ORGANIC AND INORGANIC PHYTOCHEMICAL SCREENING,
QUANTITATIVE ANALYSIS OF ALKALOIDS OF STEM AND ROOT
EXTRACT OF LAVANGA

Dr B.S.Savadi¹, Afreen Banu²

¹Principal SJGAMC&H Koppal, ²Analytical Chemist ACRL SJGAMC&H Koppal

Abstract

Introduction: Lavanga is one of the most ancient and valuable spices due to its versatile uses in treatment according to Ayurveda lavanga has tikta and katu rasa and sheeta virya. Due to katu rasa it acts as kaphashamaka and pittahara due to sheeta veerya. Lavanga contains most of various secondary metabolites with great potentials.

Materials & Methods

Aims & objectives: The aim to study is to evaluate organic and inorganic screening and Quantitative analysis of alkaloids of stem and root extract of lavanga. Qualitative analysis like phytochemical screening and inorganic screening were carried out and physico chemical screening with standard techniques. Quantitative analysis like quantification of alkaloids were estimated by Harborne method.

Results: Qualitative organic and inorganic screening showed the presence of carbohydrates, saponin, flavonoids, steroids, alkaloids, glycoside in aqueous extract, alkaloids, proteins and amino acids, Quinone and glycoside are present in ethanolic extract. Inorganic elemental analysis shows presence of calcium, Iron, sodium are appreciated in the stem and root of lavanga extract. Quantification of alkaloids shown 24.2 % of alkaloids presence.

Conclusion: Lavanga stem & root extract shows many compounds in aqueous extract than alcoholic extract and higher alkaloids presence in stem and root of lavanga & justifies their uses for human health benefit.

Keywords: Lavanga, Alkaloids, Phytochemical screening.

Study and Article History: Sample Received at 05/08/2022 study conducted in ACRL, revised on 20/07/2022 & published in Avishkara Vol 1, Issue 4, Sept 2022

Introduction:

Lavanga is a well-known Ayurvedic herb. Lavanga are aromatic flower buds of a tree Latin named as Syzygium aromaticum which comes under myrtaceae family. It is a medium sized crown, bushy evergreen tree.
8-20m in height. Bark is smooth and grey, elliptical, lanceolate leaves, acute at both ends, fragrant, with petiole. Lower surface of leaves have aromatic oil gland sand Cyme in florescence. Flowers form in small clusters. Flower buds according to maturity pale at early stage, green at middle stage, red at maturity stage, long narrow ovary and four small triangular sepal, small ball of four overlapping petals it protects the developing flower part inside. This whole makes the clove which is 1.5 to 2cm long consists of long calyx, 4 unopened petals and 4 sepal, small oblong fruits with pulp, avoid brown with one seeded berry. It is known as Lavanga due to its Kapha lying property. According to Ayurveda lavanga has tikta and katu rasa and Sheeta virya. Due to katu rasa it acts as kaphashamaka and pitta hara, due to Sheeta veerya. It also acts as krumighna (wormicidal) therefore it is used in dantshoola (dental carries).

The leaves of lavanga contain betulinic acid, which also has cytotoxic property in certain cancers like breast cancer. lavanga for a tooth ache has been used by Indian more than decade. Using of the clove powder or oil to beat toothache and tooth-related troubles are generally used in all Indian families. The Lavanga powder improves the cholesterol ratio, maintains the pH in the GI tract that in turn avoids all kinds of oral infections. Lavanga indicates the symbol of dignity in actual sense. It is a very precious spice of the world. The health benefits of clove have been known for centuries. It is beneficial as a home remedy in curing several ailments or diseases.

Acharya Dalhana has given a synonym shrreechandana pushpa for Lavanga owing to the shape of the flower. The properties of Lavanga include Katu tikta rasa, Laghu teeksha guna, Sheeta veerya, Katu vipaka. The karmas attributed to Lavanga are Chakshushya, Bhaktarochna, Deepana, Pachana, diseases like Shoola, Kshaya, Shwasakasa, etc. due to its versatile application in treatment present study has been taken for organic and inorganic phytochemical screening of and quantification of alkaloids.

**Materials and Methods:**

**Sample Collection:**
Lavanga plant was cultivated by Ramappa Nagappa Hanmnur in Kadampur, from their samples has been collected, identified by experts and taxonomists.

**Collection of extraction of plant materials**
A total of 250 g of Lavanga were macerated in 75% ethanol in distilled water using cold maceration techniques for 48 h, filtered, and then the alcohol was evaporated on water bath. Stock solution (1 mg/ml) of different extract was prepared in ethanol.

**Phytochemical screening:**
Organic analysis like Test for Carbohydrates, Saponin, Phenols, Flavonoids, Steriods, Alkaloids, Anthraquinone, Protein and aminoacids, Anthocyamine, Quinone, Glycosides. And inorganic analysis like Calcium, Magnesium, Sodium, Potassium, Iron, Sulphates, Chloride, Carbonate, and Phosphate.

**Qualitative phytochemical screening:**
Detection of alkaloids
Extracts were dissolved individually in dilute Hydrochloric acid and filtered.

**Mayer’s Test**
Filtrates were treated with Mayer’s reagent (Potassium Mercuric Iodide). Formation of a yellow coloured precipitate indicates the presence of alkaloids.

**Wagner’s Test**
Filtrates were treated with Wagner’s reagent
(Iodine in Potassium Iodide). Formation of brown/reddish precipitate indicates the presence of alkaloids

**Dragendroff’s Test**

Filtrates were treated with Dragendroff’s reagent (solution of Potassium Bismuth Iodide). Formation of red precipitate indicates the presence of alkaloids

**Hager’s Test**

Filtrates were treated with Hager’s reagent (saturated picric acid solution). Presence of alkaloids confirmed by the formation of yellow coloured precipitate

**Detection of carbohydrates:**

Extracts were dissolved individually in 5 ml distilled water and filtered. The filtrates were used to test for the presence of carbohydrates.

**Molisch’s Test**

Filtrates were treated with 2 drops of alcoholic α-naphthol solution in a test tube. Formation of the violet ring at the junction indicates the presence of Carbohydrates

**Detection of glycosides:**

Extracts were dissolved in 1 ml of water and few drops of Naoh solution, formation of yellow colour indicates presence of glycosides.

**Detection of saponins**

**Foam Test**

0.5 gm of extract was shaken with 2 ml of water. If foam produced persists for ten minutes it indicates the presence of saponins.

**Detection of phytosterols**

**Salkowski’s Test**

Extracts were treated with chloroform and filtered. The filtrates were treated with few drops of Conc. Sulphuric acid, shaken and allowed to stand. Appearance of golden yellow colour indicates the presence of triterpenes.

**Detection of phenols**

**Ferric Chloride Test**

Extracts were treated with 3-4 drops of ferric chloride solution. Formation of bluish black colour indicates the presence of phenols

Detection of tannins To the extract, 1% gelatin solution containing sodium chloride was added. Formation of white precipitate indicates the presence of tannins

**Detection of flavonoids**

Extracts were treated with few drops of conc H2SO4, Formation of Orange colour indicates flavonoids.

**Detection of proteins and aminoacids**

**Xanthoproteic Test**

The extracts were treated with few drops of conc. Nitric acid. Formation of yellow colour indicates the presence of proteins

Inorganic analysis like test for Calcium, Magnesium, sodium, potassium, Iron, Sulphates, Chloride we analyzed.

**Quantification of Total Alkaloids:**

Alkaloids were determined using Harbore method, 5 gm of the sample was weighed into 250 ml beaker 200 ml of 10% acetic acid in ethanol was added and covered and allowed to stand for 4 hours this filtered and extract was concentrated on water bath to one quarter of the original value concentrated ammonium hydroxide was added drop wise to the extract until the precipitation was complete the hole solution was allow to settle and the precipitate was collected and washed with dilute ammonium hydroxide and then filtered the residue is the alkaloids which was dried and weight

\[
\% \text{ of Alkaloids} = \frac{\text{Weight of alkaloid}}{\text{weight of sample}} \times 100.
\]

1.210/5 x 100 = 24.2
Results and Discussion

The phytochemical screening of various extract of stem and root of lavanga is shown in Table 1 and Table 2. It is observed that aqueous extract of lavanga confirmed the presence of carbohydrates, saponin, flavonoids, steroids, alkaloids, glycoside. In ethanolic extract confirmed the presence of alkaloids, proteins and amino acids, quinone and glycoside. However alkaloids and glycosides were present in both extracts. The study revealed that aqueous extract have more constituents that alcoholic extract. Inorganic analysis confirmed the presence of calcium, sodium, iron.

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Test</th>
<th>Test Applied/Reagent used</th>
<th>Observation</th>
<th>Inference</th>
<th>Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Carbohydrates</td>
<td>Molisch Test</td>
<td>Violet ring formation</td>
<td>Positive</td>
<td>++</td>
</tr>
<tr>
<td>2</td>
<td>Saponin</td>
<td>Foam test</td>
<td>Foam formation</td>
<td>Positive</td>
<td>+</td>
</tr>
<tr>
<td>3</td>
<td>Phenols</td>
<td>Ferric chloride test</td>
<td>Bluish black colour</td>
<td>Negative</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Flavonoids</td>
<td>Conc.H$_2$SO$_4$ Test</td>
<td>Orange Colour</td>
<td>Positive</td>
<td>+</td>
</tr>
<tr>
<td>5</td>
<td>Steroids</td>
<td>Salkowakis test</td>
<td>Chloroform layer appear red, acid layer shows greenish yellow fluorescence.</td>
<td>Positive</td>
<td>++</td>
</tr>
<tr>
<td>6</td>
<td>Alkaloids</td>
<td>Dragendorff’s test</td>
<td>Red or Orange Brown colour</td>
<td>Positive</td>
<td>+</td>
</tr>
<tr>
<td>7</td>
<td>Anthraquinone</td>
<td>Ammonia Test</td>
<td>Rose Red colour in aqueous layer</td>
<td>Negative</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>Proteins &amp; Amino Acids</td>
<td>Xanthoproteic Test</td>
<td>Yellow colour formation</td>
<td>Negative</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>Anthocyanine</td>
<td>2N HCl Test</td>
<td>Pink reddish colour formation</td>
<td>Negative</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>Quinone</td>
<td>Conc. HCl Test</td>
<td>Green Colour</td>
<td>Negative</td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>Glycoside</td>
<td>Alkaline Reagent Test</td>
<td>Yellow colour</td>
<td>Positive</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 1: Phytochemical screening of Aqueous Extract of Lavanga
<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Test</th>
<th>Test Applied/reagent used</th>
<th>Observation</th>
<th>Inference</th>
<th>Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Calcium</td>
<td>Ammonium carbonate</td>
<td>White precipitate</td>
<td>Positive</td>
<td>+</td>
</tr>
<tr>
<td>2</td>
<td>Magnesium</td>
<td>Ammonium carbonate</td>
<td>White precipitate</td>
<td>Negative</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Sodium</td>
<td>Potassium Pyroantimonate</td>
<td>White precipitate</td>
<td>Positive</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>Potassium</td>
<td>Sodium cobalt nitrate</td>
<td>Yellow precipitate</td>
<td>Negative</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Iron</td>
<td>2% Potassiumferrocyanide</td>
<td>Dark blue colour</td>
<td>Positive</td>
<td>+</td>
</tr>
<tr>
<td>6</td>
<td>Sulphates</td>
<td>5% Barium chloride</td>
<td>White crystalline precipitate</td>
<td>Negative</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Chloride</td>
<td>Lead acetate</td>
<td>White precipitate</td>
<td>Negative</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 2: Phytochemical screening of Alcoholic Extract of Lavanga
Table 3: Inorganic analysis of Lavanga

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture content</td>
<td>9.1%</td>
</tr>
<tr>
<td>Total ash</td>
<td>13.5%</td>
</tr>
<tr>
<td>Acid insoluble ash</td>
<td>3%</td>
</tr>
<tr>
<td>Water insoluble ash</td>
<td>14%</td>
</tr>
<tr>
<td>Alcohol soluble extract</td>
<td>18%</td>
</tr>
<tr>
<td>Ether soluble extract</td>
<td>12%</td>
</tr>
<tr>
<td>Water soluble extract</td>
<td>8%</td>
</tr>
</tbody>
</table>

Table 3 : Inorganic Analysis of Lavanga Physico chemical parameters like moisture content was shown 9.1%, total ash 13.5%, acid insoluble extract 3%, water insoluble extract 14%, alcohol soluble extract value 18%, ether soluble extract value 12%, water soluble extract value 8%.

Table 4: showing physcio chemical screening of stem and Root of Lavanga

Qualitative analysis of alkaloids was found to 24.2% of alkaloids in Stem & root of lavanga

Conclusion:

The present study revealed that aqueous extract of stem and root of lavanga showed that more phytochemicals such as carbohydrates, saponin, flavonoids, steroids, alkaloids, glycoside. Specially it was found higher amount of Alkaloids in both extract alcoholic and aqueous, In quantification of alkaloids shown 24.2% of alkaloids is presence. Form the finding of this study it is concluded that the aqueous extract of lavanga act as a potential source of phytochemicals and it is used in many disease treatments.

Lavanga has physical, mental and emotional health benefits. Lavanga possesses antioxidant, anti-fungal, anti-viral, antimicrobial, anti-diabetic, anti-inflammatory, antithrombotic, anesthetic, pain reliving and insect repellent properties due to the presence of flavonoids, glycosides and steroids. Lavanga represent one of the Mother Nature’s premier antiseptic due to the presence of saponin.

Reference

1. R. Roghini, K Vijayalakshmi, Phytochemical Screening, Quantitative Analysis Of Flavonoids And Minerals In Ethanolic Extract Of Citrus Paradise, Ijpsr,2018,Vol 9(11), P 4859-4864
2. Parle Milind* And Khanna Deepa, Clove: A Champion Spice, Ijrap 2011, 2 (1) 47-54