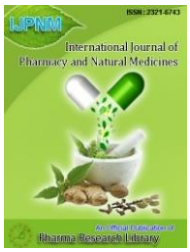

International Journal of Pharmacy and Natural Medicines
Journal Home Page: https://www.pharmaresearchlibrary.com/ijpnm
CODEN (USA): IJPNRC | ISSN: 2321-6743 | Publisher: Pharma Research Library
Int. J. Pharm. Natural Med., 2025, 13(1): 06-12.
DOI: https://doi.org/10.30904/j.ijpnm.2025.4756

A Review Article on Latex Producing Plants with Medicinal Properties

Ranjitsingh B.Rathor*[1], Sheetal C.Raghuvanshi[2], Dr. P.R. Tathe[3], Yogesh Ubrhande[4]
[1]Faculty of Pharmacy, Department of Pharmacognosy, Samarth College of Pharmacy, Deulgaon Raja, Chikhali road, Buldhana, Maharashtra state-443204
[2]Faculty of Pharmacy, Pharmaceutical Analysis, Samarth College of Pharmacy, Deulgaon Raja, Chikhali road, Buldhana, Maharashtra state-443204
[3]Faculty of Pharmacy, Department of Pharmacology, Samarth College of Pharmacy, Deulgaon Raja, Chikhali road, Buldhana, Maharashtra state-443204
[4]Faculty of Pharmacy, Department of Pharmaceuitics, Samarth College of Pharmacy, Deulgaon Raja, Chikhali road, Buldhana, Maharashtra state-443204

A B S T R A C T
Plant latex is a milky-like fluid (sap) that is stored in plant specialized cells –laticifers. It contains a mixture of phytochemicals, proteins and enzymes, such as alkaloids, phenolics, terpenoids, defense proteins, proteases and chitinases. Most of these latex ingredients possess pharmacologic activity. Due to its curing effects, latex has been used in traditional folk medicine to treat skin warts and tubercles. Nowadays, natural plant latex derived molecules and their synthetic analogs are used in medicine as antimicrobial agents, analgesics, ant proliferative and anticancer drugs. Moreover, it has been reported that alkaloids and phenolics from the plant latex exhibit potential therapeutic effects against neurodegenerative diseases such as Alzheimer's and Parkinson's diseases. Most of natural plant latex derived products are present in low amounts, difficult to isolate, possess poor bioavailability and stability. Recent advancements in nanotechnology offer advanced nanomaterials as nanocarriers of pharmacologically active latex natural agents. Conjugation of small natural latex compounds with nanoparticles, liposome's, micelles, nanodiamonds and carbon nanotubes allows improving bioavailability and stability of these natural pharmacologically active latex compounds. Furthermore, nanoscience approach provides time-controlled and site-specific delivery of potential therapeutics from latex, what gives new promising perspectives for their future use in medicine.
Keywords: alkaloids, phenolics, terpenoids, defense proteins, liposome's, micelles, nanodiamonds

A R T I C L E I N F O

***Corresponding Author**
Ranjitsingh B.Rathor
Faculty of Pharmacy, Department of Pharmacognosy,
Samarth College of Pharmacy, Deulgaon Raja,
Chikhali road, Buldhana, Maharashtra state-443204

Article History:
Received 15 Oct 2024
Revised 28 Nov 2024
Accepted 19 Dec 2024
Published 17 Jan 2025

Citation: *Ranjitsingh B.Rathor et al., A Review Article on Latex Producing Plants with Medicinal Properties, Int. J. Pharm. Natural Med., 2025, 13(1): 06-12.*

C o n t e n t s

1. Introduction

As we can see easily that there are number of path breaking innovation already done in pharmaceutical science in the form of medicines for saving mankind but there are number of diseases still remain uncurable and at the same time generation of new diseses challenging to total human being and their survival. Though the number of synthetic and natural molecules still now available. But there is always combat between life and death.in that case though number secondary metabotalites derived from natural sources or manufacturing in pharmaceutical industries but always demand for investigations, innovations, discoveries of new molecules so that useful in treatment of uncurable diseases, ailments, infections. So here we introduce a secondary metabolite (LATEX) and its derivatives which is little Beat unaware to common people and patients by

collecting some important plants which are easily available in nature and can be useful in the form of medicines.

2. Latex and Its Derivatives

Liquidambar orientalis

Common names: Oriental sweet gum or Turkish sweet gum
Biological source: It consist of entire plant of Liquidambar orientalis
Genus: Liquidambar
Family: Hemamilediaceae

Fig.1 *Foliage of Liquidambar orientalis*

Chemicals: oils, balsam storax, hydrocarbon styrene, polystyrene plastics, Styrofoam.

- Uses: Latex used as a medicine since the Hippocratic period.
- The ancient Egyptians also used the oil during embalming.
- The extraction of its sap latex and the production of a balsam for production of benzoin, benzoic acid all other derivatives.
- The latex and its extract use for production of sweet gums.
- Latex byproduct in the form of oils used in Greek culture production of aromatic oils and perfumes and its part of their trade economic system in past.

Fig.2 Achyranthes aspera

Common names: chaff-flower, prickly chaff flower, devil's horsewhip, apāmārga
Biological source: It consist of entire plant of Achyranthes aspera
Family: - *Amaranthaceae*.
Chemical constituents
It contains Triterpenoids, Saponins which possess oleanolic acid as the aglycone. Ecdysterone, an insect moulting hormone, and long chain alcohols
Uses: - In treatment of dropsy, piles, boils, for colic pain children. As a cure for cough.

- Dara (antibodies in cancer growth) have been used in folk medicine in countries including Australia.
- The seeds are given in hydrophobia, and in cases of snake-bites, as well as in ophthalmic and cutaneous diseases.
- The flowering spikes, rubbed with a little sugar, are made into pills, and given internally to people bitten by mad dogs.
- The leaves, taken fresh and reduced to a pulp, are considered a good remedy when applied externally to the bites of scorpions. .
- The flowering spikes are old safeguard against scorpions, which it is believed to cure paralysis.

Fig.3 *Mango*

Synonyms: Aam, aamba, mamidi,mampalam, maambhazam, badam aam
Biological source: - consist of large fruiting tree of Magnifera indica
Family: *Anacardiaceae.*
Chemical constituents:
Latex contained moderate amounts of carbohydrates and reducing sugars which are disaccharides. Starch, proteins, monoterpenes, phenolics, alkaloids, cardenolide, enzymes were present
Uses

- In dressings for cracked feet and scabies. It is also considered anti-syphilitic, antifungal agent
- Food preservative, flavoring agent, antibacterial properties.
- Skin care: Mango sap can be used for skin whitening and other skin care treatments.
- Honey bee sting treatment: Mango sap can be used to treat honey bee stings.
- Enzymes: Mango sap contains enzymes that are beneficial to the body.
- Commercial applications: Mango sap is a rich source of enzymes that have several commercial applications.
- Aromatic agent: The non-aqueous phase of mango sap contains terpenoids that give raw mango its aroma.

Fig.4 *Pisticia atlantica*

Common name: Mt. Atlas mastic tree and as the Persian turpentine tree.
Biological source: It consist of entire plant and various parts of plant pisticia atlantica. Desf
Family: anacardeace
Uses: Flavoring agent:
The sap is dried and used as incense, and its smoke releases a pleasant smell to the local environment for celebrations and religious ceremonies, as "incense".

Fig.5 *Semecarpus Anacardium*

Synonyms: Marking Nut Tree, Marsh Nut, Oriental Cashew Nut, Bhela, Bhelwa, and Bhilawa. Malacca bean tree, marany nut, dhobi nut tree and varnish tree
Biological source: IT consist of dried fruits of Semecarpus anacardium linn
Family: Anacardiaceae
Phytoconstituents: sterols, 1, 2, dihydroxy-3 (pentadecadienyl), benzene and, hydroxyl, pentadecadienyl, benzene, Flavonoids, polysaccharides, gums, amino acids, terpenoids, phenolics, Saponins
Uses: To aid in memory retention, antioxidant, antimicrobial, anticancer, in ulcers, treatment of gastritis, anti-vomiting, antihypertensive, in treatment of dirrhoea, anti-arthritis.

Fig.6 *Allamanda cathartica*

Synonym: golden trumpet, common trumpet vine yellow Allamanda.
It consist of fresh flowering tops of Allamanda cathartica
Family: Apocynaceae.
Phytochemicals: β-sitosterol.lignoceric acid, d-glucoside, stigmata 9-en-3, 6, 7triol, 3-hydroxy-22-epoxystigmastane, ergosterol triterpene, lupeol, β-pinene, caryophylline, hulene, ondene,cadinene
Uses: In treatment of liver tumors, jaundice, Antimalerial, Splenomegaly, Purgative o induce vomiting in low dosages. Anti-inflammatory Anti-microbial, Wound healing, Antibacterial, Anticancer, to treat diabetes, anti-hypertensive

Fig.7 *Poinsettia*

Synonyms: lalapatti, lobster flower, Easter flower, Christmas flower, painted flowers
Family: It consist of flowering tops of Euphorbia Pulcherrima
Family: Euphorbiace
Chemical composition
Alkaloids, flavonoids, Pulcherrol, Saponins, glycosides, reducing sugars, proteins, amino acids, pulcherryl acetate are among the components of its latex. Triterpenes, steroids are found in aerial parts of the plant, including its latex and leaves.
Uses: Anti-Alzheimer's disease bioactivity, analgesic

Fig.8 *Jackfruit latex*

Synonyms: kathal, lagnka, jack, fanas
Biological source:- latex obtained from the plant of Atrocarpus Hetrophyllus
Family: Moraceae
Phytochemicals:-It contains lipids, rubbers, resins, sugars, enzymes, and proteins, including cis-1,4 polyisoprene and trans-1, 4 polyisoprene, vitamins, minerals, fibers and fats.
Uses: Its decoction and latex are used in the treatment of asthma, prevent ringworm infection, and heal cracking of the feet, in the treatment of diabetes, gall stones and relieve asthma, mouth ulcer, in glandular swelling.

Fig.9 *Thevetia*

Synonyms: Pili Karen's, Yellow Oleander, Kaner, lucky nut, yellow oleander, milk bush
Biological source: Ii is well developed ornamental shrub of thevetia purpurea
Family: Apocynaceae
Phytochemicals: latex contains compounds that may have medicinal properties
Flavonoids: Rutin, quersestin, naringin, and hesperidins
Phenolic acids: Chlorogenic, syringenic, and ferulic acids
Uses: as an anticancer, anticoagulant, antioxidant, antimicrobial agent, as a cardiac glycoside

Fig.10 *Papya*

Synonyms: papita, omkari, papai
Biological Source
Papain is the dried and purified latex of the green fruits and leaves of Carica papaya L
Family: - Caricaceae
Chemical Constituents

- In papaya latex consist of cystine endow peptidases: Glycyl endopeptidase, chymopapain, and caricain
- Bioactive compounds: 2-Hydroxy-gamma-butyrolactone, 1, 3-propanediamine, hexadecanoic acid, and octadecanoic acid are some of the bioactive compounds found in papaya latex.
- Papain contains several enzymes such as proteolytic enzymes, peptidase I capable of converting proteins into dipeptides and polypeptides, rennin-like enzyme, clotting enzyme similar to pectase and an enzyme having a feeble activity on fats
- The enzymes Papain, papayaproteinase, and chymopapain, have been isolated in crystalline form from the latex.
- The fruits yield lauric, myristoleic, palmitoleic and arachidic acids, malonated benzyl-p-o-glucosides, 2-phenyl ethyl glucoside, and 4-hydroxy-phenyl-2-ethyl glucoside. Alkaloids, alcohols, terpenoids, lipids.

Uses:
Pharmaceutical industry:

- Papain is used to prevent adhesions; in infected wounds; internally as protein digest ant as anathematic (nematode), to relieve the symptoms of episiotomy (incision of vulva)
- For treatment of dyspepsia, intestinal and gastric disorders, and diphtheria
- For dissolving diphtheria membrane, in surgery to reduce incidence of blood clots where thromboplasma is undesirable and for local treatment of buccal, pharyngeal, and laryngeal disorders.
- It is used in digestive mixtures, liver tonics, for reducing enlarged tonsils, in prevention of postoperative adhesions, curb uncles, and eschar burns
- It is used in the manufacture of proteolytic preparations of meat, lever, and casein, with dilute alcohol.
- Antiseptic, antimicrobial, antiparasitic, antiseptic, Ant fertility, antioxidant Anti-inflammatory, Antihypertensive, Diuretic, Antidiaberic
- Anthelmintic. Anti-tumor. Wound healing, antipyretic, Swellings, Jaundice, Gonorrhea, Bilious fever, Itches, Eczema, Rheumatism cold, Headache, and Whooping cough.

Fig.11 Opium

Synonyms: ganja, afeem, drugs, kani.
Boloical source: Opium (poppy tears) is dried latex obtained from the seed capsules of the opium poppy Papaver somniferum.
Opium is a highly addictive narcotic drug obtained from the juice (latex) of the unripe seedpod of the poppy plant (Papaver somniferum).
Family: papavaraceae
Phytochemicals:
Morphine, heroine, codeine, Noscapine. Hydromorphone, oxycodone, hydrocodone, papavarine.
Uses:
Medications for the treatment of acute and chronic pain. Opium and its alkaloid-derivatives can also be used as tranquilizers, antitussives and in the treatment of diarrhoea.
Pain management: Morphine is commonly used to treat moderate to severe pain, and is often the first choice for palliative care.
Cancer treatment: Morphine can be used to treat pain during active cancer treatment.
Sickle cell crisis: Morphine can be used to treat vaso-occlusive pain during sickle cell crisis.
Labor analgesia: Morphine can be used for pain relief during labor.
Preoperative analgesia: Morphine can be used for pain relief during surgery, including intra-abdominal, intra-thoracic, and orthopedic surgery of the lower extremities, and Cesarean section

***Fig.12** Ipomoea staphylina*

Synonyms

Pretty Morning Glory, Lesser Glory, Ugniumboo, Oonan kodi, Theendra teega, Sunang kodi, Unang kodi, Onaan kodi, and Ugina kodi.

Biological source: It consist of entire climber parts of Ipomea Staphylina

Family: Convolvulaceae

Chemical constituents: Alkaloids, Flavonoids, glycosides, tannins, Saponins, phenols, carbohydrates, protein. Steroids, glycosides and sterols, Hexadecen-1-ol, 9-Octadecen-1-ol, Hydro peroxide, 1-ethylbutyl and 3, 3, 7, 11-Tetramethyltricyclo [5.4.0.0(4, 11)] undecan-1-ol were identified. Sitosteryl-3-O-β-D-glucoside and chiro deoxy inositol.

Medicinal properties

antimicrobial agents, food additive and flavoring agents, antioxidant, Anti-hypercholesterolemia, anticancer properties, anti-inflammatory agents, cytotoxic, cosmetics and perfumeries, hepatoprotective properties, antiviral properties, analgesic, insect pheromones, anesthetic, ant mutagenic, antispasmodic, choleretic, dermatitigenic, fungicide, herbicide, laxative, pesticide, lipoxygenase inhibitor, pesticide, tyrosinase inhibitor, vermifuge etc.

***Fig.13** Champa*

Synonyms: Bridal bouquet, White frangipani, Fiddle leaf plumeria Wild plumeria Bonairian oleander, Thai champa Naag (cobra) champa

Botanical Name: it consist of entire p plant of Plumeria pudica Jacq

Family: Apocynaceae

Chemical constituents

The latex t contains a mixture of chitinases, proteinases, and proteinase inhibitors

Amino acids: glycine, systine, serine.

Carbohydrates, steroids, Triterpenoids, polyphones

Uses: The latex of the Plumeria pudica plant has therapeutic potential such as Anti-inflammatory, Antioxidant, Protective against intestinal damage, Ant diarrheal, Protective against ulcerative colitis Treatment of skin diseases, like dartre.

3. Latex Benefits

Plant latex is a rich source of pharmaceuticals, pesticides and immune allergens. It contains phytosterol, Flavonoids, acetogenins, alkaloids and phenols. In general, plant latex contains low-molecular weight compounds (previously referred to as secondary metabolites, such as alkaloids, Flavonoids, terpenoids etc.) and macromolecular complexes, which are proteins. The plant latex compounds are responsible for numerous pharmacological properties of many plants like anti-tumors, anti-antigenic, anti-diabetic, anti-proliferative, anti-arthritis, anti-inflammatory, antioxidant, antiasthma tic, anti-fertility, analgesic, immunomodulation, wound healing, cytotoxicity, vasodilatory activities. Most of them show diverse biological activities against bacteria, fungi, viruses, protozoans, nematodes, insects, and tumor cells.

4. Conclusion

Latex plants continue to captivate botanists, scientists, and enthusiasts alike with their unique properties and diverse uses. From rubber trees to opium poppies, these plants have shaped industries, provided medicinal solutions, and played important roles in ecosystems. Whether it's exploring their cultivation, utilizing their latex properties, or simply appreciating their beauty, latex plants offer a world of intrigue and possibilities. To ensure a stable supply of natural latex and to decrease our dependence on chemical based development of latex oriented drug molecules and improvement of higher productivity would be necessary. The development of natural latex to secure our access to this essential polymer. Plant sources provide us with powerful tools, like genomics, metabolomics and proteomics, to scrutinize the mechanism of natural latex synthesis, but also provide us new methods for improvement, like marker-assisted breeding.

5. References

[1] Zheng W, Wang SY (2001) Antioxidant activity and phenolic compounds in selected herbs. J Agric Food Chem 49: 5165-5170.

[2] Atoui AK, Missouri A, Boskou G, Kefalas P (2005) Tea and herbal infusions: their Antioxidant activity and phenolic profle. Food Chem 89: 27-36.

[3] Dai J, Mumper RJ (2010) Plant phenolics: extraction, analysis and their antioxidant and anticancer properties. Molecules 15: 7313-7352.

[4] Działo M, Mierziak J, Korzun U, Preisner M, Szopa J, et al. (2016) The potential of Plant phenolics in prevention and therapy of skin disorders. Int J Mol Sci 17: 160.

[5] Griel AE, Kris-Etherton PM (2006) Tree nuts and the lipid profle: a review of clinical Studies. Br J Nutr 96: S68-S78.

[6] Halliwell B (1996) Antioxidants in human health and disease. Annu Rev Nutr 16: 33-50.

[7] Suzek H, Celik I, Dogan A, Yildirim S (2016) Protective effect and antioxidant role of sweetgum (Liquidambar orientalis) oil against carbon

tetrachloride-induced Hepatotoxicity and oxidative stress in rats. Pharm Biol 54: 451-457.

[8] Zheng W, Wang SY (2001) Antioxidant activity and phenolic compounds in selected herbs. J Agric Food Chem 49: 5165-5170. .

[9] Atoui AK, Missouri A, Boskou G, Kefalas P (2005) Tea and herbal infusions: their Antioxidant activity and phenolic profle. Food Chem 89: 27-36.

[10] Dai J, Mumper RJ (2010) Plant phenolics: extraction, analysis and their antioxidant and anticancer properties. Molecules 15: 7313-7352.

[11] Działo M, Mierziak J, Korzun U, Preisner M, Szopa J, et al. (2016) The potential of

[12] Plant phenolics in prevention and therapy of skin disorders. Int J Mol Sci 17: 160.

[13] Griel AE, Kris-Etherton PM (2006) Tree nuts and the lipid profle: a review of clinical Studies. Br J Nutr 96: S68-S78.

[14] Halliwell B (1996) Antioxidants in human health and disease. Annu Rev Nutr 16: 33-50.

[15] Suzek H, Celik I, Dogan A, Yildirim S (2016) Protective effect and antioxidant role of sweetgum (Liquidambar orientalis) oil against carbon tetrachloride-induced Hepatotoxicity and oxidative stress in rats. Pharm Biol 54: 451-457.

[16] Joel, D, M. The duct system of the base and stalk of the mango fruit. (1981). Botanical Gazette, 142(3): 329-333.

[17] Saby, J, K., Jagan, M, R., Bhat, S, G., and Prasada Rao, U, J, S. (1999). Characterization of aroma components of sap from different Indian mango varieties. Phytochemistry, 52 (5): 891-894

[18] Holmes, R, J., O'Hare, T, J., Underhill, S, J, R., Ledger, S, N., Bally, I, S, E., Macleod, W, N, B., Ferguson, J., Bowden, B, F., and Landrigan, M. FR440: Mango skin browning. Horticultural Research and Development Corporation, Gordon, New south wales, Australia. 1999, 50-57.

[19] Duhem B, Gaydou EM. Isolation and characterization of a new hispolone derivative from antioxidant extracts of Pistacia atlantica. Phytother Res. 2009.

[20] F, Bahmani E. The effects of nutritional and medicinal mastic herb (Pistacia atlantica) J Chem Pharm Res. 2015

[21] Yousfi M, Nedjmi B, Bellal R, Ben Bertal D, Palla G. Fatty acids and sterols of Pistacia atlantica fruit oil. Journal of the American Oil Chemists' Society. 2002.

[22] Ferreira IC, Barros L, Soares ME, Bastos ML, Pereira JA. Antioxidant activity and phenolic contents of Olea europaea L. leaves sprayed with different copper formulations. Food Chemistry. 2007.

[23] Duhem B, Gaydou EM. Isolation and characterization of a new hispolone derivative from antioxidant extracts of Pistacia atlantica. Phytother Res. 2009

[24] Mozaffarian V. Iran: Tehran: Farhang Moaser; 1998. A Dictionary of Iranian Plant Names

[25] Bahmani M, Saki K, Asadbeygi M, Adineh A, Saberianpour S, Rafieian-Kopaei M, Bahmani

[26] F, Bahmani E. The effects of nutritional and medicinal mastic herb (Pistacia atlantica) J Chem Pharm Res. 2015

[27] Yousfi M, Nedjmi B, Bellal R, Ben Bertal D, Palla G. Fatty acids and sterols of Pistacia atlantica fruit oil. Journal of the American Oil Chemists' Society. 2002.

[28] Ferreira IC, Barros L, Soares ME, Bastos ML, Pereira JA. Antioxidant activity and phenolic contents of Olea europaea L. leaves sprayed with different copper formulations. Food Chemistry. 2007.

[29] Bozorgi M, Memariani Z, Mobli M, Salehi Surmaghi MH, Shams-Ardekani MR, Rahimi R. Five Pistacia species (P. vera, P. atlantica, P. terebinthus, P. khinjuk, and P. lentiscus): a review of their traditional uses, phytochemistry, and pharmacology.

[30] Duhem B, Gaydou EM. Isolation and characterization of a new hispolone derivative from antioxidant extracts of Pistacia atlantica. Phytother Res. 2009.

[31] Ferreira IC, Barros L, Soares ME, Bastos ML, Pereira JA. Antioxidant activity and phenolic contents of Olea europaea L. leaves sprayed with different copper formulations. Food Chemistry. 2007. Lotha, R., Sivasubramanian, A., & Muthuraman, M. S. (2018).

[32] Silver nanoparticles from medicinally important Euphorbia cyathophora extract: biosynthesis, characterization, and anticancer activity. Asian Journal Pharm Clin Res, 11(2):154– 156.

[33] Annapurna, A., & Hatware, K. (2014). Effect of aqueous extract of Euphorbia heterophylla on blood glucose levels of alloxan induced diabetic rats. Int. J. Res. Pharm. Chem, 4, 669-672.

[34] Lotha, R., Sivasubramanian, A., & Muthuraman, M.S. Silver nanoparticles from medicinally important Euphorbia cyathophora extract: biosynthesis, characterization, and anticancer activity. Asian Journal Pharm Clin Res, 2018, 11(2): 154– 156.

[35] 2. Annapurna, A., & Hatware, K. (2014). Effect of aqueous extract of Euphorbia heterophylla on blood glucose levels of alloxan induced diabetic rats. Int. J. Res. Pharm. Chem, 4, 669-672.

[36] P. Rowe-Dutton. Artocarpus heterophyllus - jackfruit. In The propagation of tropical fruit trees (Garner RJ and Chaudhri SA, Eds.). FAO, Rome (Italy); Commonwealth Bureau of Horticulture and Plantation Crops, Maids tone, 269-290 (1985).

[37] The Wealth of India, A dictionary of Indian raw materials and industrial products, (publication and information directorate CSIR, New Delhi, 1985), 445-453.

[38] R.S.and Kumar (2002) Antimicrobial activity of Tabernaemontana divaricata root. Fitoterapia, 73(6),559-561.
[39] Sathish, R.,7&Vyawahare, B. Pharmacognostical and phytochemical studies of Tabernaemontana divaricata (linn).R.Br. Asian pacific journal of tropical biomedicine, 2015, 5(1), 51-55.
[40] Yashwant Rai, K. Shum. Seedling Behavior and Early Growth Status of Seedlings in Thevetia Peruviana (Pers). International Journal of Research in Applied, Natural and Social Sciences, 2014; 2(6): 129-134.
[41] Fu L, Zhang S, Li N et al. Three new Triterpenes from Nerium oleander and biological activity of the isolated Compounds. J Nat Prod 2005, 68: 198–206.
[42] Langford S D, Boor P J. Oleander toxicity: an examination of human and animal toxic exposures. Toxicology 1996, 109:1–13.
[43] Trikamji AY: Dravyagunavigyanam uttaraardha. Sharma ayurveda mandir datiya (MP) 2001; 5: 212-213.
[44] Bapalal VG: Nighantu Adarsh Chaukhambha bharati Academy, Varanasi, Reprint 2007; 1: 613-616.
[45] Reddy RK: Folk medicines from Chittoor district, Andhra Pradesh, India, used in the treatment of Jaundice. International Journal of Crude Drug Research 1988; 26.
[46] A text book og pharmacognosy by N.M patel and atul kabra,page no.198, p,v publications, edition 2018,page no.15.37.
[47] Vijayalakshmi, A., et al. Anti-anaphylactic and anti-inflammatory activities of a bioactive alkaloid from the root bark of Plumeria acutifolia Poir. Iranian Journal of Pharmaceutical Research, 2011. 10(3): p. 525-533.
[48] Ram, PR., and Mehrotra, BN., Compendium of Indian Medicinal plants. New Delhi: Central drug research institute, 1994. p. 674-675.
[49] Surendra, KRS. Naresh, K., Pharmacognostical standardization of Plumeria acutifolia (Poir) bark. International Journal of Pharmacy and Pharmaceutical Sciences, 2012. 4(5): p.54-57.