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REVIEW ON LAWSONIA INERMIS LINN (HENNA)

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ABSTRACTS
Lawsonia Inermis Linn. (Family: Lythraceae) has wide distribution in both tropical as well as sub-tropical regions and has been extensively utilized by mankind for over 9000 years. Henna, its leaves, flowers, roots, seeds and steam, bark are been utilized in the form of herbal medicine to treat a number of aliments such as diabetes, ulcer, rheumatoid, arthiritis, cardiac disease, leucorrhoea, leprosy, fever, etc. The plant has also been reported to possess antimicrobial, anti-oxidant, hepato protective, hypoglycemic, anti-cancer, anti-inflammatory, anti-parasitic, anti-dermatophytic and tuberculostatic properties due to the presence of bio active compound such as alkaloids, terpenoids, phenols, tannis, quinones, flavonoids, coumarins, carbohydrates, proteins and fatty acids, ets. Henna the presence review is compiled to give a detailed insight in to the therapeutic potential of the important medicinal plant *Lawsonia inermis Linn.*

KEYWORDS: Anti-oxidant, Anti-dermatophytic, Anti-microbial, Phenolic compounds, Quinones, Hepatotoxicity.

INTRODUCTION
Herbal remedies used in traditional folk medicine provide an interesting and still largely unexplored source in the creation and the development of potential new drugs for chemotherapy which might help to overcome the growing problem of resistance and the toxicity of the currently available commercial antibiotics (Spellberg et al., 2008). The traditional medicinal method, especially the use of medicinal plants, still plays a vital role to cover the basic health needs in the developing countries. Therefore, it is of great interest to carry out screening of these plants to validate their use in folk medicine and to reveal the active principle by isolation and characterization of their constituents. According with the ethnobotanical literature (Ali et al., 1999; Mostefa-Kara et al., 2010; Rahmoun et al., 2010), a great number of medicinal plants are being used to treat microbial infections, particularly in the rural areas of Algeria where the traditional folk medicine remains a major source to cure minor ailments. Up-to-date, very little research was done to investigate these traditionally medicinal plants. *Lawsonia inermis Linn*. (Lythraceae) or henna, a traditional plant with religious associations, has been widely used over centuries for medication and cosmetics in some regions of the world especially in the Middle East, Africa and Asia.[1]

Henna is a tall shrub or small tree, standing 1.8 to 7.6 m,(6 to 25 feet) tall. It is glabrous and multi-branched, with spine-tipped branchlets. The leaves grow opposite each other on the stem. They are glabrous, sub-sessile, elliptical, and lanceolate (long and wider in the middle; average dimensions are 1.5-5.0 cm x 0.5-2 cm or 0.6-2 in x 0.2-0.8 in), acuminate (tapering to a long point), and have depressed veins on the dorsal surface. Henna flowers have four sepals and a 2 mm (0.20 in) long, and erect. Henna fruits are small, brownish capsules, 4 – 8 mm (0.6 – 0.31 in) in diameter, with 32 – 49 seeds per fruit, and irregularly into four splits.[2]

Lawsonia inermis linn(Family: Lythraceae) which is commonly known as henna, mainly present in subtropical and tropical areas and is used in all over the world. It was used for over 9000 years for its cosmetic values as a dye. The phytochemical analysis of *lawsonia inermis* revealed the presence of carbohydrates, phenolic, flavonoids, saponins, proteins, alkaloids, terpenoids, quinones, coumarins, xanthones, fat, resin and tannins. It is also contained 2-hydroxy-1,4-naphthoquinone (*lawsone*). Many alkaloids, napthoquinone derivatives, phenolics and flavonoids were isolated from different parts of *Lawsonia inermis*. The pharmacological studies showed that *Lawsonia inermis* showed anti-bacterial, anti-fungal, anti-parasitic, molluscidal, anti-oxidant, hepatoprotective, central nervous, analgesic, anti-inflammatory, anti-pyretic, wound and burn healing, immunomodulatory, anti-urolithiatic, anti-diabetic, hypolipidemic, anti-ulcer, anti-diarrhoeal, diuretic, anti-cancer and many other pharmacological effects.[3]

Plant profile

***Lawsonia inermis Linn.* (HENNA)**

Synonyms

Alcanna spinosa, Casearia multiflora, Lawsonia alba Lam, Lawsonia spinosa Linn, Lawsoniaspeciosa Linn and RotanthacombretoidesBaker.[4]

Common names

Arabic: henna; Bengali: mendi, mehedi; English: Egyptian-privet, henna, Jamaica-mignonette, mignonette-tree; French: henna; German: Hennastrauch; Hindi: menhadee; Indonesian: inai, pakar kuku; Portuguese: hesia, hena, alfeneiro; Spanish: alcana, alhena; Swedish: henna; Vietnamese: nhuom mong taylamon.[5]

Scientific classification (taxonomy)[6]

Kingdom: Plantae
Clade: Tracheophytes
Clade: Angiosperms
Clade: Eudicots
Clade: Rosids
Order: Myrtales
Family: Lythraceae
Sub-family:Lythroideae
Genus: *Lawsonia*

Traditional uses

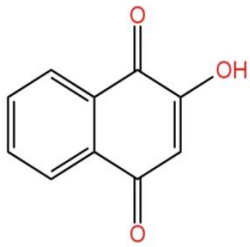
Leaves of *Lawsonia inermis* provide an important cosmetic dye. Henna leaves were extensively used for centuries in the Middle East, the Far East and Northern Africa as dye for nails, hands, hair and textile. Henna was also used in treating skin problems, headache, jaundice, amebiasis and enlargement of the spleen. Parts used medicinally Whole plant, roots, fruits, stem, leaves, barks, inflorescence, rhizome, bulbs, latex, seeds, flowers and oil were used in different ailments.[7]

Physiochemical characteristics

Physiochemical investigation of leaf showed that the total ash was (14.60%), acid insoluble ash (4.50%), water soluble ash (3.0%), loss on drying (4.5%), alcohol soluble extractive value (3.8%w/w) and aqueous extractive value (5.0% w/w).[8]

Chemical constituents

The principle colouring matter of henna is *lawsone*, 2-hydroxy- 1:4 napthaquinone (C10H6O3, m.p.190° decomp.) besides l*awsone* other constituents present are gallic acid, glucose, mannitol, fats, resin (2%), mucilage and traces of an alkaloid. Leaves yield hennatannic acid and an olive oil green resin, soluble in ether and alcohol. Flowers yield an essential oil (0.01-0.02%) with brown or dark brown colour, strong fragrance and consist mainly of alpha and beta ionones; a nitrogenous compound and resin. Seeds contain proteins (5.0%), carbohydrates (33.62%), fibers (33.5%), fatty oils (10-11%) composed of behenic acid, arachidic acid, stearic acid, palmitic acid, oleic acid and linoleic acid. The un-saponified matter contains waxes and colouring matter.[9]



***Lawsone* (2-hydroxy-1,4-napthoquinine**

Macroscopy of henna leaves

The macroscopic analysis perform to determine the macroscopic characteristics include the shape leaf shape, leaf blade, leaf base, leaf surface, the edge of the leaf, the veins, size, colour, petiole, smell and taste (Tjitrosoepomo, 1987). Microscopic analysis performed on fresh leaves, dried leaves and henna leaves powder, the result can be seen in figure 1.

Fig. 1: (A, B) Marphology of fresh leaves, (C) Powdered henna leaves, (D) Dried leaves.

Microscopy of henna leaves

The microscopic analysis was conducted to obtained anatomical elements typical of henna leaves so that it can be obtained fragment marker that can be used for identification raw plant material. Macroscopic analysis performed on fresh leaves and henna leaves powder. Fresh leave examination was conducted by transversectionslinding then place on the object class and give several drops of distilled water and covered with a cover glass and observe under a microscope. Crude drug powder was observed in chloral hydrate solution (Anonymous 2008; Anonymous 2011). The results of microscope analysis of leaves and henna leaves powder can be seen in figure 2.

In Figure 2, shown in the lower epidermis layers of henna leaf content epidermal cells in wavy shaped, non-glandular trichomes and stomata with anisocytic types, each stomata surrounded by 3 to 5 neighbouring cells with similar cell size. In the leaf mesophyll was found calcium oxalate crystals in clusters form.

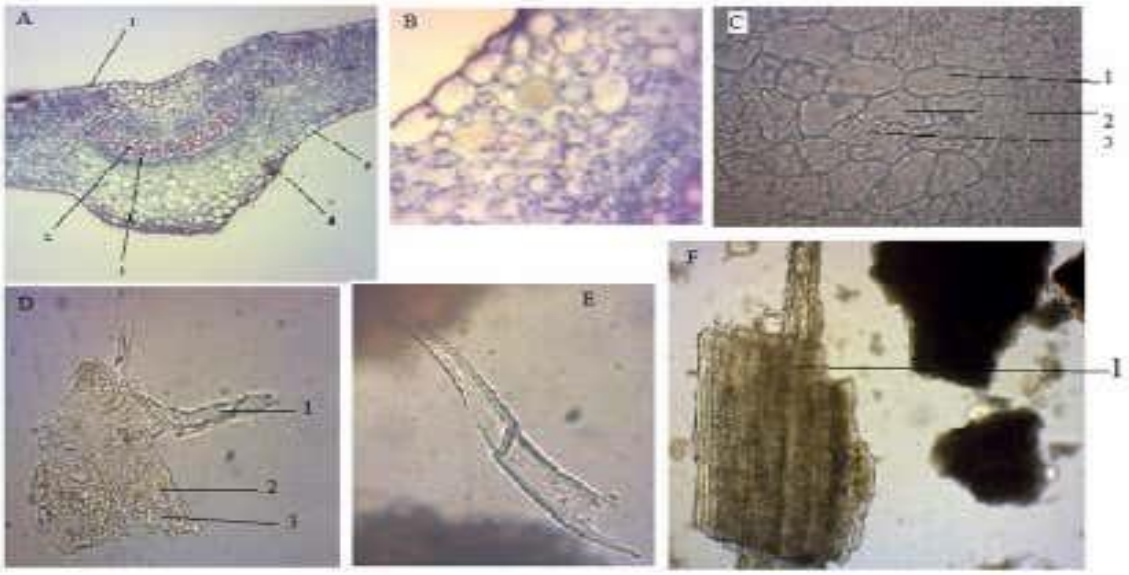


Figure 2

Figure 2: Microscopy of henna leaves. A. Transversection of henna leaves (1.upper epidermis, 2. Xylem, 3.Phloem, 4.Trichme), B. Crystal of calcium oxalate in cluster form, C. Upper epidermis (1.Epidermis cell, 2.Cell guard, 3.Stomata), D. Microscopy of powder (1. Trichome, 2. Stomata, 3.Epidermis cell), E. Trichome, F. Vascular bundle.

Figure E showed multicellular covering trichome with two cell but jain, et.al., 2010 found unicellular covering trichome and di-acytic stomata are present in both the surface of *Lawsonia inermis L.* Agarwal, et.al., 2012 found that type of stomatal are both anisocytic and anomocytic were present. Fragment if parenchyma cell were content of oil globule, crystal of calcium oxalatein

rosette and prosmatic form. This difference is due to the variation in the species of *Lawsonia inermis Linn.*[10]

Phytochemistry and Pharmacological actions

The plant is reported to contain *Lawsone*, Esculetin, Fraxetin, Isoplumbagin, Scopoletin, Betulin, Betulinic acid, Hennadiol, Lupeol, Lacoumarin, Laxanthone, Flavone glycosides, twopentacytic triterpenes. The plant has been reported to have analgesic, hypoglycemic, antimalarial, hepatoprotective, nootropic, immunostimulant, anti-inflammatory, antibacterial, antimicrobial, antifungal, antiviral, antiparasitic, antitrypanosomal, antidermatophytic, antioxidant, anthelmintic, antifertility, tuberculostatic and anticancer properties.[11]

In vitro antifungal property of the chloroform, methanol and aqueous extracts of *SolanummelongenaLinn*, *Lawsonia inermis Linn*. and Justicia gendarussa burm were evaluated against four common dermatophytic species, viz. Trichophyton mentagrophytes, Trichophyton rubrum, Microsporumgypseum and Microsporumfulvum adopting Agar cup diffusion technique. Minimum inhibitory concentrations (MIC) for the extracts of the three plants were estimated by the broth dilution method and values found. The results demonstrate the antidermatophytic nature of the selected plant extracts of which the chloroform extract of Solanummelongena was found to be the most potent.[12]

Histopathological study showed after 3days from skin infection with Streptococcus pyogenshypremia, swelling, congestion and pus formation also abscessation While in treated animals with henna extracts gross skin lesions disappeare after 11 days from infection and on day 10 showed increased well-organized bands of collagen, more fibroblasts and few inflammatory cells when compared with the controls which showed inflammatory cells, scanty collagen fibres and fibroblasts.[13]

The plant aqueous extract was effective in protecting the liver against the injury induced by Paracetamol in rats. This was evident from significant reduction in serum enzymes alkaline aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), Acid Phosphatase (ACP), Protein and Bilirubin. It was concluded from the result that the aqueous extract of Lawsonia inermis possesses hepatoprotective activity against paracetamol induced hepatotoxicity in rats.[14]

Lawsone a coloring component of the Henna (Lawsonia inermis) leaves was found to bind with proteins. Present study has suggested a new rapid method for the isolation of lawsone from *Lawsonia inermis* through the calcium ion using the Flash and Disc Counter Current Chromatography (DCC). The purified pigment structurally characterized by 2D, TLC and NMR spectroscopy, was found to be active against reactive oxygen species (ROS) by Chemeluminiscence assay using lymphocytes. Purified lawsone showed remarkable inhibitory activity on the oxidative burst response of the whole blood, polymorphonuclear cells (PMNCs), Mononuclear cells (MNCs). Syed muhammad ghufran saeed.[15]

Topical pure henna is generally safe and well-tolerated in humans but oral and topical henna with additives like para-phenylenediamine have many side effects some of them life threatening. This review highlights pharmacological effectiveness and adverse effects of henna.[16]

The study was carried out using 192 clinical isolates of Candida from six different species; 135 Candida albicans, 19 Candida parapsilosis, 17 Candida glabrata, 13 Candida tropicalis, 5 Candida krusei, 3 Candida kefyr. The anticandidal activities of *Lawsonia inermis* (henna) as paste form was determined by agar diffusion technique. The highest antifungal activity of henna was obtained against clinical Candida isolates and moderate activity also detected against isolates. Fifty-one isolates were resistance (no inhibition zone) to henna paste.[17]

CONCLUSION

Compounds derived as of natural sources as herbal extracts have always been used traditionally as healing remedies around various parts of the world. Numerous pharmacological studies reveal the potential medicinal properties of herbs in our surroundings. A bundant data on the traditional uses of plants provide the pavement for the isolation of subordinate metabolites which leads to new lead compounds. With the increasing demands in invention of new drugs, the pharmacological assay of natural plants resources plays a significant role in conventional drug discovery.

Itenable to conclude that the methanolic and aqueous extract of the *Lawsonia inermis* plant has interesting antifungal activity against the strainMicrosporumcanis, Trichophyton mentagrophytes,Trichophyton rubrum, Trichophyton tonsurans. This activity can be related to the presence of *lawsone*. Further studies are needed to investigate the effect of the methanolic and aqueous extract on other strains such as the systemic dermatophytes or mycoses. Studies of cytotoxicity data from human or animal cells in tissue culture are needed in order to establish that the methanolic and aqueous extract, particularly *lawsone*.

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