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A Comprehensive Review of *Hiptage benghalensis* (L.) Kurz

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Desai D.J.*, Rajmane R. B., Hangargekar C. B, Joshi A. A.

Department of Pharmaceutical Chemistry, Faculty of ASPM's K. T. Patil College of Pharmacy, Osmanabad 413501, Maharashtra, India. Department of Pharmaceutics, Faculty of ASPM's K. T. Patil College of Pharmacy, Osmanabad, Maharashtra, India Department of Quality Assurance, Faculty of ASPM's K. T. Patil College of Pharmacy, Osmanabad, Maharashtra, India Department of Pharmacognosy and Phytochemistry, Faculty of ASPM's K. T. Patil College of Pharmacy, Osmanabad 413501, Maharashtra, India

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ABSTRACT

Hiptage benghalensis (L.) Kurz, a member of the Malphigiaceae family, is the subject of the current review, which focuses on its botanical, phytochemical, and ethnopharmacological features. The Greek word "hiptamai," which means "to fly," is where the term Hiptage comes from. Its fruit has three wings and is called a "samara." Hiptage benghalensis is a vine-like shrub that is grown in tropical areas for its fragrant, white-pink blossoms as a tropical decorative in gardens and for use in traditional medicine. It has been used traditionally to treat a number of illnesses. This plant's many parts, including the bark, leaves, roots, stem, and flowers, have a wide range of therapeutic use for treating a variety of ailments. Rheumatism and asthma are both treated with the bark. It has been noted that leaves have analgesic and anti-inflammatory properties. Women are given plant decoction after giving birth. It harmonizes the three doshas—Pitta, Kapha, and Vata. Rheumatism, skin conditions, digestive issues, worm infections, itching, eczema, blood disorders, obesity, and flatulence are among the conditions it is traditionally used to treat. The Cardiac Tonic is another name for it. Its anthelmintic, analgesic, anti-inflammatory, anti-diabetic, anti-cancer, anti-asthmatic, mosquito repellent, antimicrobial, hepatoprotective, and anti-oxidant properties are due to the presence of phytoconstituents like flavonoids, alkaloids, anthraquinones, catechin, coumarin, phenols, steroids, tannins, terpenoids.

INTRODUCTION

Traditional medical practices have always been crucial in providing for the world's healthcare needs. Indian Systems of Medicine (ISM) refers to medical systems that are thought to have originated in India or that have immigrated to India from another country and been integrated into Indian culture. Ayurveda, Yoga and Naturopathy, Unani, Siddha, and Homoeopathy are six of the world's recognized medical systems that are found in India, giving the country the rare distinction of possessing thus many. [1]

Ayurveda is a time-tested science that uses natural resources like plants, animals, and minerals to treat disease. It continues to be one of the oldest still-practiced traditions, and it has a strong intellectual and experiential foundation. It is extensively practiced in Sri Lanka, India, and other nations. Ayurveda still holds a strong position in Indian healthcare compared to contemporary medicine, especially for the treatment of a variety of chronic disease conditions. [2]

Indigenous knowledge has been passed down from one generation to the next throughout the world, making a significant contribution to the growth of various traditional medical systems. It has also aided in the exploration of various medicinal plants to uncover the scientific underpinnings of their traditional uses. In discovering novel chemical entities (NCEs), physiologically active natural compounds have been extensively studied. [3]

Numerous herbal plants that exhibit a range of pharmacological effects can be found in nature, albeit some of these have not yet been completely studied. So, in our review, we focused on a plant from the Malpighiaceae family called Hiptage benghalensis. The word Hiptage is derived from the Greek word 'hiptamai', which means "to fly" and Benghalensis is derived from the historic region of Bengal. [4]

Fig.I: Hiptage benghalensis (L) Kurz

PLANT PROFILE:

Hiptage benghalensis has several vernacular names:

Sanskrit- Atimukta, Madhavi ,Vasanti, Pundraka, Mandaka, Vimukta, Kamuluja , BhramarotsavaBengali – Madhavilata, Madubhi

English- Clustered Hiptage, Helicopter Hiptage

Gujarati- Madhavi, Ragatpiti

Hindi-Madhavi, Anetaa

Kannada- Madhavivasantadhuti

Malayalam- Sitampu

Oriya- Boromali, Gorunda

Punjab- Benkar

Tamil- Madhavi ,Kurukkathi

Telugu-Madhavi [5,6,7]

Taxonomic synonyms for Hiptage benghalensis:

- *Banisteria benghalensis* L.
- *Banisteria tetraptera* Sonnerat
- *Banisteria unicapsularis* Lam.
- *Banisteria javanicaThunb*.
- *Gaertnera indica* J.F.Gmel.
- *Gaertnera obtusifolia* (DC.) Roxb.
- *Gaertnera racemosa* Vahl H. madablotaGaertn.
- *Gaertnera laurifolia Wall.*
- *Hiptage benghalensis* (L.) Kunz *forma longifolia* Nied.
- *Hiptage benghalensis* (L.) Kurz *forma cochinchinensis* Pierre
- *Hiptage benghalensis* (L.) Kurz *forma latifolia* Nied.
- *Hiptage benghalensis* (L.) Kurz *forma macroptera* (Merr.) Nied.
- *Hiptage benghalensis* (L.) Kurz *forma typica* Nied.
- *Hiptage javanica* Blume
- *Hiptage macroptera* Merr.
- *Hiptage madablota* Gaertn.
- *Hiptage malaiensis* Nied.
- *Hiptage obtusifolia* DC.
- *Hiptage pinnata* Elmer
- *Hiptage teysmannii* Arènes
- *Hiptage trialata* Span.
- *Molina racemosa* Cav.

- *Succowia fimbriata* Dennst.
- *Triopteris jamaicensis* L.
- *Platynema parvifolium D. Dietr.* [4,8]

Taxonomy study of Hiptage benghalensis

Kingdom**:** Plantae – plantes, Planta, Vegetal, plants

Subkingdom: Viridiplantae – green plants

Phylum: Tracheophyta

Division: Tracheophyta – vascular plants, tracheophytes

Subdivision: Spermatophytina – spermatophytes, seed plants, phanérogames

Class: Equisetopsida / Magnoliopsida

Subclass: Rosidae

Order: Malpighiales / Polygalales

Family: Malpighiaceae

Genus: Hiptage

Species :Hiptage benghalensis (L.) Kurz [4,8,9]

Habitat and Distribution:

Native to India, Southeast Asia, Taiwan, the Philippines, as well as Nepal, Indonesia, Malaysia, Myanmar, Sri Lanka, and Thailand, Hiptage benghalensis (L.) Kurz is a species. It favors a variety of conditions, from warm temperate to tropical. It can be found in Western Ghats, Kokan, and is extensively dispersed throughout Maharashtra and India. It can be found in semi-evergreen and evergreen woods, along riverbanks, and in sacred groves up to an altitude of 1500 meters.[4,5,6,8]

Cultivation:

In the tropical area, Hiptage benghalensis (L.) Kurz is grown for its therapeutic properties. It is grown for its distinctive, alluring, and fragrant white blossoms. It is frequently grown as a tropical ornamental in gardens due to the lovely, distinctive form of its blossoms. It can be spread via seeds or cuttings. Wind can easily spread the seeds.[7,10]

Description:

Micromorphology:

Hiptage benghalensis (L.)Kurz plant is large, climbing shrubs. It is a vine-like shrub and a large woody climber. Leaves are simple, opposite 7-12×2.5-5 cm and elliptic-oblong to lanceolate, leaf apex acuminate, entire margin. White, fragrant flowers with 5 merous, bisexual in terminal or axillary racemes, pedicellate articulated with pedicel 1.5 to 2 cm in length, sepals are 5 and 6-7 mm long, five free white 1.5-2×1.2-1.5 cm, elliptic to round, clawed, reflexed petals with crisped margin. Also, it has 10 stamens encircling the disc, one being larger than the other nine, antherbilobed. Flowers are erect, pubescent racemes. Flowers have a yellow center and globular to elliptic petals with hair-like structures. Flowering is from February –April, and August-December. The ovary is 3-celled, 3-lobed, and 4-6 mm long. Fruit samara is with 3 unequal wings one being larger and hairy, golden brown. Seeds are globose. Fruiting is throughout the year. [8,11]

Powder Microscopy:

Organoleptic Characters

Color: Brownish,

Odor: Aromatic,

Taste: Sweet, Astringent

Touch: Coarse powder.

Pedicel and calyx dialytic stomata, parenchyma cells of the sepal, wavy parenchyma cells, and epidermal cells of the petal are all visible in the flower. Pollen grains from the anther, a fibre, multicellular trichomes, fibres, oil globules, pericellular hair, and a prismatic crystal from a petal are all visible in the surface view.[12]

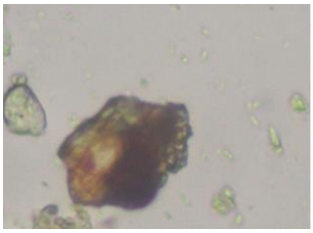


Fig. No. 2 (A) Colouring matter

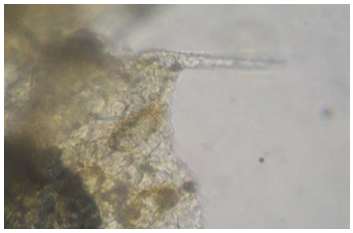


Fig. No. 2 (B) cut fragment of sepal with attached trichome (×40)

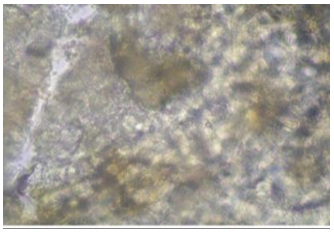


Fig. No. 2 (C) sepal in surface view (×40)

Fig. No. 2 (D) pollen grain (×40)

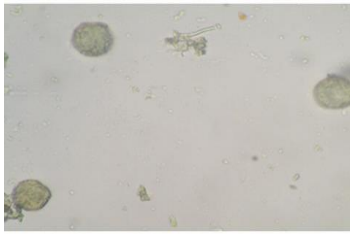


Fig. No. 2 (E) Pollen grains (×40)

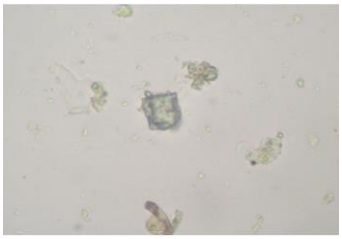


Fig. No. 2 (F) prismatic crystal (×40)

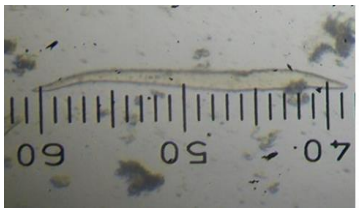


Fig. No. 2 (G) fiber (×40)

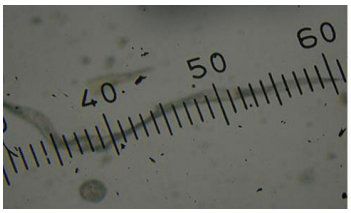


Fig. No. 2 ((H) fiber (×40)

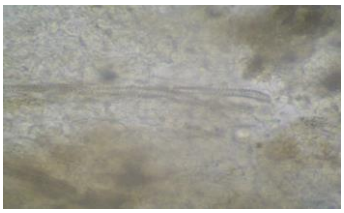


Fig. No. 2 (I) spiral vessel (×40)

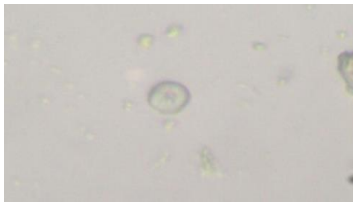


Fig. No. 2 (J) starch grain (×40)

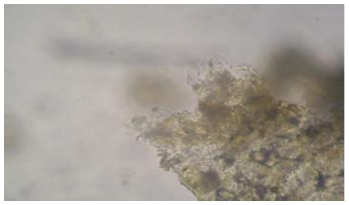


Fig. No. 2 (K) striated cuticle (×40)

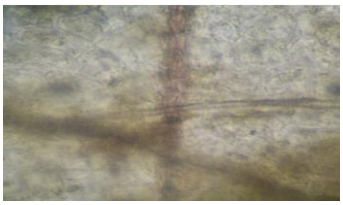


Fig. No. 2 (L) stained spiral vessel (×40)

Fig. No. 2 (M) different types of trichome (×40)

Figure 2: Powder characters of flower, (A) coloring matter (×40), (B) cut fragment of sepal with attached trichome (×40), (C) sepal in surface view (×40), (D) pollen grain

(×40), (E) pollen grains (×40), (F) prismatic crystal (×40), (G) fiber (×40), (H) fiber (×40), (I) spiral vessel (×40), (J) starch grain (×40), (K) striated cuticle (×40), (L) stained spiral vessel (×40), (M) different types of trichome (×40)

Microscopy and Micrometry

Petiole

A 3.6 mm long petiole's T.S. revealed an outer epidermis, cortex, vascular bundle, and core big pith. The epidermis is composed of straightforward epidermal cells with a tabular shape that are divided by numerous trichomes and covered in cuticles. The epidermis and cortex are composed of parenchyma cells with no intercellular space, occasional prismatic crystals, and a brown substance. The inner xylem is made up of xylem parenchyma and its fibers, while the outer phloem is structured in a circular pattern and has sieve components and fibers. Parenchyma cells laden with prismatic crystals, isolated oil globules, starch grains, and brown substance make up the centrally situated pith.

T.S. of Nectary Gland:

Adaxial epidermis with a single layer of tubular parenchyma cells loaded with pink-coloured cell sap is visible in the nectary gland. Four layers of parenchyma cells in the abaxial epidermis each contain cell sap that is pink in hue. Both have thick trichomes and a thin cuticle covering their surfaces. The homogenous mesophyll of spongy parenchyma makes up ground tissue. The open collateral vascular bundle is located in the section's middle [Figure 3J]. Parenchyma cells laden with prismatic crystals, isolated oil globules, starch grains, and brown material make up the central portion of the pith. **Figure3**G, I, K, and L

Corolla

As compared to the inner epidermis, which is two to three-layered and has a thick striated cuticle, the 1.2 mm T. S. of the petal has a single-layered outer epidermis, and both epidermis layers are pierced by both simple and apprised trichomes. Under the outer epidermis, in the hypodermis, are clusters of crystals, coloring material, and oil globules; there is no vascular bundle anywhere in the hypodermis[**Figure3**A, F].

Androecium

The pollen chamber bears oval-shaped, yellow-colored oil globules containing pollen grain and connective tissue, and a crushed portion of the anther reveals four anther lobes. The epidermis and parenchymatous ground tissue are visible in the crushed filament segment.[**Figure3**A].

Ovary

Ovule in every chamber of the tricarpellary ovary(**Figure3**B–D)

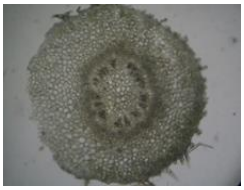


Fig. No. 3 (G) T.S. of petiole without nectary gland (×10)

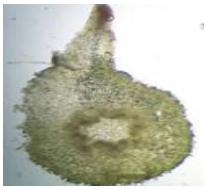


Fig. No. 3 (H) T.S. of petiole with nectary gland (×10)

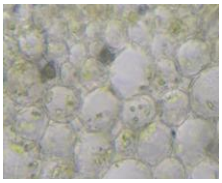


Fig. No. 3 (I) ground tissue of petiole embedded with crystal and starch grains (×40)

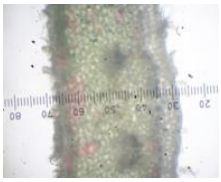


Fig. No. 3 (J) T.S. of nectary gland (×10)

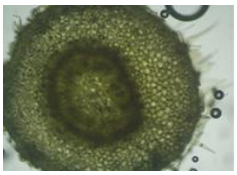


Fig. No. 3 (K) iodine stained section of petiole (×10)

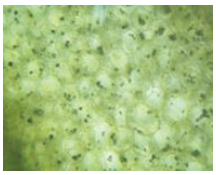


Fig. No. 3 (L) stained starch grains of petiole (×40)

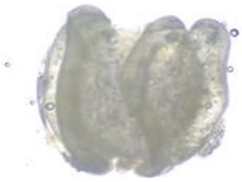


Fig. No. 3 (A) anther microscopy (×10)

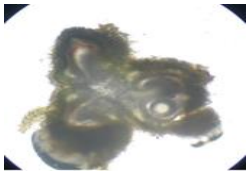


Fig. No. 3 (B) ovary microscopy (×10)

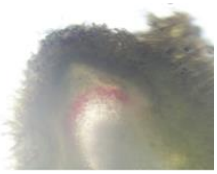


Fig. No. 3(C) colouring matter in ovary (×10)

Fig. No. 3 (D) T. S. of ovary (×10)

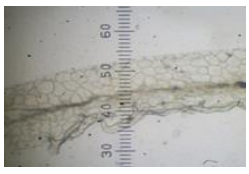


Fig. No. 3 (E) T. S. of petal (×10)

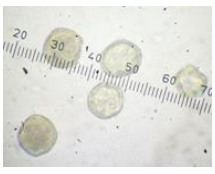


Fig. No. 3 (F) pollen grains (×40)

Figure 3: Flower microscopy (A) anther microscopy (×10), (B) ovary microscopy (×10), (C) coloring matter in theovary (×10), (D) T. S. of ovary (×10), (E) T. S. of thepetal (×10), (F) pollen grains (×40), (G) T.S. of petiole without nectary gland (×10), (H) T.S. of petiole with nectary gland (×10), (I) ground tissue of petiole embedded with crystal and starch grains (×40), (J) T.S. of nectary gland (×10), (K) iodine stained section of thepetiole (×10), (L) stained starch grains of thepetiole (×40)

Properties and action of plant:

Rasa (taste): Madhura, Katu, Tikta

Guna (Qualities) : Laghu (light to digest)

Virya (Potency) : Shita (cold)

Vipaka (metabolism): Madhura

Karma (pharmacological effect): Tridosahata(balances all three doshasVata, Pitta, Kaphadosha), *Krimi roga* (worm infestation), Medohara (anti-obesity), Vranaropaka (wound healing), Kusthaghna (curing skin disease), Dahashamaka(Pacifying burning sensation), *Shirahshool* (headache), *Agnimandya* (digestive impairment), *Kandu* (itching), *Pama* (eczema), *Raktapitta* (bleeding disorder), *Sthaulya* (obesity), and *Twak roga* (skin diseases), kernel of seeds is prescribed for reducing abdominal girth (obesity); leaves are used in chronic rheumatism, asthma, and skin disease; bark in bronchial asthma. [5,6,12,13]

Phytochemistry:

M.V. Kumudhavalli et al. reported that an aqueous extract of H. benghalensis showed more potent anthelmintic activity. 2-(3,4-dihydroxy phenyl)-3-(4,6-dihydroxy-3-methoxytetrahydro-2H-pyran-2-carbaldehyde)-5-hydroxy, 7-methoxy-4H-chromen-4-one was isolated and it was characterized by HPTLC, IR, and Mass spectroscopy.[14]

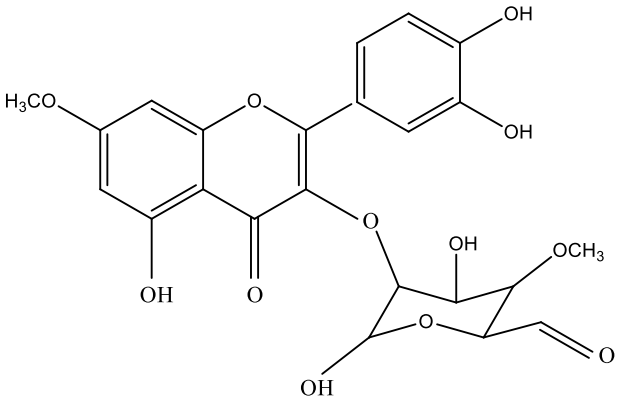
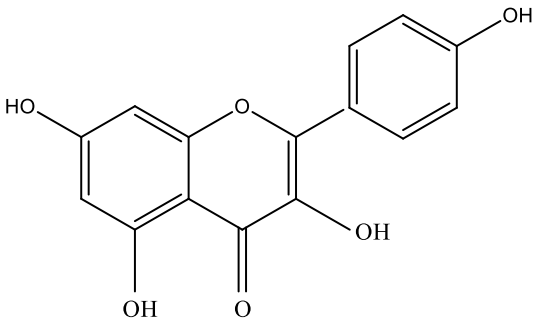
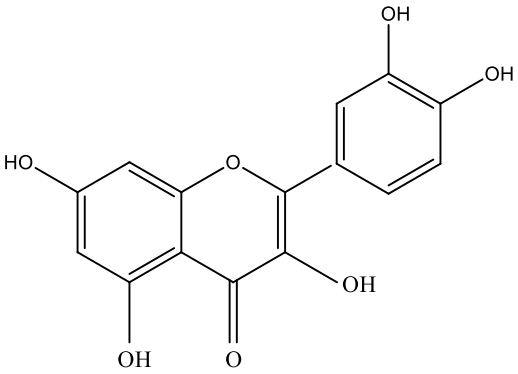


Figure 4: 2-(3,4-dihydroxyphenyl)-3-(4,6-dihydroxy-3-methoxytetrahydro-2H-pyran-2-carbaldehyde)-5-hydroxy, 7-methoxy-4H-chromen-4-one

Alkaloids, anthraquinones, catechin, coumarin, flavonoids, phenols, steroids, tannins, terpenoids, xanthoprotein, saponins, carbohydrates, gums, and reducing sugar are all found in H. benghalensis leaf and stem bark.[15,16] Flavonoids were isolated from the stem, leaves, and flowers of Hiptage benghalensis by Shweta Yadav and Padma Kumar. They demonstrated that the highest amounts of free flavonoids (0.006 mg/gdw) and bound flavonoids (0.007 mg/gdw) were found in the flowers and leaves, respectively. However, leaves (0.008 mg/gdw), flowers (0.007 mg/gdw), and stems (0.002 mg/gdw) contained the highest levels of total free and bound flavonoids. They determine the Rf value and use the HPLC analytical method to determine the presence of kaempferol and quercetin.[17]



Kaempferol



Quercetin

Figure V: Kaempferol and Quercetin

From the stem bark of Hiptage benghalensis, Chin-Lin Hsu et al. extracted triterpenes and steroid derivatives; these substances were then studied using spectroscopic techniques and reported to have anti-inflammatory potential. The following are the triterpenes and steroid derivatives.[18]

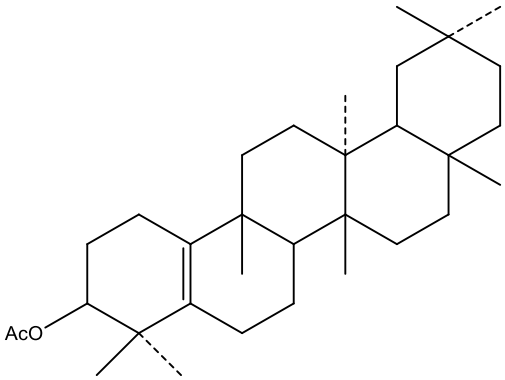


Figure 6 (A)

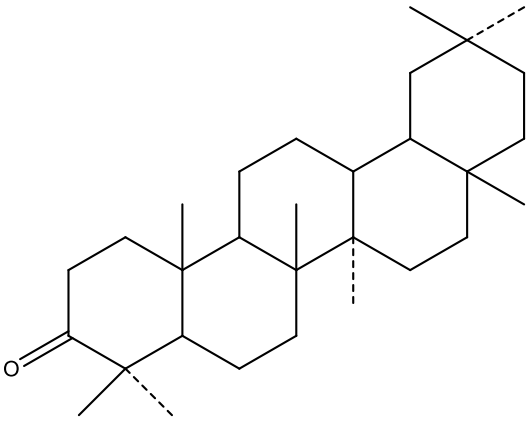
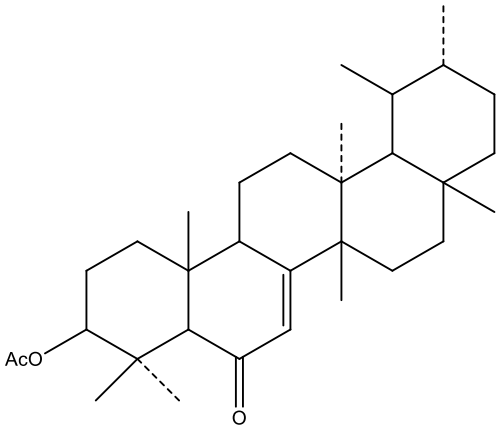


Figure 6 (B)



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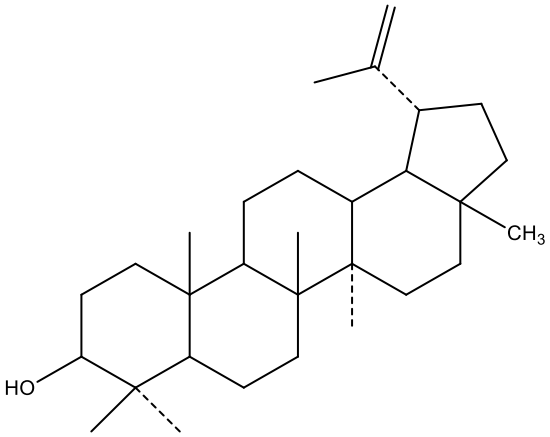

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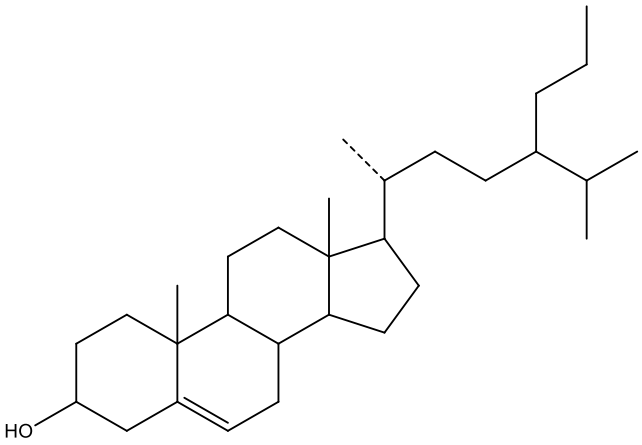

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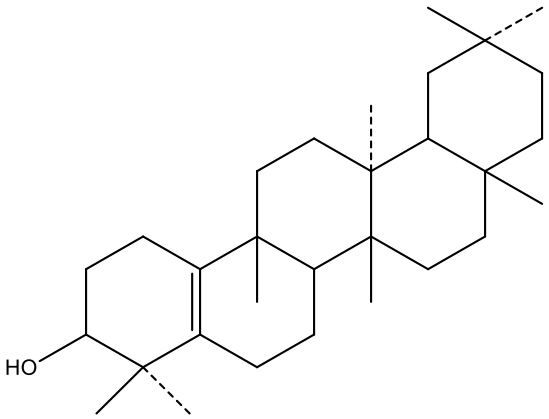

Figure 6 (F)

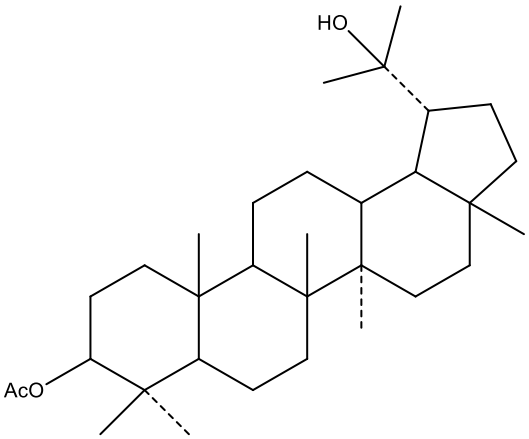

Figure 6 (G)

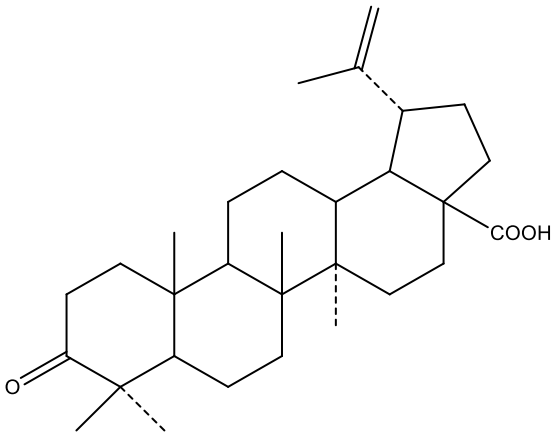

Figure 6 (H)

Figure 6 (A)- Alnus-5(10)-en-3β-yl acetate, (B)- Oleanan-3-one, (C)- 3β-acetoxy-9β-bauer-7-en-6-one, (D)- Lupeol, (E)- (24R)-24-propylcholesterol, (F)- Alnus-5(10)-en-3β-ol, (G)- 3β-acetoxy-20-hydroxylupane, (H)- Betulonic acid

Pharmacological activities of Hiptage benghalensis :

Anthelmintic activity:

The anthelmintic activity of Hiptage benghalensis was reported by Chordiya SV et al. by making aqueous and ethanolic extract at various concentrations (5, 10, and 15 mg/ml), and these concentrations were compared with the common medication piperazine citrate. The evaluation of its anthelmintic activity involved timing the paralysis and death of Pheritima posthuma (earth warm). They came to the conclusion that the aqueous extract of Hiptage benghalensis leaves exhibited more powerful anthelmintic activity than the ethanol extract.[14,19]

Antimicrobial activity:

Hiptage benghalensis was described as having antibacterial properties by Murugan M and Mohan V R. They used a variety of organic solvents, including petroleum ether, chloroform, acetone, methanol, and aqueous extract, to make different extracts of the Hiptage benghalensis leaf and stem bark. Antibacterial susceptibility testing was used to demonstrate antibacterial activity. A large variety of gram-positive and gram-negative bacteria were examined for antibacterial activity. The reference or standard antibiotics were chloramphenicol and tetracycline. We assessed the diameter of the inhibition zone surrounding the discs containing plant extracts and compared it to the diameter of the inhibition zone surrounding discs containing standard or reference antibiotics. Hiptage benghalensis leaf extract in petroleum ether exhibits antibacterial action against S. aureus, B. subtilis, P. aeruginosa, and S. typhi. Additionally, stem bark extract is active against S. typhi, E. coli, and K. pneumoniae. Hiptage benghalensis leaf chloroform extract exhibits antibacterial activity against S. aureus, K. pneumonia, E. Coli, P. aeruginosa, and S. typhi, whereas stem bark extract was inactive against B. substilis and P. aeruginosa. Except for B. substilis, all of the pathogenic bacteria tested were susceptible to the acetone extract of leaves. S. aureus and E. coli were not susceptible to the acetone extract of stem bark. Hiptage benghalensis leaf and stem bark methanolic extract have antibacterial efficacy against all of the studied pathogenic microorganisms. Hiptage benghalensis leaf extract in chloroform exhibited the highest level of efficacy against E. coli. The least amount of antibacterial activity was shown by the Hiptage benghalensis aqueous extract against all of the harmful microorganisms tested. Hiptage benghalensis leaf's bioactive components, including alkaloids, anthraquinone, flavonoids, phenols, tannins, and terpenoids, confirmed the plant's

antibacterial efficacy against a variety of microorganisms.[15] According to Lalnundanga et al., the disc diffusion method was used to assess the methanolic extract of Hiptage benghalensis root bark for its antibacterial activities. Evaluating and comparing the zone of inhibition with tetracycline, a common antibiotic, allowed for the evaluation of this action. These bacteria—K. pneumonia, E. coli, M. luteus, and P. aeruginosa—were tested for antibacterial activity. [20]

Analgesic and Anti-inflammatory activity:

Hiptage benghalensis leaf methanolic extract was found to have analgesic and anti-inflammatory properties, according to Baburao Bhukya et al. Using the hot plate test and mice whose writhing was generated by acetic acid, the analgesic activity was assessed. Hiptage benghalensis' methanolic extract underwent these two tests, and the outcomes were compared to those of common medications pentazocine and diclofenac. They came to the conclusion that the analgesic effect of Hiptage benghalensis was supported by the inhibition of serotonin, histamine, prostaglandins, and bradykinin synthesis and release, which are endogenous chemicals that cause pain at nerve endings. By using a test to generate paw edema using carrageenan, anti-inflammatory activity was assessed. Early symptoms of Hiptage benghalensis' anti-inflammatory effect included suppressing the production and release of histamine, serotonin, and kinins, while later signs are thought to be arachidonate metabolites that cause an inflammation dependent on neutrophil recruitment. [21]

According to ShehlaHridi et al., an ethanolic extract of Hiptage benghalensis leaf exhibits analgesic and anti-inflammatory properties. Using the hot plate test method and a mouse test that causes writhing in response to acetic acid, analgesic activity was assessed. They came to the conclusion that analgesic and anti-inflammatory effects are dose-dependent. Hiptage benghalensis' phytoconstituents are also in charge of its analgesic and anti-inflammatory properties. According to reports, the prostaglandin pathway is inhibited by the flavonoids, which has analgesic activity. [16]

Triterpenes and steroid derivatives found in Hiptage benghalensis stem bark were reported to have anti-inflammatory effect by suppressing NF-B in LPS-stimulated RAW 264.7 macrophages by Chin-Lin Hsu et al. By using sequential chromatography and preparative TLC, seven triterpenes and a steroid derivative were extracted from the Hiptage benghalensis stem bark that was $CHCl_3$ soluble. These compounds were characterised as alnus-5(10)-en-

3β-yl acetate, oleanan-3-one, 3β-acetoxy-9β-bauer-7-en-6-one, lupeol, (24R)-24-propylcholesterol, alnus-5(10)-en-3β-ol, 3β-acetoxy-20-hydroxylupane, betulonic acid. [18]

Mosquito repellent:

Hiptage benghalensis's root bark's acetone extract was tested for its larvicidal, adulticidal, and mosquito-repellent properties. The three mosquito vectors' larvae and adults were used as test subjects for these activities. With low LC(50) (11.15-16.78 ppm) and LT50 (1.25-4.84 h at 200 and 400 ppm) values, the acetone extract of the root bark of Hiptage benghalensis proved more effective as larvicides. They demonstrate that it is an effective larvicide against A. albopictus, A. barbirostris, and C. quinquefascitus, and can be suggested for the management of these mosquito species in their breeding sites. [22]

Hepatoprotective and antioxidant activity:

Hiptage benghalensis methanolic extract was tested for its ability to protect the liver. It also has possible antioxidant effects by raising glutathione levels and having free radical-scavenging properties. Its hepatoprotective effects were equivalent to those of the common medication silymarin. (50 mg/kg) [23]

Antidiabetic activities:

Hiptage benghalensis stems and leaves have anti-diabetic properties. The effects of the ethanol extract of Hiptage benghalensis leaves on glycemia, lipid profiles, lipoprotein levels, and antioxidant activity were assessed by A V S Ravi Sai et al. The indices HDL, LDL, VLDL, TC, TG, Albumin, Creatinine, total protein, and glucose were calculated to demonstrate its anti-diabetic potential. After being given Hiptage benghalensis ethanol extract, streptozotocin-diabetic rats showed considerably lower levels of urea and creatinine as well as higher blood total protein and albumin levels. They came to the conclusion that the anti-diabetic activity may be caused by the presence of phenols, tannins, flavonoids, steroids, and triterpenoids. [24]

According to OECD guidelines-423, Winka J. J. et al. published acute oral toxicity trials of an ethanolic extract of Hiptage benghalensis and found that it was safe and non-toxic up to 2000 mg/kg. [25]

The stem of Hiptage benghalensis was extracted using ethanol, and Shehla Hridi et al. tested it for anti-diabetic properties. Hiptage benghalensis ethanol extraction was administered in

addition to sucrose solution, increasing sucrose retention in the gut compared to sucrose solution alone. Its hypoglycemic impact might have been caused by a mechanism that inhibits glucose absorption. [26]

Anti-asthmatic activity:

Hiptage benghalensis has anti-asthmatic properties both in the early and late stages of asthma. Using the bronchoalveolar lavage fluid from guinea pigs sensitized by egg albumin and PAF acether, the anti-asthmatic activity of Hiptage benghalensis was assessed on Total Leukocyte Counts (TLC) and Differential Leukocyte Counts (DLC). Similar to the common medication ketotifen fumarate, this action. The suppression of leukocyte migration upon antigen exposure in the early stage (Egg albumin sensitized, by I.V. route) as well as the late stage (PAF anothersensitized, by aerosol method) of asthma provided evidence of Hiptage benghalensis' anti-asthmatic efficacy.[27]

Anticancer activity:

Hiptage benghalensis's methanolic extract has been evaluated for its anticancer activities using the MTT assay on three different cancer cell cultures: human cervical carcinoma cells (HeLa), human breast cancer cells (MCF-7), and human neuroblastoma cells (IMR-32). Hiptage benghalensis's anticancer impact was demonstrated by apoptotic activity in all cancer cell lines in a dose-dependent manner via ROS (Reactive Oxygen Species) production and caspase-3 activities. Using the MTT (3-(4,5-Dimethylthiazol-2-yl)-2,5-diphenyltetrazoliumbromide) assay, Hiptage benghalensis methanolic extract increased the percentage of inhibition of MCF-7, HeLa, and IMR 32 cells.[28]

Therapeutic uses of Hiptage benghalensis :

The bark, leaves, seeds, and flowers of the plant are traditionally used to treat a variety of conditions, including skin diseases (Tvakroga), digestive problems (Agnimandya), worm infections (Karmiroga), itching (Kustha), eczema (Pama), bleeding disorders (Raktapitta), ulcers, burning sensations, obesity (Sthaulya), wounds, rheumatism, intrinsic hemorrhage Skin disorders can be treated with leaves. A mother who has just given birth is given a plant decoction. Seed oil is used to boost the body's production of slimy secretions as well as to treat flatulence and biliousness. [5,13]

CONCLUSION:

The information gathered from this study will aid in the authentication of different components of Hiptage benghalensis. According to this analysis, Hiptage benghalensis is a significant medicinal plant with a wide range of pharmacological effects. Alkaloids, anthraquinones, catechin, coumarin, flavonoids, phenols, steroids, tannins, terpenoids, xanthoprotein, saponins, carbohydrates, and gums, as well as reducing sugar, were found to have anti-inflammatory, antimicrobial, anthelmintics, analgesic, hepatoprotective, anti-oxidant, anti-asthmatic, anti-diabetic, and this knowledge will make it easier to create innovative herbal remedies for a wide range of ailments.

Conflict of interests:

Authors declare that there is no conflict of interest.

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 **Author -1**	***Desai D. J. , M. Pharm – Corresponding Author*** Assistant Professor, Department of Pharmaceutical Chemistry, Faculty of ASPM's K. T. Patil College of Pharmacy, Osmanabad 413501, Maharashtra, India.
 **Author -2**	***Rajmane R.B , M.Pharm*** Assistant Professor , Department of Pharmaceutics, Faculty of ASPM's K. T. Patil College of Pharmacy, Osmanabad, Maharashtra, India.
 **Author -3**	***Hangargekar C.B, M.Pharm*** Assistant Professor, Department of Quality Assurance, Faculty of ASPM's K. T. Patil College of Pharmacy, Osmanabad, Maharashtra, India
 **Author -4**	***Joshi A. A , M.Pharm, Ph.D*** Principal, Department of Pharmacognosy and Phytochemistry, Faculty of ASPM's K. T. Patil College of Pharmacy, Osmanabad 413501, Maharashtra, India