the hand sections (transverse) and observed under 10x X 10x microscopic lens. Histochemical localization and characterization of phytochemicals from the fresh materials were performed using few reagents such as Wagner’s, Iodine Solutions, 10% Lead Acetate, Benedict’s, Lugol’s, 10% NaOH, Fehling’s(A&B), Millon’s, 0.2% Ninhydrin and 1% Phloroglucinol. Observing the colorations of these materials with reagents the characterization of the phytochemicals such as alkaloids, starch, tannins, reducing sugars, proteins, flavonoids, amino acids and lignins were made and listed out.

RESULTS AND DISCUSSION

Presence of alkaloids

It is found from the table-1 that alkaloids are present with orange brown coloration by Wagner’s reagent in few epidermal and pith cells and in all xylem cells in stem. But alkaloids in root are present in the cells of the

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cork and in xylem region. But in petiole alkaloids present in epidermis, hypodermis and in xylem. Similar type of results were obtained by some workers [5].

Through iodine test (Blue coloration) it was found that starch grains were located in epidermis, xylem and pith in stem, but only in xylem in root and in cortical parenchyma and few cells in xylem in leaf petiole. Many other workers found prototype results [5,6].

**Presence of tannins**

Yellow colorations was found by using 10% lead acetate in the epidermis and xylem in stem and in cork and secondary phloem in root and only in xylem in leaf petiole of *B. lupulina*. Other workers [7] found similar type of results in the family Convolvulaceae.

**Presence of reducing sugar**

It is observed from the table-1 that reducing sugar is present in few primary xylem, hypodermis, epidermis in stem and in few secondary phloem cells, cork cells, hypodermis and epidermis in root. In leaf petiole it is present only in few cortical cells. Two types of tests were performed using Benedict’s reagent and Fehling’s (A & B) reagent with brick red colorations in both the tests. Other scientists [8] observed similar type of result of chemical analysis of some medicinal plants.

**Presence of proteins**

<table>
<thead>
<tr>
<th>Reagents</th>
<th>Colouration</th>
<th>Phytochemicals</th>
<th>Tissue location</th>
<th>Petiole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wagner’s</td>
<td>Orange brown</td>
<td>Aalkaloids</td>
<td>Epidermis, xylem, pith cells</td>
<td>Xylem, cork cells</td>
</tr>
<tr>
<td>Iodine solution</td>
<td>Blue</td>
<td>Starch</td>
<td>Epidermis, xylem, pith cells</td>
<td>Xylem</td>
</tr>
<tr>
<td>10% Lead acetate</td>
<td>Yellow</td>
<td>Tannin</td>
<td>Epidermis, xylem</td>
<td>Xylem, cork cells</td>
</tr>
<tr>
<td>Benedict’s</td>
<td>Brick red</td>
<td>Reducing sugar</td>
<td>Few primary xylem, few hypodermis</td>
<td>Few secondary phloem, cork cell, hypodermis, epidermis</td>
</tr>
<tr>
<td>Fehling’s</td>
<td>Brick red</td>
<td>Reducing sugar</td>
<td>Few primary xylem, few hypodermis</td>
<td>Few secondary phloem, cork cell, hypodermis, epidermis</td>
</tr>
<tr>
<td>Lugol’s</td>
<td>Yellow brown</td>
<td>Protein</td>
<td>Epidermis, hypodermis, xylem, pith cells</td>
<td>Hypodermis, secondary xylem, cork cell</td>
</tr>
<tr>
<td>Millon’s</td>
<td>Yellow brown</td>
<td>Protein</td>
<td>Epidermis, hypodermis, xylem, pith cells</td>
<td>Hypodermis, secondary xylem, cork cell</td>
</tr>
<tr>
<td>10% NaOH</td>
<td>Yellowish brown/ magenta</td>
<td>Flavonoids</td>
<td>Few hypodermis</td>
<td>Cork, hypodermis</td>
</tr>
<tr>
<td>0.2 % Ninhydrin</td>
<td>Purple</td>
<td>Amino acids</td>
<td>Epidermis, few xylem</td>
<td>Xylem, phloem</td>
</tr>
<tr>
<td>1 % Phluroglucinol in 50% HCl</td>
<td>Redish brown</td>
<td>Lignin</td>
<td>Xylem</td>
<td>Cork cells, hypodermis, cortex</td>
</tr>
</tbody>
</table>
CONCLUSION

Phytochemical screening of the leaf, stem and petiole of *Barleria lupulina* revealed the presence of alkaloids, starch, tannins, reducing sugar, proteins, flavonoids, amino acids and lignin in different tissues. From the results it is found that presence of number of chemical constituents in xylem is higher than other tissues. These compounds have significant application against human pathogens that causes acne and are reported to have curative properties against several pathogens such as *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumonia*, *Staphylococcus aureus* etc. and therefore could suggest their use in the treatment of various diseases [11].

REFERENCES