A mini review on chemistry and biology of Hamelia Patens (Rubiaceae)

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ABSTRACT

Hamelia patens Jacq. Commonly known as “redhead,” “scarlet,” or “firebush,” belongs to the Madder family (Rubiaceae), different parts (leaves, stem, flower, root, seeds and even whole plant) of Hamelia patens used. It is a perennial bush, and grow in full sun and in shade. It grows to about 6 feet. Neotropical shrub Hamelia patens Jacq has been cultivated as an ornamental in the United States, Great Britain, and South Africa. Hamelia patens have contained pentacyclic oxindole alkaloids: isopteropodine, rumberine, maruquine and alkaloid A, B and C, other chemical constituents are apigenin, ephedrine, flavanones, isomaruquine, narirutins, pteropodine, rosmarinic acid, narirutin, speciophylline, and tannin. In last few decades several Indian scientists and researchers have studied the pharmacological effects of steam distilled, petroleum ether, chloroform, ethanol & benzene extracts of various parts of Hamelia plant on immune system, reproductive system, central nervous system, cardiovascular system, gastric system, urinary system and blood biochemistry.

Key words: Hamelia patens, alkaloids, Traditional uses

INTRODUCTION

Plants are one of the most important sources of medicines. Today the large numbers of drugs in uses are derived from plants. The genus Hamelia patens (family-Rubiaceae) commonly known as “bayetilla,” “trompetilla,” “coralillo,” or “hierba coral. These two last names are related to the red color of some of its organs. The genus Hamelia (family Rubiaceae) consists of 16 species of shrubs or small trees native to lowland neotropical areas ranging from southern Florida, the West Indies, and Mexico to Brazil and Argentina. Hamelia patens was named a Texas Superstar by Horticulture Department at Texas A&M. University because of its excellent performance during the hot dry Texas summers, it is recommended as a low maintenance native shrub in Florida. and has been promoted as an attractant for hummingbirds and butterflies to gardeners throughout the southern U.S. as a perennial or annual. Hamelia patens has been introduced and cultivated for at least 250 years, with six species grown in England in 1839. It grows as a tree in the Atlantic tropical lowland of Costa Rica. It is a reliable tropical plant that has found its way into many a landscape because of its proven drought and soil tolerance that basically can grow anywhere. Firebush should be planted in full sun or part shade in well-drained soil beginning in mid-May and on into the summer. Firebush can tolerate many types of soils from heavy clays to high alkaline as long as it has good drainage. Hamelia patens does not have pest or disease problems that plague so many of the tropical. To the delight of organic growers, this plant is a prize, because it requires no pesticides, Use a complete fertilizer at planting and then once a month with soluble nitrogen to continue a strong blooming show. The show continues for into the fall when the foliage changes to a striking blood-red color. Hamelia patens does not have pest or disease problems that plague so many of the tropical. To the delight of organic growers, this plant is a prize, because it requires no pesticides, Use a complete fertilizer at planting and then once a month with soluble nitrogen to continue a strong blooming show. The show continues for into the fall when the foliage changes to a striking blood-red color. But it can easily be killed when overwatered. The species can be propagated from seeds, but most commercial ornamentals are produced from cuttings, monthly production may simply be a direct result of seasonal changes in the physical environment. A more complicated level of control would be an adjustment in fruit ripening rate to match changes in fruit removal rates. Firebush flowers throughout the year. It is a hummingbird-pollinated plant. The flowers are also visited by butterflies. Hamelia patens in India shows considerable variation in floral morphology, pollination and fruit set in different seasons. Hamelia patens at Agra, in order to compare

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these data of cultivated plants with those obtained within its area of natural distribution. [35] Hamelia patens has been studied chemically. It is known to contain pentacyclic oxindole alkaloids,[16-17-18] and also contains a new glycoside, 5, 7, 2', 5'-tetrahydroxyflavanone 7-rutioside, together with narirutin and rosmarinic acids were isolated from the aerial parts of Hamelia patens.[19] Firebush contains 17.5 percent crude protein and has an in vitro digestibility of 61.6 percent,[20] and has a sugar content of approximately 9%, although significant variation exists both within and among trees.[21] Hamelia patens is commonly used as a treatment for wound in central America.[22] The important advantages claimed for therapeutic uses of medicinal plants in various ailments are their safety besides being economical, effective and their easy availability. Because of these advantages the medicinal plants have been widely used by the traditional medical practitioners in their day to day practice. In Mexico it is used for 42 different medicinal purposes, especially to stop bleeding, healing sores, and in menstrual disorders.[23-24] Pimples, malaria, sore[25], skin disease, blisters, eczema, stomachache[26], athlete’s foot, relieve pain, skin lesions, rash, insect bites, itching headache, asthma, burn, scurvy, inflammation, rheumatism, nervous shock, post partum pain, uterine and ovarian affections, in scant, expel intestinal worms and dysentery.

SYNONYMS

Hamelia ereta Jacq., Hamelia coccinea, Hamelia pedicellata Wernh, Hamelia latifolia Reichb. ex DC.

Common names

Hindi: Hamelia

English: Scarlet bush, Fire bush, Hummingbird bush, Polly red head, Texas firecracker, Red head va

Span: Sanalo-todo, Pata de pajaro

Mayan: Ix-can

PLANT MORPHOLOGY

This species is bush or small tree, 1.4-3.0 m but sometimes reaches 7 m in height tall, trees produce flowers and fruits throughout the year.[22] the fruits are also eaten by birds which disburse the seeds.[32] Plants may have single or multiple stems. The twigs are orange to purple. Leaves are opposite or grouped in threes or fours, and finely hairy to glabrous. The leaves have petioles 1 to 3.5 cm long and blades that are mostly ovate-elliptic to obovate-elliptic with an acute or acuminate tip. The lateral and especially the mid veins are red or pink. In temperate areas, as the temperatures turn cool in the fall, the foliage turns to a brilliant red, hence the common name. The inflorescence is terminal, a modified dichasium with flowers that are tubular, 12 to 22 mm long, and orange to red in color. The fruit is a berry, spherical to elliptical, 7 to 10 mm long, turning red and then black at maturity. The seeds are orange-brown, 0.6 to 0.9 mm long.[33] firebush has a tap and lateral root system with abundant fine roots. Stem bark is gray and smooth and the inner bark is light green.[34]

TAXONOMY

Kingdom: Plantae
(Unranked): Angiosperms
(Unranked): Eudicots
(Unranked): Asterids
Order: Gentianales
Family: Rubiaceae
Genus: Hamelia
Species: Hamelia patens
Botanical name: Hamelia patens Jacq.

CHEMICAL CONSTITUENTS

Hamelia patens is rich in active phytochemicals including alkaloids and flavonoids. It contains several of the same oxindole alkaloids as Cat’s Claw (Uncaria tomentosa) including pteropodine and isopteropodine; both have been highly studied and even patented as effective immune stimulants. These two chemicals have also recently shown to have a positive modulating effect on brain neurotransmitters (called 5-HT2 receptors) that are targets for drugs used in treating a variety of conditions including depression, anxiety, eating disorders, chronic pain conditions and obesity. Three new oxindole alkaloids have also been discovered in Hamelia patens methanol extract of the Leaves Determined by GC-MS.[31]
Hamelia patens which have never been classified before; they have been named Hamelia patens alkaloid A, B and C. Scientists in India discovered that Hamelia leaves contain small amounts (0.05%) of ephedrine a stimulant alkaloid that has received some negative press of late. In addition, the aerial parts of the plant have been found to contain rosmarinic acid, a phytochemical that has demonstrated immune modulating and antidepressant activity. The main plant chemicals of the plant have been found to contain rosmarinic acid, some negative press of late. In addition, the aerial parts (0.05%) of ephedrine a stimulant alkaloid that has received been named which have never been classified before; they have patents.

### BIOLOGICAL ACTIVITIES AND CLINICAL RESEARCH

Much of the clinical research on Hamelia has validated the traditional uses of the plant. In animal studies (with rats) Hamelia patens leaf extracts demonstrated analgesic, diuretic, and hypothermic actions. External use of the leaf in mice showed significant anti-inflammatory activity comparable to that of a prescription anti-inflammatory drug used as a control. Scientists in two different countries have documented antibacterial and antifungal properties against a wide range of fungi and bacteria in several in vitro studies. The plant has also been documented with diuretic effects and was shown to inhibit the growth of tumor and bacteria cells. Spontaneous Activity Stimulation, Cytostatic Activity also reported.

### Biological Activities for Compounds of Hamelia patens

Compounds of Hamelia patens like Pteropodine, Isopteropodine, Isoptertopodine, Pteropodine, Rosmarinic Acid, and Pteropodine have shown the significant biological activities.

### MEDICINAL USE OF VARIOUS PARTS OF HAMELIA PATENS

A decoction or infusion of the leaves of Hamelia patens is generally used internally or externally for bacterial and fungal infections as well as for its anti-inflammatory and pain reducing properties. Typically, if the remedy is taken internally, an infusion is employed; a leaf decoction is prepared for external use. Try planting a beautiful scarlet bush in the garden. While working in the garden on hot days, chew on one of the leaves like the rainforest Indians do; it has remarkable hypothermic and cooling actions which will help keep the body from overheating. The use of this plant in herbal medicine systems has been reported to be safe and non-toxic when taken orally at the traditional remedy dosages. Only one of the animal studies published thus far indicated toxicity, when they injected a methanol extract of Hamelia patens leaves into mice at high dosages (1.5 grams per kg of body weight). Hamelia patens is also recommended for the treatment of stop the bleeding, wound healing, athlete’s foot, relieve pain, skin lesions, rash, insect bites, itching, headache, asthma, burn, scurvy, inflammation, rheumatism, nervous shock, post partum pain, menstrual disorders, uterine, ovarian affections, expel intestinal worms, dysentery and also possess different activities like Antibacterial, Antifungal, Analgesic, Anti-inflammatory, Cytostatic, Diuretic, Hypothermic and, Spontaneous Activity.

### CONCLUSION

Hamelia patens, the versatile medicinal plants are the unique source of various types of compounds having diverse chemical structure. A very little work has been done on the biological activity and plausible medicinal applications of these compounds and hence extensive investigation is needed to exploit their therapeutic utilities to combat diseases. A drug development programme should be undertaken to develop, modern drugs with the compounds isolated from Hamelia patens. Although crude extracts from
various parts of the plants have medicinal applications from time immemorial, modern formulation can be developed after extensive investigation of its bioactivity, mechanism of action, pharmacotherapeutic and toxicity with help of standardization clinical trials. Global scenario is now changing toward the use of nontoxic plant products having traditional medicinal uses; development of modern drugs from the centuries old knowledge on this tree should be emphasized for the control of various diseases. In fact time has come to make good use through modern approaches of drug development a significant amount of research has already been carried out during the past few decades in exploring the chemistry of different parts of the plant, which generate enough encouragement among the scientists exploring the chemistry of different parts of the plant, already been carried out during the past few decades in generating more information about this medicinal plant. An extensive research and development work should be undertaken. "Hamelia patens" and its products for their economics and therapeutic utilization, therefore this review article might be helpful for scientists and researcher to find new chemical entities responsible for its claimed traditional activities.

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