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REVIEW ARTICLE **OPEN ACCESS**

Celtis australis: A Narrative Review

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ABSTRACT
Celtis australis is primarily a agro-forestry tree found in Himalayas which provides main source of fodder to live-stock along with other requirements for sustenance of life in rural areas which due to its value as fodder use and for obtaining timber. It is found over a wide range of altitudes and weather conditions. It has specific morphological attributes and has wide usage in traditional medicine system in India owing to its various phytochemical constitution. Its active constituents include- flavonoids, triterpenoids and steroids. Extracts derived from its leaves and other parts of the plant have shown significant use in medications for variety of disease conditions.
Keywords*: C. australis, deciduous, Phytochemistry, Himalayas, Fodder, Anti-oxidant*

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INTRODUCTION

Mediterranean hackberry or Nettle tree which is scientifically known as '*Celtis australis*' is deciduous and large rounded crowned tree which provides shade. It belongs to Cannabaceae (formerly known as-Ulmacea) family. It may show growth till 20 to 25 meters height. It is found as a native plant in North and East Africa, Southern parts of Europe and Turkeiye [1-5].

Celtis australis L. is one of the largest families in plant kingdom and comprises of 15 types of genera along with 200 plant species [6].This tree has high tolerance towards drought and has resistance towards different parasites [5].

C. australis can be used as a suitable alternative for a variety of deciduous tree species as design tree (for ornamental purposes) for example, incense tree, sweetgum, and ash tree.

C. australis has variety of purposes tree species like as a fodder plant, for its use as fuel, fruits, medicinal uses and as a timber plant [7, 8]. Fruits of *C. australis* are edible and have anti-oxidant, nutritional, physic-chemical,, anti-bacterial as well as anti-fungal properties [9-13].

Length of *C. australis* leaves falls within a range between 4 to 15 centimeters while its width measures from 1 cm to 7 cms, length of its petiole ranges from 0.5 cm to 4.5cms.The length of its internodes ranges from 0.5to 6cms. The length of *C. australis* seeds range between 4 to 11milli meters while its seed weigh between 7.7 till 48grams [14].

Macroanatomy of *C. australis*

Stem:

Its old branches are brown colored, hard, cylindrical and have longitudinal striation with roughened surface. Its younger branches have green color, hairs and show longitudinally arranged fine vertical striations. The branches of its stem are monopodial and both old as well as young branches are very difficult to break. On breaking open the stem, fibrous type of fracture which exposes white colored solid internal surface are seen. Its branches have faint variety of typical odor along with astringent taste [15].

Bark:

Its bark has brown coloration, is hard in nature and has roughened surface which show longitudinal types of wrinkles and multiple lenticels. Inner bark surface has yellow colour, is smooth in nature and has longitudinally arranged striations. Its bark possesses no odor and has astringent type of taste [15].

Leaf:

Its leaves are arranged in simple, alternate, stipulate arrangement along with hairy stipules as well as have petiolate pattern. Its younger leaves have purple to green color, leathery textured and are pubescent in nature. Laminas of leaves are greenish in color, ovate and lanceolate shape along with acuminate apex.

Upper two- thirds of leaf margins are in serrated form whereas lower one-third has an entire margin. The leaf base has asymmetric arrangement. C. *australis* leaves have palmate and reticulate venation comprised of three prominent veins. Upper leaf surface appear dark in color when compared to its lower surface. Both of the leaf surfaces are glabrous with hairs large veins on lower leaf surface. Mid-rib of *C. australis* leaf is prominent over its lower surface. It leaves have short petioles are cylindrical in shape, are pale greenish in color, are hairy in appearance and have grooves on its upper leaf surface. The leaves have no odor and have mucilaginous and astringent type of taste [15].

Medicinal uses of C. australis

Leaves as well as fruits of *C. australis* have astringent properties and are used for treating stomachs. Decoctions prepared from its leaves as well as fruits are used as remedial medications for treating heavy menstrual bleeding, amenorrhea and intestinal colic. Its extract derived from leaves as well as fruits are used for treating mucosal surfaces in peptic ulcerations, dysentery along with diarrhea [16]. *C. australis* plant has been found to be effective in management of fracture of bones, acnes, contusions, joint pain and muscular sprain traditional Indian medicines [17].

Phytochemistry of Celtis australis

Methanolic extracts prepared from leaves of *Celtis australis* have been demonstrated toyield two flavonoid derivatives- a) 2''-*α*-rhamnopyranosylvitexin and b) 2''-*α*-rhamnopyranosyl-7-*O*-methylvitexin. [18].

Celtis australis contains 4 tri-terpenoids namely, a) 9β,25-cyclo-30-propyl hopane-31β-ol; b) 3β-hydroxy 30-propyl-hopane-31-one; c) 3β-hydroxyoleanane and d) 9β,25-cycloolean-12(13)-ene3-O-β-D-glucofuranoside along with two steroids- 9β,19-cyclo3β,14β-dihydroxycholane and 3-O-β-D-glucopyranoside; 6-acetoxy 2-hydroxy 1,3,4-trimethoxyanthraquinone, an anthraquinone along with apigenin, quercetin and its glucoside. These have been isolated from fruits as well as bark of *Celtis australis.*[19, 20]

Extracts obtained from this plant have demonstrated presence of crude proteins, phosphorus along with crude fiber that have reached peak concentration value during summers (between May to June). [21]

Nutritive Constitution of *C. australis* Foliage

Chemical constitution of *Celtis australis* foliage shows seasonal and altitude based variations. During inter-seasonal period, it has been found to contain 91.7 to 169.7 mg/grams of crude proteins, 0.77 to 1.63 mg/g of phosphorus, 2.84 to 7.57 mg/g of potassium, 139.3 to 198.0 mg/g of crude fibrous content, 11.12 to 18.29 mg/grams sugar and 47.90 to 65.26 mg/grams of starch. Foliage obtained from trees found on high altitudes exhibit high levels of nutrients when compared with trees fromlower altitudes. [22]

Chemical constitution of leaves hasdry matter (32.60%), Organic matter (88.0%), Crude proteins(15.23%), Crude fibers(16.90%), content of ash (12.0%), Cellulose content (24.4%) and hemi-cellulose (7.62%). [23]

Anti-inflammatory

The ulmus family includes the deciduous tree species *Celtis sinensis* Pers., which primarily thrives in open, shade-tolerant settings. In Korea, Japan, and China, celtis has been widely used as a folk medicine to treat stomach ailments, lumbago, abdominal discomfort, urticaria, eczema, and other illnesses. International researchers have now discovered several chemical qualities from Celtis, including antioxidant, anti-tumor, antibacterial, and anti-inflammatory capabilities, inhibit acetylcholinesterase (AChE), and other activities. At the same time, further research has been done on the pharmacology and toxicity of the flavonoids and terpenoids found in *Celtis sinensi* [24].

Anti-oxidant

Realizing that DNA damage and lipid peroxidation caused by free radicals are linked to serious health issues like cancer and ageing has been a significant advance during the past 20 years. Antioxidants from plants are becoming more and more recognised as effective in preventing certain illnesses. Despite having several folk medical applications, *Celtis australis* L. and *Celtis occidentalis* L. have not yet had their antioxidant and cytotoxic effects examined. As a result, the leaf extracts of both plants were examined for these activities, and the bioactive chemicals that were in charge of the activities were isolated. Through the use of UV, HRESIMS, 1D (1H and 13C), and 2D (1H-13C HSQC and 1H-13C HMBC) NMR investigations, the molecular structures of the compounds were clarified [25].

Anti-microbial

The discovery that free radical-induced lipid peroxidation and DNA damage are linked to serious health issues, including cancer and ageing, has been a significant advance during the past two decades. Antioxidants produced from plants are becoming recognized as helpful in preventing certain disorders. *Celtis australis L*. and *Celtis occidentalis L*. are two plants with numerous folk medical applications that haven't before had their antioxidant and cytotoxic effects examined. Therefore, these activities were looked into in both plants' leaf extracts as well as the bioactive substances that were causing them. UV,

HRESIMS, 1D (1H and 13C), and 2D (1H-13C HSQC and 1H-13C HMBC) NMR studies were used to determine the molecules' structures [26].

Anti-hyperlipidimic

Depending on the socioeconomic circumstances of the population, tribal societies frequently practice the custom of employing EWFs to heal illnesses. The variety of possibilities for these EWFs point is the need for more research into pharmacological and phytochemical applications [27, 28].

Antidiarrheal

Realising that DNA damage and lipid peroxidation caused by free radicals are linked to serious health issues like cancer and ageing has been a significant advance during the past 20 years. Antioxidants from plants are becoming more and more recognised as effective in preventing certain illnesses. Despite having several folk medical applications, *Celtis australis L*. and *Celtis occidentalis L.* have not yet had their antioxidant and cytotoxic effects examined. As a result, the leaf extracts of both plants were examined for these activities, and the bioactive chemicals that were in charge of the activities were isolated. Through the use of UV, HRESIMS, 1D (1H and 13C), and 2D (1H-13C HSQC and 1H-13C HMBC) NMR investigations, the molecular structures of the compounds were clarified [29, 30].

CONCLUSION

Celtis australis, is an ancient plant that has been used for treating various conditions such as fever, colic, neurological diseases such as epilepsy, measles and chicken pox. Extracts of this plant may be recommended as an adjuvant therapy in patients in different disease conditions. Its other uses include its use as a fodder plant and for harnessing timber.

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