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Research Article

Histochemical Investigation of Exotic Weed *Lantana camara* Linn

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Abstract

The histochemical Studies of leaves, Root and Stem of *Lantena camara Linn.*(Verbenaceae) in Maharashtra. It is a annual shrub grown widely in different places of India. The species has been investigated for the phytochemical, anti-oxidant and antimicrobial Potential. This paper encompasses a comprehensive review on histochemical and Biological aspects of *Lantena camara L.* For histochemical studies the freehand sections of leaves, stem and root were taken and treated with respective reagent in localize component, viz. Starch, protein, tannin, saponin, fat, and alkaloids in the tissues.

Keywords: Histochemistry, *Lantena*, Alkaloids, Protein

INTRODUCTION

Lantana is one of the world's ten worst invasive species and a High concern of India. *Lantana* has spread across the area of the country, invading roadsides, fallow plots, agricultural fields, and forests. *Lantana* occupies according to a recent study published in Global Ecology and Conservation reports 154,000 sq.km forest (more than 40 percent by area) in India's tiger range. Among forests, fragmented deciduous forests of Central India, Shivalik Hills in the North, and Southern Western Ghats are worst hit by its invasion[1]. *Lantana* can tolerate high temperature and moisture with the ability to adapt to the changing climate. It is an ornamental plant belonging from Verbenaceae family. The species now threatens about 300,000 sq.km of Indian forests. *Lantana camara* is quite variable in appearance, shade tolerance and toxicity to livestock because of different cultivars. Overall, *lantana* is a perennial shrub that has several stems growing from its base. It may grow individually or in thickets and can reach heights of 10 feets. The stiff leaves are oval and broadly lance-shaped and can be yellow-green to green in color. The leaves are aromatic, when crushed[2]. The flowers are compact, flat-topped flower heads and vary in coloration from yellow to orange to red or from white to pink to lavender. The berries resemble blackberries when mature but are green when immature and each fruit contains 1-2 seeds. *Lantana camara* easily invades disturbed ecosystems and often forms in dense thickets. It can quickly dominate the understory in forests and suppress the growth of native plants, turning the forest communities into shrub-lands[3]. It has become a serious economic pest, it reduces vigor and productivity of the crops. The leaves and unripen fruit are poisonous. It can cause Liver failure or even death in livestock animals such as cattle, sheep, goats or horses, and also in wild animals. The unripe fruit can also be dangerous to chlidrens. Reproduction for *Lantana camara* is both sexual and vegetatively[4]. One plant produces about 12,000 fruits and allow for long-distance dispersal of the seeds. It is also a well Known medicinal properties in Traditional medicinal knowledge and the latest scientific studies have focus the possible use of *L.camara* in modern medicine.

MATERIALS AND METHODS

Temporary and permanent mounts of sections were employed for the test of histochemical studies. For study of isolated different tissues, small pieces of material were macerated in Jeffery's fluid. For the histochemical studies free hand sections of the organs to be studies, were taken and treated the respective reagent to localize component. Viz. starch, protein, tannin, saponin, fat and alkaloids in the tissues.

1) **Starch-** 0.3 g of iodine and 1.5 g of potassium iodide were dissolved in 100 ml of distilled water. A drop of the solution was added on the section, washed water and observed under microscope.

2) **Protein**- a) Saturated aqueous solution of picric acid is an excellent precipitating agent for protein, staining them an intense yellow. It was allowed to react with the reagent for 24 hours. b) Dilute eosin, stains protein red.c) To localize protein, reagent was prepared by mixing 0.1 g potassium Ferro cyanide dissolved in 20 ml water and 100 ml glacial acid. Section was kept in for an hour. They section were

washed with 60% alcohol and few drop of aqueous Fecl, were added Blue color indicates the presence of proteins.

3) Tannin -Sections were treated with dilute acidic Fecl solution (0.5% to 1% of ferric chloride in 0.1 N HCL); mounted in clove oil and observed under microscope for the presence of tannins. 10% aqueous Fecl, plus little Na co: blue green colour is given by tannin.

4) Fat- 0.5 g of dye, Sudan III or Sudan IV was dissolved in 100ml of 70% alcohol. Sections were kept in the stain for 20 minutes, rinsed quickly with 50% alcohol and mounted in glycerin for observations. Blue, red, pink, precipitate indicated the presence of fat.

5) Saponins-Sections were placed directly in one drop of concentration H So on a slide, which gives a characteristic sequence of colour reactions, beginning immediately with yellow, changing to red within 30 minutes and finally becoming violet or blue green in a short time. To determine localization of the saponin, sections were put in saturation barium hydroxide solution for about 24 hours. Sections were washed with calcium chloride, the placed in potassium dichromate. Yellow colour indicated the presence of saponins.

6) Test for Alkaloids- Transverse sections of the different plants were treated with the following with the following alkaloid reagent.

a) **Mayer's Reagent**

Potassium mercuric iodide solution; 13.55g of $HgCl_2$, and 50 g of KI, were dissolved in one liter of distilled water. Presence of grey colour in the section reveals the presence of alkaloids.

b) **Wagner's Reagent**

1gm iodine and 2g potassium iodide were dissolving in 50ml of distilled water. Presence of golden yellow colour reveals the presence of alkaloids.

RESULT AND DISCUSSION

Histochemical localization in different organs of taxa under study was made using methods described elsewhere. The intial presentation gives details about the occurrence of ergastic content or secondary metabolites, viz. Starch, protein, fat, tannin, saponin and alkaloids in leaves and stem.

1. **Starch:** Starch is the principal ergastic substance of protoplast. Starch is composed of long chain molecules, whose basic units are anhydrous glucose residues of formula

$C_6H_{12}O_5$[5]. The morpho metric variation of starch grain is so extensive that they may be taxonomically and pharmacognostically up to a limit, (Kustar, 1956)

Deposition of starch in the present investigation was studied for root it shows presence in endodermis and parenchymatous cell and stem show presence of starch in xylem and phloem parenchyma, scattered cells of cortex. Leaves show presence in lower and upper epidermis and few cells of midrib & pith parenchyma.

2. **Protein:** Protein is the major constituents of living protoplast, but they also occur as temporarily inactive erastic substance, Erastic protein is knows as storage material[7]. In this investigation scattered cells of cortex, vascular bundles and parenchymatous cells and few cells of pith of root show presence of protein while in stem epidermis, scattered cells and medullary rays, pith parenchyma, scattered cell of phloem parenchyma. In leaves the prominent deposition of protein in xylem parenchyma and scattered cells of medullary rays and pith parenchyma.

3. **Tannin:** It is the heterogeneous group of phenol derivatives, usually related to glucosides. Tannin are particularly abundant in leaves of much plant. In the study few cells of cortex and epiblema of root show presence of tannin and in stem Vascular bundle, Scattered cells of medullary rays and pith parenchyma. While in leaves only scattered cells of pith parenchyma show the tannin reaction.

4. **Fat:** Fat are widely distributed in plant body and they probably occur in small amount in every plant cells they are mainly reserve material in seeds, spores and embryos in meristematic cells and occasionally in differentiated tissues of vegetable body[8]. In roots the scattered cells of endodermis and stem few cells of cortical parenchyma show existence of fat in small amount & leaves show presence in scattered cells of epidermis, Mid-rib pith parenchyma.

5. **Saponins:** The saponins are of rare occurrence and wherever present, they apparently remain to one or two organs. In this study root cells Epiblema, Exodermis, Scattered cells of vascular system & stem; scattered cells of cortex parenchyma show in saponin and in leaves only pith parenchyma show distribution of saponin.

6. **Alkaloids:** Alkaloids are degradation of protein they were investigated by using two methods, namely; Meyer's reagent and Wagner's reagent. In Mayer's reagent alkaloids were observed in stem Xylem parenchyma, Scattered cells of pith & Leaves cells mainly alkaloids in Xylem parenchyma, few cells of mesophyll while root shows no presence of alkaloids. In Wagner's reagent only cells of few cells of epidermis, medullary rays and Vascular bundles of stem and Scattered cells of medullary rays & Pith of leaves show presence of alkaloids.

Table 1: Histochemical test for fresh section of leaves, root and stem of *Lantena camara Linn.*

Sr.No	Ergastic content	Localization		
		Root	Stem	Leaves
1	Starch	Present in scattered cells in endodermis and Parenchymatous cell	Xylem and phloem parenchyma, Scattered cells of Cortex	Lower epidermis, upper epidermis, Few cells of mid-rib parenchyma, pith parenchyma.
2	Protein	Scattered cells of cortex, Vascular bundles, Parenchymatous cells and few cells of pith	Epidermis, Scattered cells of medullary rays, pith parenchyma, Scattered cells of Phloem parenchyma.	Xylem parenchyma, Scattered cells of medullary rays and pith parenchyma
3	Tannin	Epiblema, few cells of cortex	Vascular bundle, Scattered cells of medullary rays and pith parenchyma.	Scattered cells of pith parenchyma
4	Fat	Scattered cells of endodermis	Few cells of cortical parenchyma	Scattered cells of epidermis, Mid-rib pith parenchyma
5	Saponin	Epiblema, Exodermis, Scattered cells of vascular system	Scattered cells of cortex parenchyma	Pith parenchyma.
6	Alkaloids			
	Mayer's reagent	---------	Xylem parenchyma, Scattered cells of pith	Xylem parenchyma, few cells of mesophyll
	Wagner's reagent	---------	Few cells of epidermis, Medullary rays and Vascular bundles.	Scattered cells of medullary rays and Pith

Conflict of Interest

The author hereby declares no conflict of interest.

Consent for publication

The author declares that the work has consent for publication.

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