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Review article

Pharmacognostic research

Lantana camara: A review of Pharmacognostic studies and its traditional uses

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ABSTRACT

Lantana camara is a well-known medicinal plant in traditional medicinal system. *Lantana camara* has a promising place in ayurvedic system of medicine due to its various medicinal values like antidiabetic, antiinflammatory, antibacterial, antifungal, antifertility etc. As per review of literature various parts of *Lantana camara* have shown different pharmacological actions. Leaves have been reported for antiproliferative, antimicrobial, fungicidal, insecticidal and nematocidal, antimycobacterial, adulticidal, wound healing and anthelmintic activities. Whereas barks have shown antipyretic, and antispasmodic activity. Similarly fruits are reported for their Antidiabetic activity (in vivo). The fruit is unripe and these are inedible to human indigestion. fruits can result in serious damage to the digestive tract.

Lantana camara is regularly used as herbal medicine and in some areas as firewood and mulch. Especially in India, there has been to a great extent work conducted on the chemical constituents of *Lantana camara*. The leaf oil is employed as an antiseptic for scars; the roots are used for the treatment of a toothache and the flowers for chest complaints in children. The plant is rich in carbohydrates, alkaloids, tannins, saponins and phenolic compounds which witness the ample of medicinal potential of the herb. *Lantana camara* leaves extract exhibited anti-proliferative, antimicrobial, fungicidal, insecticidal and nematocidal activities. *Lantana camara* shoots extract exhibited significant antioxidant activity. The berries fruits are useful in fistula, pocks, tumors and rheumatism. The essential oil of *Lantana camara* exposed a broad spectrum of antibacterial, antimicrobial, and antifungal activities^[19]. In *Lantana camara*, chemical constituents are present as triterpenes like lantadenes A, B, C, and D, alkaloids, flavonoids, saponins, tannins, Germacrene A, B and D and chief compounds are Valencene and γ -gurjunene-3.

Keywords: *Lantana camara*, Traditional uses, Phytochemistry, Pharmacology.

INTRODUCTION

Nature has bestowed our planet with an enormous wealth of medicinal plants which are highly esteemed all over the world as a rich source of therapeutic agents for the prevention and cure of disease and ailments. there are many herbs on earth which lies unexplored in the field of medicine or science. One such herb is *Lantana camara* Linn.

Lantana camara Linn. Commonly known as *Lantana* which is familiarized in India as a flowering ornamental plant and also as a decorating plant belonging to family Verbenaceae. *Lantana* plant is entirely naturalized and found throughout India. *Lantana camara* has been standing as one of the most fundamental medicinal weeds in the world. The word *Lantana*

camara obtains from Latin 'lento' which means 'to bend'. This species was first represented and acknowledged its binomial name by Linnaeus in 1753. The plant *Lantana camara*, commonly known as wild sage or red sage, Surinam Tea Plant Spanish flagand and West Indian *lantana*.etc.

Lantana is the plant of the genus of Verbenaceae family with 600 variations existing natural, and it is an arboreous plant with different flower colours i.e. red, white, yellow and violet. It is an evergreen potent smelling shrub, and its leaves are opposite, simple with large petioles, oval blades which are rugged and hairy and have bluntly toothed margins. Berries of *Lantana camara* are round, fleshy, two-seeded bean. In initially seeds of *Lantana camara* are green color and turning

purple and finally to a blue-black colour. *Lantana camara* is indigenous plant found in tropical regions.

Lantana camara

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

indica Roxb., *Lantana salvifolia* Jacq., *Lantana trifolia*, *Lantana orangeri*, *Lantana tiliaefolia* Cham, *Lantana achyranthifolia* Desf., *Lantana montevidensis* Briq., *Lantana viburnoides* Vahl.



Fig 1: Entire plant with different species along with different parts of *Lantana* genus (leaves, barks, stems, flowers of different colors, fruits, seeds).

Table 1: Taxonomical classification

Common feature	Specific character	Common feature	Specific character
Botanical name	<i>Lantana camara</i>	Order	Lamiales
Kingdom	Plantae	Family:	Verbenaceae
Division	Magnoliophyta	Genus	<i>Lantana</i>
Class	Lamiales	Species	<i>Lantana camara</i> Linn.

Table 2: Vernacular names [5 & 6]

Language	Name
Telugu	Pulikampa
Hindi	Raimuniya
English	Lantana weed
Tamil	Arippu and Unnichi
Kannada	Kakke and Natahu
Marathi	Tantani and Ghaneri
Malayalam	Aripoo, Poochedi, Konginipoo and Nattachedi
Sanskrit	Thirei, Samballei, Chaturangi and Vanacehdi
Manipuri	Nongballei

Lantana camara L. is regarded both as a notorious weed and a popular ornamental garden plant and has found various uses in folk medicine in many parts of the world. Some taxa of the widely variable *L. camara* complex are toxic to small ruminants and this effect has been associated with the types and relative amounts of some triterpene ester metabolites. However, *L. camara* also produces a number of metabolites in good yields and some have been shown to possess useful biological activities.

All these aspects are considered in this review to allow an evaluation of the potential for utilization of the large biomass of *Lantana* available. The phytochemistry of other members of the *Lantana* genus is included.

The *Lantana camara* plant has been used to treat a wide variety of disorders. It was found to use in folk remedies for cancers and tumors. In Central and South America, the leaves

were made into a poultice to treat sores, chicken pox and measles.

Description

Lantana camara is a thorny shrub upright, half climbing or sometimes more or less hanging, reaching 2-3 m in height. The stems and branches are angular, bearing curved spines, arranged along the edges. The leaves are simple, opposite, decussate with rough lamina, oval, regularly dentate with acute apex. The inflorescence is a hemispherical head, axillary or terminal, yellow, pink or orange colored, made up of many small tubular flowers. The fruits are small drupes fleshy, about 3 mm in diameter, varying in color from blue to black.



Fig 2: Entire plant of Lantana camara along with different parts

Leaves

The leaves are simple, opposite, decussate carried by a petiole, 1.5 to 2 cm long. The blade is leathery, oval to

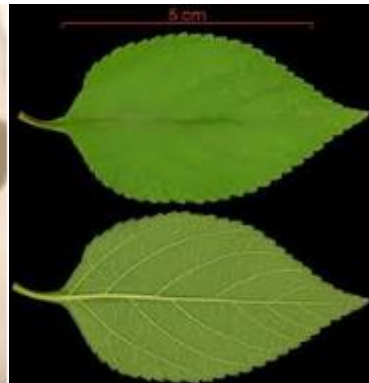
broadly oval shaped, 5 to 8 cm long and 3-4 cm wide, truncated to subcordate at the base, acute or acuminate at the top. Rough and hispid on the upper surface, pubescent on the lower surface. The leaf margin is regularly toothed.



Leaves of L.Camara



Individual leaf



Surface images of leaves

Fig 3: Lantana camara leaves

Flower

L. camara has small tubular shaped flowers, which each have four petals and are arranged in clusters in terminal areas stems. Flowers come in many different colors, including red, yellow, white, pink and orange, which differ depending on location in inflorescences, age, and maturity.

Flowers surrounded by an involucre of bracts narrowly ovate, long from 5 to 7 mm, green. Floral pedicel 6 to 12 mm long. Corolla tube curved along 10 to 12 mm, with ascending hairs inside, opening in the top four rounded lobes spread 6 to 8 mm in diameter. The first flower is often white, turning yellow, purple (Violet), orange, pink or red with age.



Fig 4: Different colored flowers of Lantana camera

Fruits

The fruits of *L. camara* are berry-like drupes fleshy, about 3 mm in diameter, varying in color from blue to black and green flowers may turn from green to dark purple when mature. Green unripe fruits are inedible to humans and animals alike. Because of dense patches of hard spikes on their rind,

ingestion of them can result in serious damage to the digestive tract. Both *vegetative* (asexual) and *seed* reproduction occur. Up to 12,000 *fruits* can be produced by each plant [20] which are then eaten by birds and other animals which can spread the seeds over large distances, facilitating the spread of *L. camara*.



Fig 5: Fruits of *Lantana camara*

Stems

These are appearing as four angled, armed with recurved thorns. Many branched, weak and to 5000 mm long x 5-50 mm diameter. Young stems are square, with hooked prickles on the angles, 2-4 mm diameter with a pithy core and covered in inconspicuous short, stiff hairs that are often glandular.

Older stems may lose their hairs and prickles and become brittle, woody and arching or scrambling and turn grey to brown Coppices (forms new stems) when cut. The stems and branches are angular, bearing curved spines, arranged along the edges. Usually flowers and fruits as a shrub 1-4 m tall, sometimes growing as a disorganized climber but reaching well up into the trees. Vine stem diameters to 4 cm recorded.



Fig 6: Stems of *Lantana camara*

Spines

These are looking like thin and thick as well as small and large triangular structures known as curved spines appearing on the edges of surface of angularly arranged stems and

branches. Spines of *Lantana camara* are sharp and more in number. They are very much strong when compared to weak stems. Their size is very less in comparison with stem and their side branches.



Fig 7: Stems with spines of *Lantana camara*

Table 3: Description of *Lantana camara* and its parts

Plant parts	Description
Stems	Four angled, armed with recurved thorns. It is woody, square in cross section, hairy when young, cylindrical and up to 15 cm thick as it grows older. L
Leaves	Opposite, ovate to ovate-lanceolate, 2.5 to 10 cm long, 1.75 to 7.5 cm wide, acuminate, Leaves are bright green, rough, hairy with margins are crenate / serrate to dentate and emit a pungent odor when crushed. Upper surface is scabrous & rugous and lower surface is finely pubescent.
Petiole	2 cm long.
In Florescence	A dense, axillary, flat topped head-like spike, 1-3 cm across
Calyx	Cup shaped 1.2 to. 2.2 mm long, shallow 2 lobes, subtended by a bracteole.
Corolla	Salver form, covered, 6-910ng, limb spreading, 4-8 mm across, yellow, orange, red or pink in the same head (generally yellow and pink on opening of corolla but changing to orange and red, sometimes blue or purple).
Petals	Four.
Peduncle	2.5 to 7.5 cm long.
Fruits	A drupe, globular, dark purple to black, 4-7 mm in diameter across at maturity, borne in clusters. Fruits are shining with two nut lets.
Seed	Pale yellow, egg shaped, 2-4 mm long, hard and stony. Seed setting takes place between September to May with 1 - 20 seeds on each flower head. Mature plants produce up to 12,000 seeds annually. Seed germination occurs when sufficient moisture is present; germination is reduced by low light conditions.
Roots	Shallow extensive root system with robust, brown, woody crowns. Form suckers. The root system is very strong with a main taproot and a mat of many shallow side roots.

Growth and Distribution

Lantana camara is the most outspread species growing abundantly at altitudes up to 2000 m in tropical, subtropical and temperate regions. The species name (camara) is probably followed from the West Indian In its native range in tropical America, *Lantana camara* mainly endows in small clumps less than or equal to 1m in diameter. In its naturalized range, *Lantana camara* usually forms dense monospecific thickets 1 - 4m high and approximately 1 - 4m in diameter. *Lantana camara* has becoming naturalized in almost 60 countries The distribution of *Lantana* is still expanding with many countries and Islands that are Yap, Galapagos Islands, Palau, Saipan, Tinian, Solomon Islands and Futuna Islands. At disordered areas such as roadsides, railway tracks, and canals are also favorable for the species. It does not arise to have an upper temperature or rainfall limit. *Lantana camara* can't come through under dense and intact canopies of taller native forest species, and *Lantana camara* is susceptible to frosts, low temperature, and saline soils.

Cultivation

Lantana camara grows in a wide variety of habitats in the tropical and subtropical zones. It has succeeded in areas where the annual rainfall is around 750mm, though is then usually found along creek lines. It is also found in tropical areas receiving 3,000mm of rainfall per year, provided that the soils are sufficiently well drained. The plant is tolerant of high temperatures, but seldom occurs where temperatures frequently fall below 5°C. Some varieties can withstand minor frosts, provided these are infrequent; prolonged freezing temperatures kill aerial woody branches and cause defoliation. Succeeds in a wide range of soils, preferably well-drained. Succeeds in poor soils. Grows well in dry areas but also present in wetter habitats. Grows best in open, unshaded situations, but tolerates moderate shade. Locally becoming an aggressive and pernicious weed. This thorny shrub forms dense under stored vegetation that crowds out and inhibits establishment of other species. Allelopathic

substances are produced by shoots and roots which inhibit germination and growth of other plants. The plant is apt to form dense thickets, spreads very quickly, with one plant producing as many as 12,000 seeds a year. At some sites, infestations have been so persistent that they have completely stalled the regeneration of rainforest for three decades. Plants respond well to cutting back, able to resprout even from severe and repeated cutting back. The plants can tolerate all but the hottest forest fires, quickly resprouting from the base. Stems and leaves emit an unpleasant aroma when crushed.

The scent is similar to blackcurrants. Flowering Time: Early summer, Early fall, Early spring, Early winter, Late summer, Late fall, Late spring, Late winter, Mid-summer, Mid fall, Mid spring, Mid winter (Blooms repeatedly). Bloom Color: Orange, Pink, Red, Salmon, White, Yellow (Pink Magenta (Pink-Purple) (Red Orange Bright Yellow Purple) (Red, Orange, Yellow). Spacing: 36-48 in. (90-120 cm).

Phyto Chemistry of *Lantana Camara* Linn Phytochemistry

Lantana camara has therapeutic activity due to the presence of natural agents. The greater part of their activity is due to bio active compounds. As per literature survey, Phytochemical analysis of various parts of *L. camara* have showed the presence of various phyto constituents such as alkaloids, glycosides, steroids, saponins, flavonoids, coumarins, tannins, carbohydrates, hydroxy anthraquinones, anthraquinone glycosides, vitamins, phytosteroids, fixed oils, fats, and triterpinoids etc..[Roghini, R. et al...2018, S.Bashir et al.2019 & Aadil Mansoori et al..2020]. Wollenweber et al., have identified and reported the presence of two triterpenoid esters namely, camarilic acid and camaricinic acid. Silva et al., in 1999 discovered the chemical composition of essential oils collected from different regions. The chief constituents present in the oil of *Lantana camara* were α - phellandrene, germacrene-D, limonene, β -caryophyllene, sabinene,, α -zingi-berene and α -humulene etc. Various active constituents

which are present in different parts of Lantana camara plant are shown in the following table.

Table 4: Presence of various phytoconstituents present in different parts of Lantana camara plant

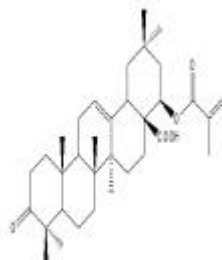
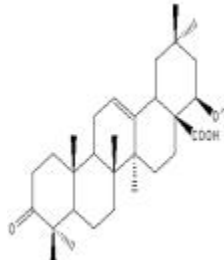
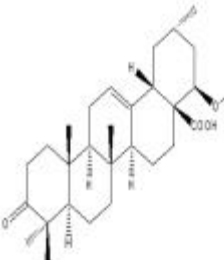
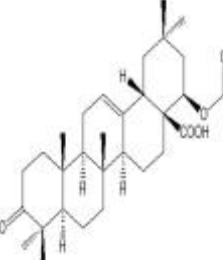
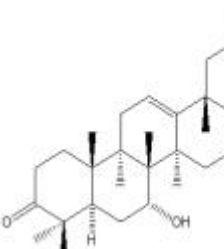
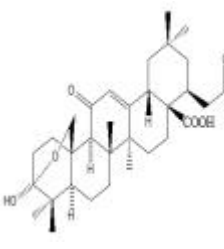
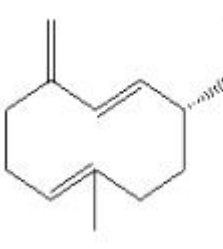
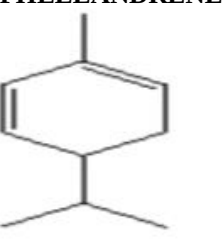
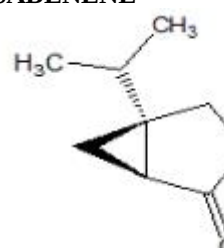
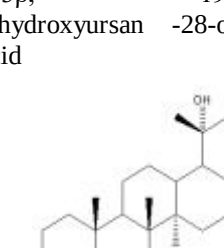
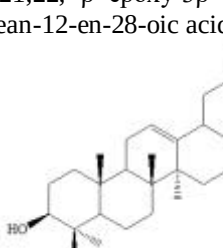
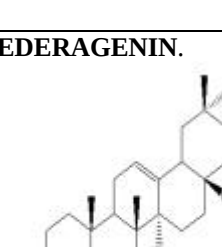
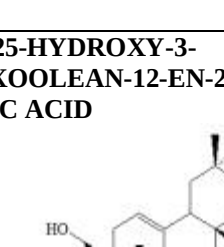
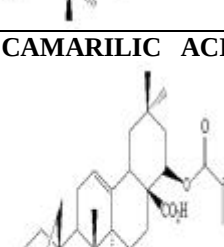
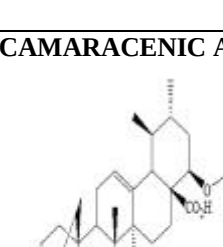
Chemical class	Different parts of Lantana Camara					
	Leaves	Flowers	Fruits	Stems	R Roots	Aerial parts
Carbohydrates	++	+++	----	----	++	----
Lipids	+++	++	----	----	+++	----
Proteins	----	----	----	----	----	----
Vitamins	++	----	----	----	----	----
Flavonoids	++	++	+++	+++	----	----
Tannins	+++	++	+++	+++	----	----
Alkaloids	+++	++	----	++	----	----
Phenolic Compounds	++	+++	+++	----	----	----
Saponins	++	+	+++	+++	----	----
Volatile oils	+++	+++	----	----	----	+++
Triterpenoids	+++	----	----	----	----	+++
Anthraquinone glycosides	----	----	----	----	----	----
Hydroxyanthraquinones	----	----	----	----	----	----
Coumarins	+++	----	----	----	----	----
Steroids	++	+	----	----	----	----
Glycosides	+	---	----	----	----	----
Cardiac glycosides	++	---	----	----	----	----
Anthocynins	----	++	----	----	----	----
Terpenoids	----	+	+++	+++	----	----
Phloba tannins	----	----	----	----	----	----
Quinones	+	+	----	----	----	----
Anthraquinones	+	---	----	----	----	----
Phytosteroids	++	---	----	----	----	+++
Irridoid glycosides						
	Heavily present +++	Slightly present ++	Present +	Absent ---		

Important Active Constituents of Lantana Camara Linn

Table 5: Various chemical classes with examples (Phytoconstituents)

Chemical class	Examples of important chemical constituents of Lantana camara .L
Volatile oils (Leaves, flowers &Aerial parts)	Mainly a sesque terpene hydrocarbon known as β -Caryophyllene. Others are- Alloaromadendrene, Aromadendrene oxide-(2), Bicyclosquiphellandren, α -pinene, α - erpineol, geranyl acetate, α -guaiene, α -copaene, α -cubebene, α --selinene, β -selinene, β -Elemene γ -Elemene, Aromadendrene, Nerolidol, Spathulenol, Isospathulenol, Davanone, B cumene Limonene, Davanone, Isoterpinolene, Santolina triene, 1-naphthalenol, α -phellandrene, Limonene, α -zingi-berene, Caryophyllene oxide, Caryophyllene epoxide II, α -Humulene, Bicyclogermacrene, Germacrene B & D , Germacrene-D-4-ol, Farnesol, Spathulenol, Sabinene ,Sabinene-1,8-cineole, β -cadinene, δ -Cadinene, Bicyclogermacrene, Curcumene, α - Valencene, δ 3-Carene,
Carbohydrates (Leaves, roots &flowers)	Reducing sugars, Six oligosaccharides like ajugose, stachyose, verbascotetraose, verbascose, lantanose A, lantanose B
Vitamins (Leaves)	Vitamin-A , Vitamin-C and Vitamin-E
Total phenolic contents (Leaves &Flowers)	Gallic acid equivalent (GAE): Lantoside, Lantanone, Lanaroside, Camarinic acid. Ketonic acid,
Pentacyclic triterpenoids (Aerial parts):	Camaryolic acid, methylcamaralate, and camangeloyl acid), β -sitosterol 3-O-beta-D-glucopyranoside, octadecanoic acid, ocosanoic acid, palmitic acid, oleanolic acid, lantanolic acid, camaric acid, lantadene A, lantadene B, ictrogenin, lantadene, Coleanolic acid, ursolate acetate, ursolic acid, reduced lantadene, lantalonic acid, lantic acid.
(Triterpenoids)	28-norolean-12,17-diene triterpene lantigdienone and camarinin

Stems)	
Triterpenoid esters	Camarilic acid and Camaricinic acid
Flavonoids (Leaves, stems, flowers&fruits)	Quercetin,,-methoxy quercetin, 3,7-dimethoxy quercetrin, 3,7,4'-trimethoxy quercetin, camaraside from <i>Lantana camara</i> and from <i>L.camara var aculeata</i> -pectolinarigenin-7-O- β -D-glucoside..
Steroids (Leaves, flowers& roots)	Stigmasterol.
Tannins	Germacrene-A,B and D, valencene (main compound) and γ -gurjunene.
Triterpenes (Aerial parts)	Lantadenes-A,B,C,D,
Iridoid glycosides:	Theveside, theviridoside, gepiposide, 8-epiloganin, shanzhside methyl ester, lamiridoside.
Phenylethanoid glycosides	Verbascoside, martynoside, derhamnosylverbascoside, isomumioside, calceolarioside E.

LENTADENE-A	LENTADENE-B	LENTADENE-C	LENTADENE-D
			
LANTACENE	CAMARIN	CAMARININ	GERMACRENE-D
			
PELLANDRENE	SABENENE	3β, 19α-dihydroxyursan-28-oic acid	21,22, β epoxy-3β hydroxy olean-12-en-28-oic acid
			
hederagenin.	25-HYDROXY-3-OXOLEAN-12-EN-28-OIC ACID	CAMARILIC ACID	CAMARACENIC ACID
			

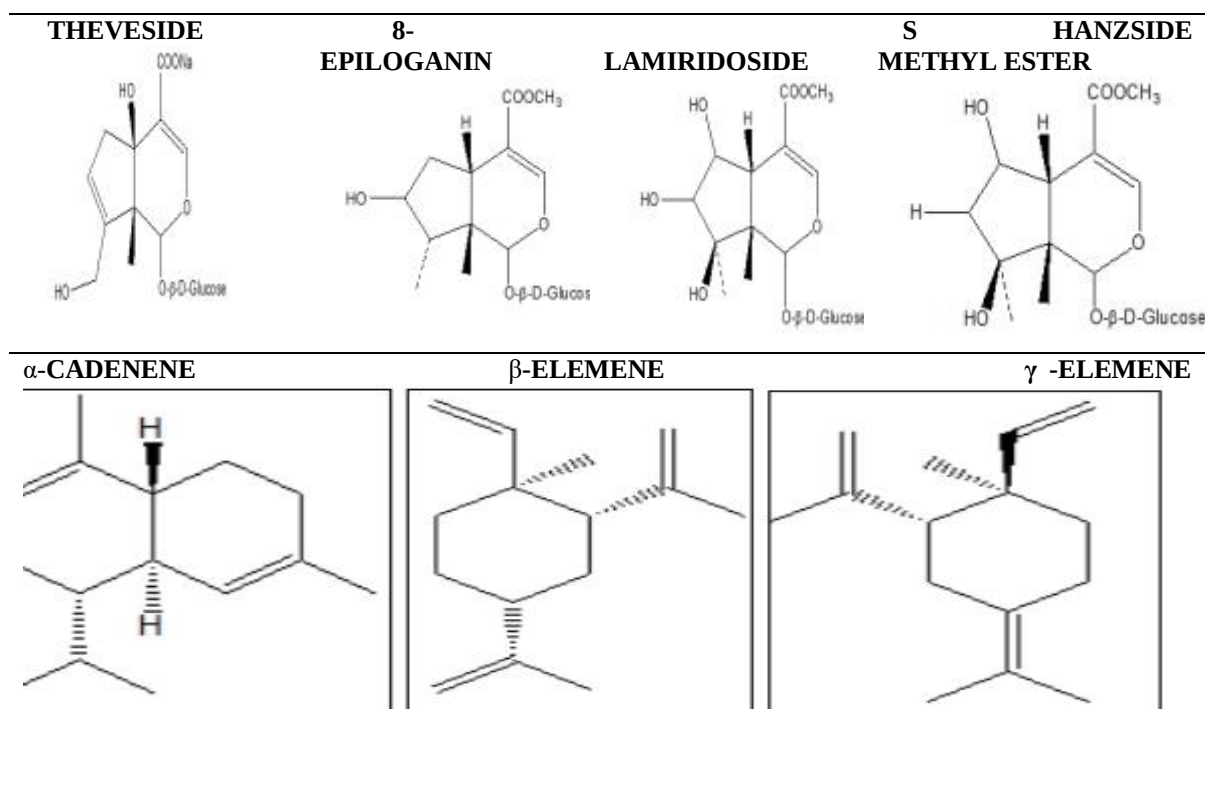


Fig 8: Structures of Important Chemical Constituents

Table:9 Uses of Lantana Camara

Parts Used	Uses	References
Plant	Act as hedge plant, provide perch sites and cover	Ghisalberti et al., 2000; Day et al., 2003
Flowers	Nectar source for butterflies and moths	Mohan Ram and Mathur, 1984; Day et al., 2003
Bark	Astringent and used as a lotion in cutiginous eruptions, leprous ulcers	ISSG, 2008; Trek Nature, 2009
Stalks	Raw material for paper pulp which is used for wrapping, writing and printing paper. Making baskets and temporary shelters. Used as Bio fuel	2006; Naithani and Pande, 2009; Kannan., 2008; Sharma., 1988; Prasad et al., 2001
Leaves	Boiled and used for swelling and pain in the body. Alkaloidal fractions lower blood pressure, accelerate deeprespiration and stimulate intestinal movements.	1996; Noble., 1998; Nagao., 2000
Plants extract	Drought-tolerant so good candidates for xeriscaping. Employed in the folk drug for the treatment of cancers, chicken pox, measles, asthma, ulcers, swellings, eczema, tumors, high blood pressure, bilious fevers, catarrhal infections, tetanus, rheumatism and malaria.	Yuch and Weissich, 2000; Chavan and Nikam, 1982; Sharma and Sharma, 1989; Day 2003; Begum et al., 2003; Sharma, 2007

Summary

Lantana camara is a well-known medicinal plant that is frequently prescribed in various indigenous systems of medicine .I.e. Lantana a camara has a promising place in Ayurveda system of medicine due to its various medicinal values like antidiuretic, anti-inflammatory, antibacterial, antifungal, antifertility etc.

Lantana camara is regularly used as herbal medicine and in some areas as firewood and mulch. Especially in India, there has been to a great extent work conducted on the chemical constituents of Lantana camara. The leaf oil is employed as an antiseptic for scars; the roots are used for the treatment of a toothache and the flowers for chest complaints in children.

CONCLUSION

The pharmacological studies conducted on Lantana camara indicate the immense potential of this plant in the treatment of various conditions since the plant is rich in carbohydrates, alkaloids, tannins, saponins and phenolic compounds which witness the ample of medicinal potential of the herb. Important chemical constituents which are present in different parts of Lantana camara were triterpenes like lantadenes A, B, C, and D, alkaloids, saponins , flavonoids such as Quercetin,, 3-methoxy quercetin, 3,7-dimethoxy quercetrin, 3,7,4'-trimethoxy quercetin, camaraside from *Lantana camara* and from *L.camara var aculeata*-pectolinarigenin-7-O- β -D-glucoside., tannins like

Germacrene A, B and D and chief compounds are Valencene and γ -gurjunene-3. The detailed structures are summarized. Lantana camara leaves extract exhibited anti-proliferative, antimicrobial, fungicidal, insecticidal and nematocidal activities. Lantana camara shoots extract exhibited significant

antioxidant activity. The berries fruits are useful in fistula, pocks, tumors and rheumatism. The essential oil of Lantana camara exposed a broad spectrum of antibacterial, antimicrobial, and antifungal activities 18 -20.

REFERENCES

1. Md.Imad Uddin Anti-diabetic activity of silver nanoparticles synthesized from ashwagandha root aqueous extract, April 2018 vol-7, issue-2.
2. Anusha, Kamala. Pharmacological potency of aqueous leaf extract of *Alstonia Scholaris* associated metabolic alterations in alloxan induced diabetic rats Journal of Pharmacognosy and phytochemistry.
3. World health organization Archived from the original on 15 November 2018.
4. Anusha, sambha naik Anti-hyperglycemic activity of ethanolic leaf extract of *Alstonia scholaris* in induced diabetic rats, journal of global biosciences.
5. Maura umashankar and srivastava shruti, traditional indian herbal medicine used as anti-pyretic, antiulcer, antidiabetic and anti-cancer: review, IJRPC, 2011,1(4).
6. Ahmatullah M, Azam et al. Medicinal Plants Used for Treatment of Diabetes by the Marakh Sect of the Garo Tribe Living in Mymensingh District, Bangladesh. Complement Altern Med, 2012.
7. "About diabetes". World Health Organization. Archived from the original on 8 March 2014. Retrieved 4 April 2014.
8. Krantz AJ, Bailey CJ (2005). "Oral antidiabetic agents: current role in type 2 diabetes mellitus" .
9. Van Wyk B.E. (2008). Journal of Photochemistry and Photobiology B: Biology, 132, 45-55
<http://dx.doi.org/10.1016/j.jphotobiol.2014.02.001>.
10. Kim, K.J., Sung, W.S., Suh, B.K., Moon, S.K., Choi, J.S., Kim, J.G. and Lee, D.G. (2009) Antifungal Activity and Mode of Action of Silver Nanoparticles on *Candida albicans*. Biometals, 22, 235-242.
11. Dahanukar SA, Kulkarni AR RN. No Title: Pharmacology of medicinal plants and natural products. Indian J Pharmacol, 2000.
12. Harsha VH, Hebbar SS, Hegde GR S V. No Title: Ethnomedical knowledge of Plants used by Kunabi tribe of Karnataka in India.
13. Cragg GM, Newman DJ SK. No Title: Natural Products in Drug Discovery and Development.
14. Harborne A.J. (1998) Phytochemical Methods A Guide to Modern Techniques of Plant Analysis, 3rd ed. Elsevier Science.
15. Johnston G.A. (2005) GABA (A) receptor channel pharmacology. Curr Pharm Des, 11(15), 1867-85 of Silver Nanoparticles Using *Withania somnifera* Leaf Powder and Silver Nitrate. 2013.
16. Henry F. Aritonang, Harry Koleangan, and Audy D. Wuntu, Synthesis of Silver Nanoparticles Using Aqueous Extract of Medicinal Plants' (*Impatiens balsamina* and *Lantana camara*) Fresh Leaves and Analysis of Antimicrobial Activity, Hindawi, International Journal of Microbiology, Vol.10, 2019.
17. Patil Shriniwas P.A, and Kumbhar Subhash T.B, "Antioxidant, antibacterial and cytotoxic potential of silver nanoparticles synthesized using terpenes rich extract of Lantana camara L. leaves" ELSEWARE BIOCHEMISTRY AND BIOPHYSICS REPORTS, Vol.10, pp.76-81 Jul-2017.
18. J. Das, M. Paul Das, and P. Velusamy, "Sesbania grandiflora leaf extract mediated green synthesis of antibacterial silver nanoparticles against selected human pathogens" Spectrochimia Acta Part a : Molecular and Biomolecular Spectroscopy, vol.104, pp.265-270,
19. Akash Ved, Tarannum Arsi, Om Prakash and Amresh Gupta, A REVIEW ON PHYTOCHEMISTRY AND PHARMACOLOGICAL ACTIVITY OF LANTANA CAMARA LINN, International Journal of Pharmaceutical Sciences and Research, Vol. 9(1): 37-43, 2018.
20. Ross IA: Medicinal plants of the world. Chemical constituents, traditional and modern medical uses. New Jersey Humana Press 1999.
21. Kumarasamyraja D, Jeganathan NS and Manavalan R: Pharmacological review of Lantana camara L. International Journal of Pharm Res 2012; 2: 1-5.
22. Ghisalberti EL: Lantana camara Linn.: Review. Fitoterapia 2000; 71: 467-485.
23. Thamotharan G, Sekar G, Ganesh T, Saikatsen, Chakraborty R and Kumar SN: Anti-ulcerogenic effect of Lantana camara Leaves on in-vivo test models in Rats. Asian Journal of Pharmaceutical and Clinical Research 2010; 3: 57-60.
24. Ganesh T, Saikatsen, Thilagam G, Loganatham T and Chakraborty R: Pharmacognostic and antihyperglycemic evaluation of Lantana camara (L) var. aculeate leaves in alloxan-induced hyperglycemic rats. Int J Res Pharm 2010; 1:247-52.
25. Kumar G, Karthik L and Rao KVB: In-vitro anti-candida activity of Calotropis gigantea against clinical isolates of Candida. Journal of Pharmacy Research 2010; 3: 539-542.
26. Saraf A, Quereshi S, Sharma K and Khan NA: Antimicrobial activity of Lantana camara L. J Exp Sci 2011; 2: 50-54.
27. Kirtikar KR, Basu BD: Indian Medicinal Plants. 1981; 6.
28. Saxena RC, Dixit OP and Harsttan V: Insecticidal action of Lantana camara against Callosobruchus chinensis (Coleoptera bruchidae). Journal Stored Pro Res 1992; 53: 230-235.
29. Begum S, Mohammad BS, Siddiqui and Siddiqui S: Triterpenoids from the aerial parts of Lantana camara. Journal of Natural Product 1995; 58: 1570-1574.
30. Sharma S, Singh A and Sharma OP: An improved procedure for isolation and purification of lantadene A, the bioactive pentacyclic triterpenoid from Lantana camara leaves. Jour Med Aro Plant Sci 1999; 21: 686-688.

31. Day MD, Wiley CJ, Playford and Zalucki MP: Lantana current management, status and future prospects. Australian Centre for International Agricultural Research Canberra 2003.
32. Basu and Hazra B: Evaluation of nitric acid scavenging activity, in-vitro and ex-vivo of the selected medicinal plants traditionally used in inflammatory diseases. *Phytotherapy Research* 2006; 20: 896-900.
33. Kirtikar KR, Basu BD: *Indian Medicinal Plants*, Vol. 3, 1935:1914.
34. Chopra RN, Nayar SL and Chopra IC: *Glossary of Indian medicinal plants*, CSIR, New Delhi. 1956; 149.
35. *The Wealth of India*. Council of Scientific and Industrial Directorate, CSIR, New Delhi Vol. 6, 1962: 31.
36. *The useful plant of India*. Publication and Information Directorate, CSIR, New Delhi, 1992; 316.
37. Siddiqui BS, Raza SM, Begum S and Firdous S: Pentacyclic triterpenoids from *Lantana camara*. *Phytochemistry* 1995; 38: 681-685.
38. Barre JT, Bowden BF, Coll JC, Jesus JD, De La Fuente V, Janairo GC and Ragasa CY: A bioactive triterpene from *Lantana camara*. *Phytochemistry* 1997; 45: 321-324.
39. Kumar VP, Chauhan NS, Padh H and Rajani M: Search for antibacterial and antifungal agent from selected Indian medicinal plants. *Journal of Ethnopharmacology* 2006; 107: 182-188
40. Venkatachalam T, Kishorkumar V, Selvikalai P, Avinash M and Senthilkumar N: Phytochemical and preliminary phytochemical studies on the *Lantana camara* fruits. *Int J Pharm and Pharm Sci* 2011; 3: 52-54
41. Thamotharan G, Sekhar G and Ganesh T: Anti-ulcerogenic effects of *Lantana camara* leaves on in-vivo test models in Rats. *Asian J Pharm Clin Res* 2010; 3: 57-60. 23.
42. Mariyajancyrani P, Kumarravel S and Kannan PS: GC-MS analysis of *Lantana camara*, *Indian Journal of Pharmaceutical Research and Development* 2009; 2: 63- 66. 24. Mishra A: Allelopathic properties of *Lantana camara*, a review article. 2014; 2: 32-52.
43. *Lantana camara*. <http://www.ars-grin.gov/~sbmljw/cgi-bin/taxon-pl?310628>. Germplasm Resources Information Network (GRIN).
44. Global Invasive Species Database. www.issg.org.uk Retrieved. 2014; 03-22.
45. www.brahmayurved.com/herbs/Lantana-weed-orchaturagi. Php.
46. Palmer WA and Pullen KR: The phytophagous arthropods associated with *Lantana camara*, *L. hirsuta*, *L. urticifolia* and *L. urticoides* (Verbenaceae) in North America. *Biol Control* 1995; 5:54-72.
47. Swarbrick JT, Willson BW and Hannan JMA: *Lantana camara* L. In: *The Biology of Australian Weeds* (ed. by Panetta FD, GrovesRH, Shepherd RCH). R. G. and F. J. Richardson, Melbourne 1998; 119-136.
48. Waterhouse DF and Norris KR: *Biological Control: Pacific Prospects*, Inkata Press, Melbourne 1987.
49. Munir AA: A taxonomic review of *Lantana camara* L. and *L. montevidensis* (Spreng.) Briq. (Verbenaceae) in Australia. *J Adel Bot Gard* 1996; 17: 1-27.
50. Cilliers CJ: The weed, *Lantana camara* L. and the insect natural enemies imported for its biological control into South Africa. *J Entomol Soc South Afr* 1983; 46: 131-138.
51. Van Oosterhout E, Clark A, Day MD and Menzies E: *Lantana control manual*. Current management and control. Options for *Lantana* (*Lantana Camara*) in Australian State of Queensland. Department of Natural Resources, Mines, and Energy, Brisbane. <http://www.nrm.qld.gov.au/pests/wons/Lantana>.
52. Wollenweber E, Dorr M, Muniappan R and Karsten S: Flavanoid aglycones and triterpenoids from the leaf exudate of *Lantana camara* and *Lantana montevidensis*. *Biochemical Systematics and Ecology* 1997; 25: 269-270.
53. Silva MHL, Andrade EHA, Zoghbi MGB, Luz AIR, Silva JD and Maia JGS: The essential oils of *Lantana camara* L. occurring in North Brazil. *Flavour Fragr J* 1999; 14: 208- 210. Ved et al., *IJPSR*, 2018; Vol. 9(1): 37-43. E-ISSN: 0975-8232; P-ISSN: 2320-5148 *International Journal of Pharmaceutical Sciences and Research*
54. Begum S, Zehra SQ, Wahab A and Siddiqui BS: Triterpenoidal secondary metabolites from *Lantana camara* Linn. *Helvetica Chimica Acta* 2006; 89: 1932- 1941.
55. Khan M, Srivastava SK, Syamasundar KV, Singh M and Naqvi AA: Chemical composition of leaf and flower essential oil of *Lantana camara* from India. *Flavour and Fragrance Journal* 2002; 17: 75-77.
56. Banik RM and Pandey DK: Optimizing conditions for oleanolic acid extraction from *Lantana camara* roots using response surface methodology. *Industrial crops and products* 2008; 27: 241-248.
57. Kuhad RK, Gupta R, Khalsa YP and Singh A: Bioethanol production from *Lantana camara* (red sage): Pretreatment, saccharification and fermentation. *Bioresource Technology* 2010; 101: 8348-8354.
58. Zoubiri S and Baalouamer A: Larvicidal activity of two Algerian Verbenaceae essential oils against *Culex pipiens*. *Veterinary Parasitology* 2011; 181: 370-373.
59. Misra L and Laatsch H: Triterpenoids, essential oil and photo oxidative 28, 13-lactonization of oleanolic acid from *Lantana camara*. *Phytochemistry* 2000; 54: 969-974.
60. Sharma OP, Singh A and Sharma S: Levels of lantadenes, bioactive pentacyclic triterpenes, in young and mature leaves of *L. camara* var. *Aculeate*. *Fitoterapia* 2000; 71: 487-491.
61. Sharma OP: Review of the biochemical effects of *L. camara* toxicity. *Vet Hum Toxicol* 1984; 26: 488-93.
62. Pan WD, Li YJ and Mai LT: Studies on the chemical constituents of the roots of *L. camara*. *Yao Xue Xue Bao* 1992; 28: 8328269.
63. Pan WD, Mai LT and Li YJ: Studies on the chemical constituents of the leaves of *L. camara*. *Yao Xue Xue Bao* 1993; 28(3): 5-9.
64. Singh SK, Singh A, Tripathi VJ and Finzi PV: Minor constituents of *Lantana camara*. *Journal of Indian Chemical Society* 1996; 73: 547-548.

65. Jonville MC, Kodja H, Humeau L, Fournel J, De Mol P, Cao M, Angenot L and Frédérick M: Screening of medicinal plants from Reunion Island for antimalarial and cytotoxic activity. *Journal of Ethnopharmacology* 2008; 120:382-386.
66. Gomes de MJ, de Sousa ATA, Thijian Nobre de Almeida e CV, Lyra de Vasconcelos CD, do Desterro RM and Carneiro do NS: Antiproliferative activity, antioxidant capacity and tannin content in plants of semi-arid Brazil. *Molecules* 2010; 15: 8534-42.
67. Pour BM, Latha LY and Sasidharan S: Cytotoxicity and oral acute toxicity studies of *Lantana camara* leaf extract. *Molecules* 2011; 16: 3663-3674.
68. Mahdi P, Sashidharan S, Rameshwar NJ and Ramnathan S: Anti-leukemia activity of methanolic extracts of *Lantana camara*. *Phcog Res* 2009a; 1: 274-279.
69. Ghosh S and Das SM: Anti-inflammatory and anticancer compounds isolated from *Ventilago madraspatana* Gaertn. *Rubia cordifolia* Linn. and *Lantana camara* Linn. *Journal of Pharmacy and Pharmacology* 2010; 62: 1158-1166.
70. Badakhshan MP, Sasidharan S, Rameshwar NJ and Ramanathan S: A comparative study: antimicrobial activity of methanol extracts of *Lantana camara* various parts. *Pharmacognosy Research* 2009b; 1: 348-351.
71. Barreto FS: Antibacterial activity of *Lantana camara* Linn and *Lantana montevidensis* Brig extracts from CaririCeará Brazil. *Journal of Young Pharmacists* 2010; 2: 42- 44.
72. Mary Kensa V: Studies on phytochemical screening and anti-bacterial activities of *Lantana camara* Linn. *Plant Sciences feed* 2011; 1: 74-79.
73. Deepak G, Silviya S and Kishwar HK: Biochemical compositions and antibacterial activities of *Lantana Camara* plants with Yellow, Lavender, Red and White flowers. *Eur Asia J Bio Sc* 2009; 3: 69 77.
74. Abdulla MA: Acceleration of Wound Healing Potential by *Lantana camara* leaf extract in experimental rats. *Research Journal of Medical Sciences* 2009; 3: 75-79.
75. Sathish R, Bhushan V and Natarajan K: Anti-ulcerogenic activity of *Lantana camara* leaves on gastric and duodenal ulcer in experimental rates. *Journal of Ethnopharmacology* 2011; 134: 195-197.
76. Nayak BS, Raju SS, Eversley M and Ramsabhag A: Evaluation of wound healing activity of *Lantana camara* L.-A preclinical study. *Phytotherapy Research* 2009; 23:241-245.
77. Mayee R and Thosar A: Evaluation of *Lantana Camara* for antiurolithiatic and antioxidant activities in rats. *Pharm Clinical Res* 2011; 3: 10-14.
78. Bhakta D and Ganjewala D: Effect of leaf positions on total phenolics, flavonoids and proantho-cyanidins content and antioxidant activities in *Lantana camara* (L). *Journal of Scientific Research* 2009; 1: 363-369.
79. Jain S, Itoria P, Joshi A and Dueby BK: Pharmacognostic and phytochemical evaluation and antipyretic activity of leaves of *Lantana camara*. *Inter J Bio Ad Res* 2011; 28.
80. Srivastava D and Singh P: Antifungal potential of two common weeds against plant pathogenic fungi *Alternariasps*. *Asian Journal of Experimental Biological Sciences* 2011; 2: 525-528.
81. Tripathi S, Rawat K, Swati D and Himani P: Potential of *Lantana camara* Linn. Weed against wood destroying fungi. *Indian Forest* 2009; 135: 403-411.
82. Deena MJ and Thoppil JE: Antimicrobial activity of the essential oil of *Lantana camara*. *Fitoterapia* 2000; 71: 453- 455.
83. Weenen H, Nkunya MH and Bray DH: Antimalarial activity of Tanzanian medicinal plants. *Planta Med* 1990; 56: 368-370.
84. Rwangabo PC: Umuhengerin a new antimicrobially active flavonoid from *Lantanatri folia*. *Journal of Natural Product* 1988; 51: 966-968.
85. Gidwani BK, Bhargava S, Rao SP, Majoomdar A, Pawar DP and Alaspure RN: Analgesic, anti-inflammatory and anti-hemorrhoidal activity of aqueous extract of *Lantana Camara* Linn. *Research Journal of Pharmacy and Technology* 2009; 2:3 78-381.