

## HPTLC and Microscopic Study of *Lantana camara*

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| Received: 30.04.2019 | Accepted: 09.05.2019 | Published: 17.05.2019

DOI: [10.21276/sjams.2019.7.5.3](https://doi.org/10.21276/sjams.2019.7.5.3)

### Abstract

### Original Research Article

Potential of various plants to control various diseases which mankind has been suffering since time immemorial, has led human being to exploit these plants for therapeutic uses. That's why human being for their benefits has started gathering information about plants that were useful as food or drug. Use of *Lantana* in herbal medicines since ancient times shows therapeutic potential of the plant in modern medicines as well as in pharmacological and toxicological activities.

**Key words:** HPTLC, Herbal medicines, therapeutic uses.

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## INTRODUCTION

The word *Lantana camara* has been derived from Latin word "lento" which means "to Bend" [1]. Described and given its binomial name by Linnaeus in 1753 [2, 3]. *Lantana camara* has ethnomedicinal uses. It has been used to cure various common diseases such as asthma, ulcer, cancer, leprosy, skin itches, measles, rabies and chickenpox. Studies show that this herb has amazing properties. This species has been used in medicines in many parts of the world. *Lantana camara* has been expanded or well established in many tropical and sub-tropical regions of the world and naturalized approximately in 60 countries or island groups between 35° N and 35°S latitudes. *Lantana* is a genus of about 150 species of perennial flowering plants; it was grown as ornamental plant in 17<sup>th</sup> and 18<sup>th</sup> century. This plant

is native of tropical regions of the America and Africa. *Lantana camara* is an introduced species by the British, which turned itself into a noxious weed and expanded itself in almost all the possible habitats of India. This species is taming the present threat so Indian society can be benefitted by properly utilizing the plant and thereby also conserve the ecosystem with its bio-resources. In Himachal Pradesh around 1,500 sq.km of area under forests lying in lower elevation (upto 1,000m) is highly infested with *Lantana camara*.

## ABOUT PLANT

Scientific name: *Lantana camara*

Synonyms: *Camara vulgaris*, *Lantana scabrida*, *Lantana aculeata*

Common names: Sleeper weed, Lantana, Wild sage

| 1. Scientific Classification |                |
|------------------------------|----------------|
| Domain                       | Eukaryotic     |
| Kingdom                      | Plantae        |
| Phylum                       | Spermatophyta  |
| Sub phylum                   | Angiosperms    |
| Class                        | Dicotyledones  |
| Order                        | Lamiales       |
| Family                       | Verbinaceae    |
| Genus                        | <i>Lantana</i> |
| Species                      | <i>Camara</i>  |



**Fig-1: Flowers and leaves of mature *Lantana camara* plant**

### Ecology

Its wide spread and diverse distribution is a reflection of its wide ecological tolerances. The species occur in varied habitats ranging from open unshaded regions which include wastelands, rainforest edges, beachfronts, and forests distributed by activities such as fire logging [4, 5]. The species also thrive well in

disturbed areas which include road side, railway track and canals [6, 5]. Anthropogenic activities further aggravate the invasion and allow it to spread [7]. The two principal ingredients for successful establishment are its growth under climatic conditions and no cap on temperature or rainfall limit.

**Table: 1 Habitat description of *Lantana camara***

| Habitat Parameters    | Requirements                                       |
|-----------------------|--|
| Light range           | Sun to full sun                                    |
| pH range              | 4.5-8.5  |
| Temperature           | Intolerant of frequent or prolonged freezing       |
| Annual rainfall range | 1000-4000mm  |
| Soil range            | Mostly sandy to clay loam                          |
| Water range           | Semi- Arid to Normal                               |
| Altitude              | Less than 2000m above sea level                    |
| Light conditions      | Prefers unshaded habitats, can tolerate some shade |

### Importance of *Lantana camara*

*Lantana* though being a noxious weed has several minor uses, mainly in herbal medicine. There are series of research studies conducted on the

exploitation of chemical constituents present in different parts of plant species. Table 2 summarizes uses of *Lantana camara*.

**Table-2: Uses of *Lantana camara***

| Parts Used     | Uses   |
|----------------|--|
| Plant          | Act as hedge plant, provide perch sites and cover  |
| Flower         | Nectar source for butterflies and moths  |
| Bark           | Astringent and used as lotion in cutiginouseruptions, leprous ulcers   |
| Stalks         | Raw material for paper pulp which is used for wrapping, writing or printing paper.<br>Making baskets and temporary shelters.<br>Used as biofuel.                 |
| Leaves         | Boiled and applied for swellings and pain in body.<br>Alkaloidal fractions lower blood pressure, accerlate deep respiration and stimulate intestinal movements.  |
| Plant extracts | Draught-tolerant plant so good candidates for xeriscaping.<br>Used in folk medicine for treatment of cancers, chicken pox, measles, asthma ulcers swellings etc. |

### MEDICINAL - IMPORTANCE

*Lantana camara* is an important plant which is reported for various medicinal properties.

### Anti-cancer and anti- proliferative activity

Different varieties of *Lantana* plant part were reported for anti-cancerous activity. Leaves of *Lantana camara* reported anti-proliferate activity against HEP-2

(Laryngeal cancer) and NCI-H292 (Lung cancer) cell lines.

#### Anti-bacterial activity

*Lantana camara* roots and leaves were reported for anti-bacterial activity. The extract shows anti-microbial activity against *Staphylococcus aureus*, *Proteus vulgaris*, *E. coli* etc. Leaves extract of *Lantana camara* showed highest activity against gram positive *Bacillus cereus* and gram negative *Salmonella typhi*.

#### Anti-fungal activity

Ethanol and hot water extract of *Lantana camara* was reported against wood destroying white and brown rot of fungi.

#### Anti-ulcerogenic activities

Anti-ulcerogenic activity of methanol extract of leaf of *lantana camara* was reported on aspirin, ethanol and cold resistance stress induce gastric lesions in rats.

#### Anti-helmentic activity

Helminthes infections are among most common infections in man, affecting proportion of population all over the world. Leaf extract of *Lantana camara* showed significant anti-helminthic activity on selected worms. Methanol extracts from the leaves, stems and roots of *Lantana camara* were investigated for their anthelmintic activity against *Pheritima posthuma* [8].

#### Allelopathic activity

There are allelochemicals present in all parts of the plant. When these chemicals released in surrounding, interferes with germination of many species.

#### Wound Healing activity

Wound Healing is the natural body process of regenerating dermal and epidermal tissue. The plant is used as herbal medicine for treatment of antiseptic for wounds [9]. Prockop *et al.* [10] Wound healing is the body's natural process of regenerating dermal and epidermal tissue. Collagen accounts for 30% of the total protein in the human body. In normal tissue Collagen provides strength, integrity and structure. When tissues are disrupted following injury, collagen is required to repair and restore normal structure and function. However thermal burns to the skins produce a remarkably different healing response due to their effects on the cells and tissue. Beyond the area of total destruction induces nutrient starvation of involved tissue. Apart from thermal injury wound may arise due to physical injury and chemical injury or microbial infections.

Owing to the medicinal importance of this weed *Lantana*, present study was initiating to study the morphological and anatomical features of this plant.

Study also includes powder microscopy, phytochemical and HPTLC analysis of the same.

## MATERIALS AND METHODS

Plant material along with the substratum was collected from Dharampur, Solan (HP). In laboratory, plant material after separation from the substratum was washed several times with tap water and then checked under binocular to avoid contamination with any other plant material.

The purified plant material was then cleaned in water with pressurized air to remove any adhering soil particles. It was finally washed with double distilled water and then dried at room temperature between folds of blotting sheet. Each plant sample was then carefully identified observing both morphological as well as anatomical features. Part of collected plant material was shade dried for one week before powdering. The powdered material was stored in air tight packets for phytochemical and HPTLC analysis.

## RESULTS AND DISCUSSIONS

### Morphological Features

*Lantana* is a small herbaceous, erect perennial shrub with spiny branches and grow around 2-4m in height (Fig: 1).

**Root:** Short tap root system is present and lateral root form carpet which helps in anchorage and absorption.

**Stem:** The stem is divided into nodes and internodes. Leaves arise from the nodes. Stem perform the function of storage, asexual reproduction, protection or photosynthesis.

**Leaves:** Leaves are simple and oppositely arranged along the stem leaf is stalked, crenate or serrated margin. The leaf blades are mostly egg shaped in outline with broad end at base (ovate) and have a strong aroma when crushed or rubbed.

**Flowers:** Flowers is tubular (umbel round shape) and have four petals which are arranged in cluster in terminal stem. Flower is many coloured like red, yellow etc which depends upon inflorescences age and maturity.

**Fruits:** Small berry like drupes fleshy which turns from green to dark purple when mature about 3mm in diameter.

### Macroscopic analysis of *Lantana camara* leaves

It includes the evaluation of external features of leaves.

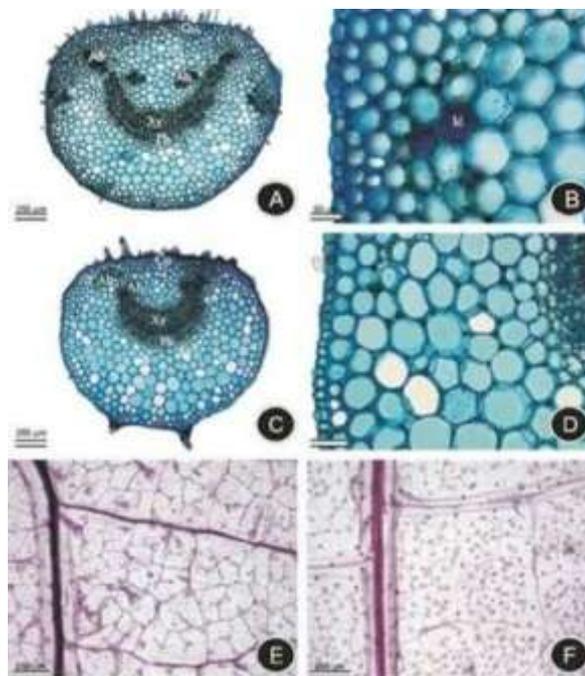
**Table-3**

| Sr .No. | Characters        | Observation                       |
|---------|-------------------|-----------------------------------|
| 1       | Condition         | Fresh                             |
| 2       | Colour            | Bright-green                      |
| 3       | Odour             | Pungent                           |
| 4       | Shape             | Ovate                             |
| 5       | Size              | 16 inches tall and 36 inches wide |
| 6       | Surface           | Upper-Rough and Lower-Hairy       |
| 7       | Apex              | Acute-acuminate                   |
| 8       | Margin            | Serrate                           |
| 9       | Venation          | Reticulate                        |
| 10      | Petiole size      | 1.5-2cm                           |
| 11      | Blade of the leaf | 5-6cm                             |

**Anatomical Features**

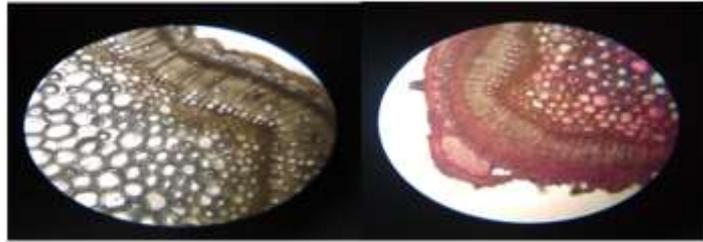
Transverse section *Lantana camara* leaf shows (Fig:2 ) the presence of:

- Upper epidermis
- Palisade Parenchyma
- Lower epidermis
- Vascular bundle
- Glandular trichome
- Cambium
- Spongy tissue

**Fig-2: T.S. of *Lantana camara* leaves**

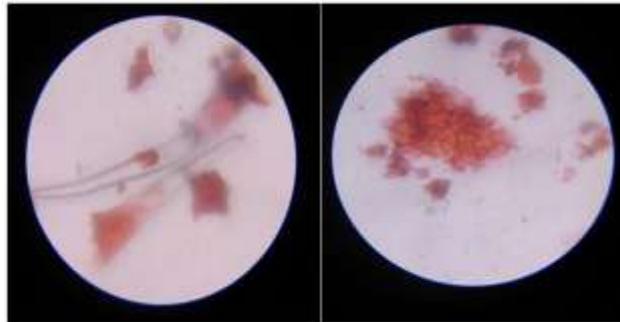
**Transverse section of Stem (Fig: 3) showing presence of**

- Epidermis
- Cortex
- Trichomes (multicellular, unicellular)
- Vascular bundle



**Fig-3: T.S. of *Lantana camara* stem**

**Results of Powder Microscopy**



**Fig-4: Trichomes and stomata *Lantana camara* leaves**

**Results of HPTLC**



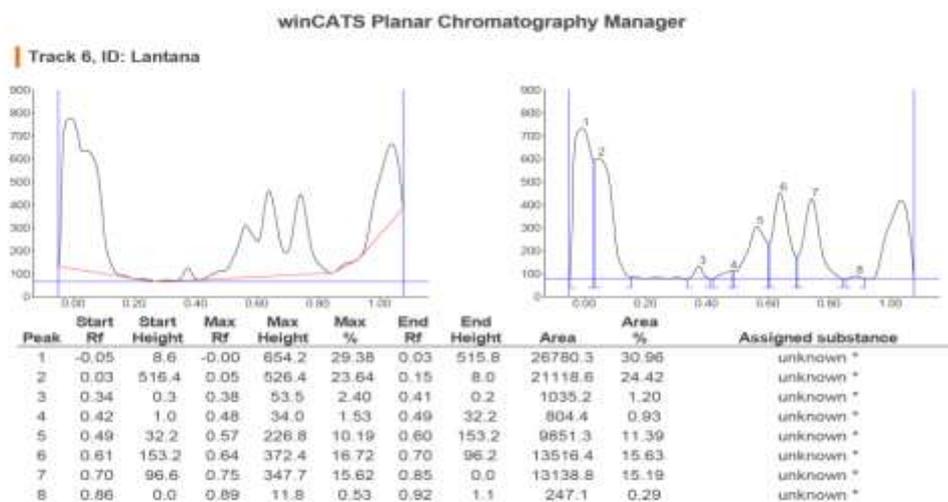
**Fig-5: Colour spots on TLC plate**



**Fig-6: TLC plate after oven drying**

The scanned chromatograph of HPTLC at different wavelength (254nm, 366nm, 566nm) are

shown in graphs. Rf of different spots are seemed in TLC and their respective areas are shown as follow:



**Evaluation results**

**Evaluation Sequence**

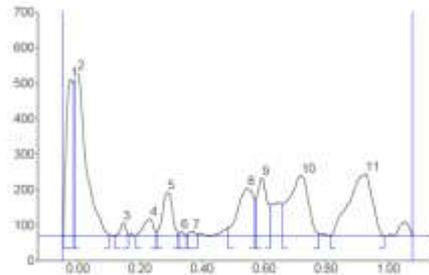
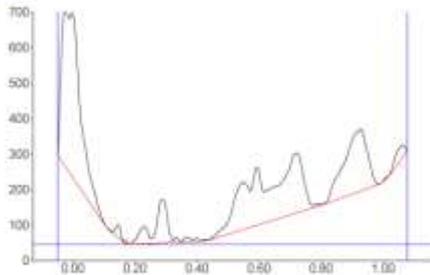
| Track | Track type | Vial | Sample ID      |
|-------|------------|------|----------------|
| 1     | Sample     | 1    | Rosemary       |
| 2     | Sample     | 2    |                |
| 3     | Sample     | 3    | Roylea cineria |
| 4     | Sample     | 4    | Roylea cineria |
| 5     | Sample     | 5    | Lantana        |
| 6     | Sample     | 6    | Lantana        |

**Table of substances**

| Substance | Position Tracks |    |   |   |   |   |   |   |
|-----------|-----------------|----|---|---|---|---|---|---|
|           | MD              | mm | 1 | 2 | 3 | 4 | 5 | 6 |
|           |                 |    |   |   |   |   |   |   |

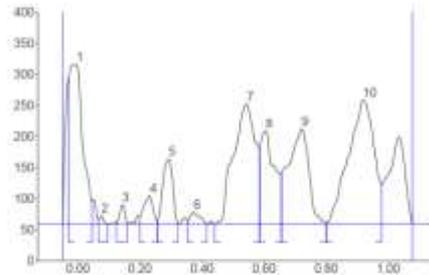
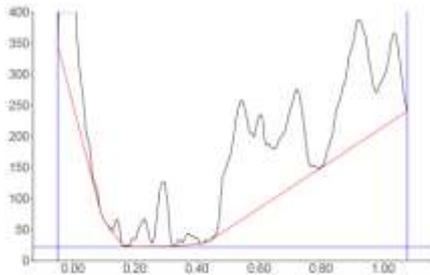
winCATS Planar Chromatography Manager

Track 5, ID: Lantana



| Peak | Start Rf | Start Height | Max Rf | Max Height | Max % | End Rf | End Height | Area    | Area % | Assigned substance |
|------|----------|--------------|--------|------------|-------|--------|------------|---------|--------|--------------------|
| 1    | -0.05    | 25.4         | -0.02  | 440.4      | 24.82 | -0.01  | 431.1      | 7351.0  | 14.67  | unknown *          |
| 2    | -0.01    | 432.4        | 0.00   | 460.2      | 25.93 | 0.10   | 4.4        | 12423.9 | 24.79  | unknown *          |
| 3    | 0.12     | 2.1          | 0.15   | 36.7       | 2.07  | 0.16   | 1.3        | 449.0   | 0.90   | unknown *          |
| 4    | 0.19     | 0.5          | 0.23   | 48.7       | 2.74  | 0.25   | 12.5       | 1105.8  | 2.21   | unknown *          |
| 5    | 0.25     | 13.3         | 0.29   | 122.9      | 6.92  | 0.32   | 4.5        | 2784.6  | 5.56   | unknown *          |
| 6    | 0.33     | 5.4          | 0.33   | 12.6       | 0.71  | 0.35   | 1.3        | 128.7   | 0.26   | unknown *          |
| 7    | 0.35     | 2.1          | 0.37   | 12.1       | 0.68  | 0.39   | 4.4        | 188.0   | 0.38   | unknown *          |
| 8    | 0.49     | 22.2         | 0.55   | 134.4      | 7.58  | 0.57   | 101.8      | 4873.3  | 9.72   | unknown *          |
| 9    | 0.57     | 102.5        | 0.60   | 162.6      | 9.17  | 0.62   | 88.2       | 3753.3  | 7.49   | unknown *          |
| 10   | 0.66     | 91.2         | 0.72   | 169.1      | 9.53  | 0.78   | 6.4        | 7582.5  | 15.09  | unknown *          |
| 11   | 0.82     | 2.5          | 0.93   | 174.8      | 9.85  | 0.99   | 0.2        | 9495.7  | 18.95  | unknown *          |

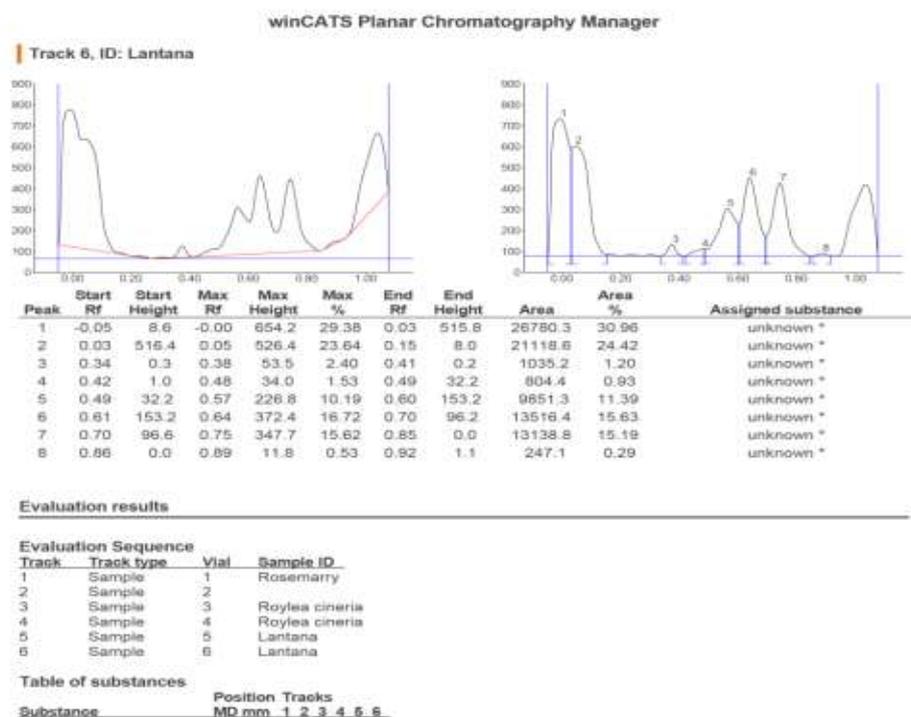
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Tuesday, April 03, 2018 2:00:23 PM

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Page 6 of 7



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