

## Nutritional and Ethnomedicinal Potential Plants of the Qur'an: An Overview - III

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**Abstract**

Our ancient literatures of Hindus', Muslims as well as of Cristian's are full of plants described about their nutritional and medicinal potential. A significant number of plants described in their texts are still unidentified because of least or no interest in plant taxonomy among neither graduate scientists in well-developed different organisations nor respected teachers of Universities or Colleges of repute. We can say with confidence that there are no teachers who can teach Plant Taxonomy in significant numbers of academic institutions. A man of Biotechnology can do nothing if he/she can not identify the plant on which the work has to be worked out. As a result, due to non-identification of plants we can not use our wealth of knowledge which has been provided by our ancestors present in form of scriptures. We were presented a book written by Dr. M. I. H. Farooqi entitled "Qur'ani Poudhe-Vagayanic Dhristi Se" while in Seminar organised by UP Biodiversity Board, Lucknow. We found that there are seventy-one plants being reported in Holy Qur'an and Bible. We have consulted the literatures available as well as the tribal of Bahraich about the uses of the plants available. The perusal of the alphabetical list of plants of Holy Qur'an reveals that there are 71 plant species representing 48 genera of 30 families. *Brassicaceae*, *Cucurbitaceae* and *Moraceae* family were found to be the biggest family represented by 6 plant species each whereas *Caesalpiniaceae*, *Papilionoideae* and *Poaceae* with 5 plant species each; *Rosaceae* and *Rhamnaceae* with 4 plant species; *Mimosaceae*, *Liliaceae*, *Pinaceae*, *Euphorbiaceae*, *Oleaceae*, *Lytharaceae*, *Lamiaceae* and *Arecaceae* with 2 plant species and rest fourteen families viz., *Malvaceae*, *Asclepiadiaceae*, *Lauraceae*, *Bixaceae*, *Dipterocarpaceae*, *Juglandaceae*, *Cupressaceae*, *Lecnoraceae*, *Loranthaceae*, *Anacardiaceae*, *Sterculiaceae*, *Ericaceae*, *Salvadoraceae*, and *Vitaceae* is being represented by single plant species each.

**Keywords:** Ethnobotanical; Ethnomedicinal; Potential; Plants; Qur'an.

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**Introduction:**

Herbal Medicine is the oldest form of medicine known to mankind. It was the mainstay of many

early civilizations and still the most widely practiced form of medicine in the world today,

Ethnobotany is one of the most interesting themes of economic botany which might have first of all come into the existence probably when earliest man of "stone age" observed the animals mostly the apes and monkeys eating certain plants or plant parts viz., Fruits, leaves and even inflorescences to satisfy their hunger. Therefore, on the basis of plants usage first of all by animals and later on by the human beings the concepts of Ethnobotany and Ethnozoology were evolved, which merged into a common term known as Ethnobiology. However, the term Ethnobotany was first of all used in the last of 19<sup>th</sup> century by J.W. Harsh Berger (1895)

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to indicate the interrelationship of plants with aboriginal people or tribal societies [Trivedi and Sharma, 2011]. In many parts of the world, wild plants are obtained from forests or wild areas designated for extractive resources and managed by local communities [Jadhav et al., 2011]. Wild edible plants provide food quantity as well as medicines [Patale et al., 2015].

India is one of the twelve mega-biodiversity countries of the World having rich vegetation with a wide variety of plants. As per the 2001 census, the tribal population of India is 8.43 crore, constituting 8.2% of total population of the country [Annual Report, 2005–2006]. With enormously diversified ethnic groups and rich biological resources, India represents one of the great emporia of ethnobotanical wealth [Pal, 2000]. Even today, tribal's and certain local communities in India still collecting and preserving locally available wild and cultivated plant species for their day today life [Mahishi et al., 2005 and Ayyanar et al., 2010].

We were presented a book written by Dr. M.I.H. Farooqi entitled "Qur'ani Poudhe-Vagayanic Dhristi Se" while in Seminar organised by UP Biodiversity Board, Lucknow. We found that there are seventy-one plants being reported in Holy Qur'an and Bible. We have consulted the literatures available as well as the tribal of Bahraich about the uses of the plants available. The perusal of the alphabetical list of plants of Holy Qur'an reveals that there are 71 plant species representing 48 genera of 30 families. *Brassicaceae*, *Cucurbitaceae* and *Moraceae* family were found to be the biggest family represented by 6 plant species each whereas *Caesalpiniaceae*, *Papilionoideae* and *Poaceae* with 5 plant species each; *Rosaceae* and *Rhamnaceae* with 4 plant species; *Mimosaceae*, *Liliaceae*, *Pinaceae*, *Euphorbiaceae*, *Oleaceae*, *Lytharaceae*, *Lamiaceae* and *Arecaceae* with 2 plant species and rest fourteen families viz., *Malvaceae*, *Asclepodiaceae*, *Lauraceae*, *Bixaceae*, *Dipterocarpaceae*, *Juglandaceae*, *Cuprassaceae*, *Lecnoraceae*, *Loranthaceae*, *Anacardiaceae*, *Sterculiaceae*, *Ericaceae*, *Salvadoraceae*, and *Vitaceae* is being represented by single plant species each. We have enumerated five plants viz., *Acacia nilotica*, *Acacia senegal*, *Acacia seyal*, *Alhgi maurorum* and *Allium cepa* in detail in first part and eight plants viz., *Allium sativum*, *Astragaluh adscendens*, *Bombax ceiba*, *Brassica arabica*, *Brassica juncea*, *Brassica nigra*, *Brassica rapa* and *Brassica schimperi* in second part of the manuscript. In present third part of the manuscript we are enumerating seven plants viz., *Butea monosperma*, *Calotropis gigantean*, *Cedrus libani*, *Cedrus deodara*,

*Ceratonia siliqua*, *Cinnamomum camphora* and *Citrullus colocunthis*.

### Eneumerations

*Butea monosperma* (Lam.) Taub. Flame of the Forest, bastard teak, battle of Plassey tree, Bengal kino, palas tree, parrot tree

- Assamese: bipornok, kingxuk, polax
- Bengali: palash
- Gujarati: kesudo, khakhro, palash
- Hindi: dhak, palash, tesu
- Kannada: muttuga, palasha
- Konkani: palas
- Malayalam: chamata, kinsukam, plaas
- Manipuri: pangong
- Marathi: dhak, palas
- Nepali: palans
- Oriya: palasha
- Sanskrit: kimshuka, palasha
- Tamil: kincukam, palasam
- Telugu: kimsukamu, (Fabaceae)

### Synonyms

*Butea braamania* DC.; *Butea frondosa* Roxb.; *Butea frondosa* Willd.; *Butea frondosa* var. *lutea* (Witt.) Maheshw.; *Erythrina monosperma* Lam.; *Plasomonosperma* (Lam.) Kuntze; *Plasomonosperma* var. *flava* Kuntze; *Plasomonosperma* var. *rubra* Kuntze; *Rudolphia frondosa* (Willd.) Poir.

*Butea monosperma* is found throughout the drier parts of India, often gregarious in forests, open grasslands and wastelands. A characteristic tree of the plains, it often forms pure patches in grazing grounds and other open places [World Agroforestry Centre, 1977].

*Butea monosperma* is a species of *Butea* native to tropical and sub-tropical parts of the Indian Subcontinent and Southeast Asia, ranging across India, Bangladesh, Nepal, Sri Lanka, Myanmar, Thailand, Laos, Cambodia, Vietnam, Malaysia, and western Indonesia.

It is native to India, flame of the Forest, a Sacred Tree, is a medium sized tree, growing from 20 to 40 feet high, and the trunk is usually crooked and twisted with irregular branches and rough, grey bark. The leaves are pinnate, with an 8–16 cm petiole and three leaflets, each leaflet 10–20 cm long. The hindi phrase "Dhaak ke teen paat" comes from

the prominent three leaflets of this tree. It is seen in all its ugliness in December and January when most of the leaves fall: but from January to March it truly becomes a tree of flame, a riot of orange and vermilion flowers covering the entire crown. These flowers, which are scentless, are massed along the ends of the stalks—dark velvety green like the cup-shaped calices and the brilliance of the stiff, bright flowers is shown off to perfection by this deep, contrasting colour. Each flower consists of five petals comprising one standard, two smaller wings and a very curved beak-shaped keel. It is this keel which gives it the name of Parrot Tree. In olden days, the flowers of Tesu were used to make color for the festival of Holi. In Manipur, there is an interesting cultural use of the wood of this tree with beautiful flowers— when a member of the Meitei community dies and, for some reasons, his body can not be found, the wood of this tree is cremated in place of the body.

A postal stamp was issued by the Indian Postal Department to commemorate this flower.

#### ***Ethnobotanical Potential***

Young roots are consumed [Digital Compendium of Forestry Species of Cambodia, 2008].

*Butea monosperma* (Lam.) is a tree with a purpose: Improving livelihood of disadvantaged rural people of central India [Sridhar et al., 2015].

#### ***Ethnomedicinal Potential***

Butea gum, or Bengal kino, an exudate from the tannin-rich vesicles in the bark, is used medicinally [Mansfeld's Database of Agricultural and Horticultural Plants; Brummitt & Powell, 1992].

A powerful astringent, it is used in the treatment of diarrhoea and wounds [World Agroforestry Centre Publication; Digital Compendium of Forestry Species of Cambodia, 2008].

The seeds, ground into a paste with honey, are used for anthelmintic, antifungal, antibacterial and purgative properties [World Agroforestry Centre Publication, 1977; Plant Resources of Southeast Asia Publication PROSEA, 2003; Allen and Allen, 1981].

The seed paste, mixed with lemon juice, are used as a rubefacient [Allen and Allen, 1981].

The seeds contain around 18% oil. Called 'moodoga oil', it is an effective treatment for hookworms [Watt., 1883; Allen and Allen, 1981].

The flowers and leaves are aphrodisiac, astringent

and diuretic [Allen and Allen, 1981].

The flowers are useful in the treatment of liver disorders [World Agroforestry Centre Publication, 1977].

The flowers contain butrin and isobutrin. These compounds have been shown to have antihepatotoxic principles [Plant Resources of Southeast Asia Publication PROSEA, 2003].

The seeds act as an anthelmintic [World Agroforestry Centre Publication, 1977].

A potential anti-asthmatic agent has been reported from the bark [Plant Resources of Southeast Asia Publication].

#### ***Agroforestry Uses***

Seedlings and green branches are spread in rice fields as a salt-filtering agent and green manure. Leaf-decomposing bacteria produce a slime that is able to aggregate clay particles. In the course of this process micro-cavities are formed loosening the compacted soil and allowing leaching of noxious salts from the soil solution [Digital Compendium of Forestry Species of Cambodia, 2008].

In India, farmers frequently use this tree to stabilize field bunds [World Agroforestry Centre Publication, 1977].

As per study of Sridhar et al. (29) the lac cultivation on *Butea monosperma*-based agroforestry is quite helpful for livelihood security in drought-prone regions of Central India and a single tree of *Butea monosperma* can produce 1.5–2.5 kg and gives an annual income of ₹700/- to ₹800/-. An apiculture-based agroforestry system is another option which will not only provide additional income to the farmers, but will also result in other benefits to the agricultural production due to the role of honeybees as pollinators.

#### ***Other Uses***

The flowers are used for the preparation of a yellow dye for silk especially, also ritually used [Mansfeld's Database of Agricultural and Horticultural Plants (Brummitt & Powell, 1992)].

A bright yellow to deep orange-red dye, known as butein, can be prepared from the flowers. It is used especially for dyeing silk and sometimes for cotton, and is traditionally used by Hindus to mark the forehead [World Agroforestry Centre Publication, 1977]. The colour is, however, fleeting, but it may be made less so by using alum or lime as a mordant, which also deepens the colour [Watt.,

1883]. Sometimes myrabolans are used for this purpose, or the dye is combined with anatta (*Bixa orellana*) [Watt, 1883].

A red dye is obtained from the roots [Digital Compendium of Forestry Species of Cambodia, 2008].

The bark is a source of tannins [World Agroforestry Centre Publication, 1977].

A red exudate is obtained from the tannin-rich vesicles in the bark [World Agroforestry Centre Publication, 1977; Mansfeld's Database of Agricultural and Horticultural Plants; Brummitt & Powell, 1992]. It hardens into a gum, known as Butea gum, or Bengal kino and can be used medicinally, as a dye or for tannin [World Agroforestry Centre Publication, 1977; Mansfeld's Database of Agricultural and Horticultural Plants; Brummitt & Powell, 1992; Watt, 1883]. It occurs in the form of round tears, often fragmentary. It may be purified by solution in water. It is of a brilliant ruby-red colour, translucent and brittle, heat rendering it more so instead of melting it [Watt, 1883].

A small quantity of a bright, clear oil is obtained from the seeds [World Agroforestry Centre Publication, 1977; Mansfeld's Database of Agricultural and Horticultural Plants; Brummitt & Powell, 1992; Watt, 1883]. The seeds contain up to 18% oil [Allen and Allen, 1981].

A course, tough, fibrous material, known as 'pala fibre' is obtained from the inner bark. It is used for cordage, caulking the seams of boats and making paper [World Agroforestry Centre Publication, 1977; Digital Compendium of Forestry Species of Cambodia, 2008; Dodge, 1897; Allen and Allen, 1981].

A strong fibre, obtained from the roots, is used in India for making native sandals, ropes etc. [Watt., 1883; Dodge, 1897].

The soft and not durable wood is light, white or yellowish-brown when fresh, but often turning greyish because of susceptibility to sap stain. It is not of great value but is sometimes used for utensils [World Agroforestry Centre Publication, 1977].

The wood is durable under water and is used to make well curbs, water dippers, sacred utensils etc. [Allen and Allen, 1981].

The wood makes a fuel of moderate quality [World Agroforestry Centre Publication, 1977]. The leaves are sometimes used as a fuel [World Agroforestry Centre Publication, 1977]. The wood is burnt for gunpowder charcoal [World Agroforestry Centre Publication, 1977].

### Propagation

Seed-sow in situ [World Agroforestry Centre Publication, 1977]. Germination, which starts in about 10–12 days, is completed in 4 weeks [World Agroforestry Centre Publication, 1977]. Fresh seeds have a good germinative capacity (about 63%) at optimum germination temperature of about 30°C [World Agroforestry Centre Publication, 1977]. While germinating in the wild, the seed remains in the pod which opens at the tip and allows the young shoot and root to emerge [Plant Resources of Southeast Asia Publication PROSEA, 2003]. The cotyledons remain attached to the seedling for a considerable time [Plant Resources of Southeast Asia Publication PROSEA, 2003].

Root suckers and Air layering.

*Calotropis gigantea* (L.) Aiton Madar, Giant Milkweed (Apocynaceae)

### Common Names

Bengali Aakanda; English Crown Flower, Giant Milk Weed, Milkweed, Bowstring hemp, Giant Calotrope, Hindi Arka, Mudar, Ak, Safed Aak; Malayalam Erikku, Chuvannaerikk, Yerikku, Vellerikk, Erikkalachedi, Vella-erikku, Dinesam; Manipuri Angkot; Marathi Arki, Ruiti, Arka, Rui; Others Crown Flower, Milkweed, Giant Calotrope, Swallow-wort, Yerukku, Bowstring Hemp, Giant Milkweed, Mandar; Sanskrit Hrasvagnih, Sadapushpa, Arka, Alarka, Arki; Tamil Arkkam, Erukku, Malaiyerukku, Yerukku; Telugu JillediPuvvu, Jilledu, Uchchinta, Nallajilledu, Uccinta.

### Synonyms

*Asclepias gigantea* L.; *Madorius giganteus* (L.) Kuntze; *Periploca chinensis* Decne.; *Periplocacochin chinensis* Lour.; *Streptocauloncochin chinense* (Lour.) G. Don Shrubs, stem rounded. Leaves 10–16 × 8–10 cm, smaller in branchlets; elliptic-ovate to obovate, apex acute or obtuse, base cordate; lateral nerves 5–7 pairs, ad pressed pubescent when young, becoming glabrous on maturity. Flowers pale purple or greenish-white, 3 cm across; pedicels to 3 cm long, stout; calyx lobes to 3 mm long; corolla campanulate, tube short, lobes ovate to oblong, recurved; staminal corona of 5 vertical lobes, 1 cm long. Fruit saccate, to 6 × 3 cm, ovoid; seeds many. Flowering and fruiting: throughout the year.

Flower- In terminal or lateral panicles, purple or lilac or dull white. Flowering throughout the year. Fruit-A follicle, Oblong, in flattened; seeds oblong to ovate, ending in a silky coma. Fruiting

throughout the year. Field tips- Leaves sessile, auriculate at base, densely white powdery.

It is common in East Asia-Southern China, Indian subcontinent, Myanmar, Thailand, Laos, Vietnam, Malaysia, Indonesia.

Dry coastal areas, along the sheltered shores of lagoons, overgrazed pasture land [Barwick, 2004]. Woods of dry areas, stream banks from sea level to 1,400 metres in southern China [Flora of China, 1994].

Succeeds in the drier tropics. Most commonly found in areas of the tropics with a specific dry season, at elevations up to 1,000 metres [Protabase, 2004]. An excellent plant for the seaside garden [Barwick, 2004].

Prefers a well-drained soil in a sunny position [Whistler and Arther, 2000]. Succeeds in a variety of soils, but prefers littoral, sandy soils [Protabase, 2004]. Plants can thrive in dry sands [Dodge, 1897]. Established plants are very drought tolerant [Barwick, 2004]. Plants are tolerant of salt-laden winds [Barwick, 2004].

One hectare of ground stocked with plants 30 cm apart can yield 24 tonnes of green stems, from which 260-350 kilos of fibre can be obtained [Dodge, 1897]. The plant is of great religious significance in India, where it is sacred to the God Shiva [Dodge, 1897]. Plants can flower all year round, but the main flowering is in the hot season [Protabase, 2004].

The sap (latex) is somewhat poisonous [Whistler and Arther, 2000]. It is used for poisoning arrows [Protabase, 2004].

All parts of the plant are toxic, due to the presence of several cardiac glycosides [Protabase, 2004].

The plant is also known to cause allergic contact dermatitis, and the latex causes keratoconjunctivitis [Protabase, 2004].

#### ***Ethnobotanical Potential***

The central part of the flower is candied and used as a sweetmeat [Uphof, 1959]. A fine fibre is obtained from the bark of the stems [Flora of China 1994; Whistler and Arther, 2000; Dodge, 1897]. Very strong, it is said to possess many of the qualities of flax (*Linum usitatissimum*), though it is somewhat finer [Uphof, 1959; Dodge, 1897].

It is much used for making textiles, fishing nets and bow strings [Dodge, 1897]. The mature seed pods contain a large quantity of floss, which has a variety of uses. For example, it can be used to stuff pillows etc or mixed with other fibres to make cloth [Whiting, 1943; McPherson, 1977; Buchanan, 1987;

Hill, 1952; Dodge, 1897]. It is a Kapok substitute, being very water repellent, it can be used as a buoyancy aid in Life Jackets or as a stuffing material [Whiting, 1943].

The floss absorbs oil whilst repelling water and so has also been used to mop up oil spills at sea. Candlewicks can be made from the seed floss [Whiting, 1943; Coffey, 1993]. The twigs are used as chew sticks for cleaning the teeth [Protabase, 2004; Dodge, 1897].

The juice is used in making a yellow dye and in tanning [Flora of China, 1994]. The wood is sometimes used for fuel, but it is of poor quality [Protabase, 2004].

However, a good quality charcoal is obtained from the wood and can be used for making gunpowder [Manandhar, 2002; Protabase, 2004; Dodge, 1897].

#### ***Ethnomedicinal Potential***

The milky sap (latex) coagulates when warm and is said to have similar cardiac properties to digitalis (from various *Digitalis* spp.) [Dodge, 1897].

It is also considered to be antiseptic, emetic, purgative and vermifuge [Protabase, 2004]. It is used in the treatment of a variety of other conditions including dysentery, leprosy, elephantiasis, epilepsy, asthma and many other complaints [Dodge, 1897].

Mixed with salt, it is taken orally as an emetic for treating severe colds [de Filippis, et al., 2004]. In Nepal, the latex is applied to sprains, body pains, boils and pimples [Manandhar, 2002].

The milky latex is used externally to stop bleeding, and for treating a wide range of conditions including leprosy, rheumatism, ringworm, boils, scabies, stings, burns, bruises, cuts, sores and wounds, [Protabase, 2004; de Filippis, et al., 2004]. It is applied to the gums and teeth to treat caries and toothaches [Protabase, 2004].

The bark is used as a medicine for the treatment of neurodermatitis and syphilis [Flora of China, 1994]. The powdered bark is used to treat diarrhoea, dysentery, elephantiasis, and leprosy [Manandhar, 2002; Protabase, 2004].

The stem bark is diaphoretic and expectorant, and is used for dysentery, spleen complaints, convulsions, lumbago, scabies, ringworm, pneumonia, and to induce labour.

An infusion of the leaves is used to treat severe chest colds and heart conditions [de Filippis, et al., 2004]. The leaf juice is used in the treatment of

intermittent fever [Manandhar, 2002]. The smoke of dried, burned leaves is inhaled to calm asthma attacks [Protabase, 2004].

The crushed leaves are warmed and used as a poultice on sores, burns, headaches and rheumatic pains [Uphof, 1959; Flora of China, 1994; Manandhar, 2002; Protabase, 2004]. The powdered flowers are valued for treating coughs, colds and asthma [Manandhar, 2002; Protabase, 2004]. An infusion is taken to treat intestinal worms, rheumatism and epileptic attacks [Protabase, 2004].

The juice of young buds is dropped into the ear in the treatment of earache [Manandhar, 2002]. The fruit pulp is considered abortive [Protabase, 2004]. Roots and flowers are being used against dog bites [Murtem and Chaudhry, 2019].

#### **Agroforestry Uses**

As it thrives upon soils where nothing else will grow, needing neither culture nor water, it has been considered a good plant for bringing waste land under tillage and for reclaiming drifting sands [Dodge, 1897]. The leaves can be used for mulching, green manuring of rice fields and for binding sandy soil [Protabase, 2004]. The plant is sometimes grown as a hedge [Protabase, 2004].

*Cedrus libani* A. Rich. 1823 Lebanese cedar, cedar of Lebanon (Vidakovic, 1991) (Pinaceae):

#### **Synonyms**

*C. libanotica* Link; *C. libanitica* (Trew) Pilger; *C. libanensis* Juss. ex Mirb.; *C. cedrus* Huth.; *C. patula* K. Koch (Vidakovic, 1991). Author cited as Loud. in (Vidakovic, 1991).

*Cedrus libani*, commonly known as the cedar of Lebanon or Lebanon cedar, is a species of cedar native to the mountains of the Eastern Mediterranean basin. It is an evergreen conifer that can reach 40 m in height. It is the national emblem of Lebanon and is widely used as an ornamental tree in parks and garden. Native to mountains near the Mediterranean in Turkey, Syria and Lebanon. In Turkey, occurs from the western Taurus Mountains, east to the province of Hayat; there are also two occurrences near the Black Sea; the area of occupancy is about 993 km<sup>2</sup>. In Syria, occurs at one location on the eastern side of Jabal An-Nusayriya, with an area of occupancy of only 1.5 km<sup>2</sup>. In Lebanon, occurs along the Mount Lebanon chain with an area of occupancy of 22 km<sup>2</sup>. Only some of the Taurus Mountains stands can be described as healthy, intact forest; through its remaining range, the forests are fragmented and

degraded by factors of decline that include grazing, logging, urbanization, winter sports, and insect pests [Gardner, 2015].

*Cedrus libani* occurs at elevations of 1,300–3,000 m, usually on N and W aspects on well-drained, mainly calcareous soils. Climate is cool with abundant winter snow at higher elevations. Typically, in pure stands or with *Abies cilicica*, *Juniperus excelsa*, *J. oxycedrus*, *Pinus nigra*, *P. brutia*, and hardwood species such as *Quercus cerris*, *Sorbus torminalis*, and *Prunus ursina* [Gardner, 2015].

Hardy to Zone 7 (cold hardiness limit between -17.7°C and -12.2°C) [Bannister and Neuner, 2001].

This may be the conifer with which humans have the longest recorded history. "Through five millenniums of recorded history, a parade of civilizations has praised the cedars of Lebanon and then chopped them down. Lebanon has been deforested by Mesopotamians, Phoenicians and ancient Egyptians; by the Greek and Roman empires; by crusaders, colonizers and modern Middle East turmoil" [Barnard and Haner, 2018]. The cedar is mentioned often in the Old Testament of the Bible. For example, the First Temple of Solomon was built of it. In modern times, Cedar of Lebanon is widely cultivated as an ornamental species.

Masri (1995) provides this summary of the species historical importance: The Cedar of Lebanon is cited numerous times in religion and mythology. In addition to its significant role in the Epic of Gilgamesh, the Cedar of Lebanon is regarded as a world tree in several mythological passages. One deeply mythological passage sees the imperial nation, the embodiment of history, under the figure of something like a world-tree [Ezekiel 31.1–18]. The cutting of the cedar is seen as the destruction of world-empires—really, as the end of history. Our understanding of ecology, the dependence of human history on maintenance of the natural environment, simply makes this primitive insight explicit.

#### **Ethnobotanical Potential**

The sawdust of the cedar puts snakes to flight, and thus makes sleeping under the shade of a cedar a relatively safe siesta. Furthermore, based upon historical analyses, it is believed that the cedar was used in the preservation of the corpses in Egypt.

The Cedar of Lebanon aided society not only culturally but was the basis of numerous economies for ancient civilizations. The cedar had been used for the construction of temples, palaces, and boats. The export of cedar wood to Egypt was an important factor in the growth of Phoenician prosperity and

provided capital to launch the more ambitious enterprises in international trading, navigation, and arts and crafts.

The Phoenicians and the Egyptians were not alone in utilizing the cedar. The Assyrians, Nebuchadnezzar, the Romans, King David, King of Babylonia, Herod the Great, and the Turks in the Ottoman Empire all exploited the cedars. During the War of 1914–1918, most of the remaining stands were exploited and destroyed for railroad fuel. As a consequence, the extent of the cedars in Lebanon has dramatically declined.

The latest, and perhaps most severe human threat to the cedars is climate change, which “could wipe out most of the country’s remaining cedar forests by the end of the century” [Barnard and Haner, 2018]. There are a variety of factors at play here, familiar in climate change effects on forests around the world: increasing temperature, increasing aridity, increasing fire risk, and proliferation of pest insects are foremost among them. But the principal concern in Lebanon is that the trees have no place to go; they are already growing on the mountaintops. They cannot migrate upwards to more hospitable environments.

The Taurus Mountains are said to have the best remaining wild stands of this species, but that is largely due to its occurrence in remote and inaccessible locations. Gardner (2015) notes that “there are extensive forests occurring from Boz Mountain (Acipayam) in the west and Ahir and Nur (Amanos) mountains in the east,” but I have no more specific location information. Barnard and Haner (2018) note that significant extant stands include the Barouk Cedar Forest (part of the Shouf Biosphere Reserve, south of Beirut), and the Tannourine Cedars Forest Nature Reserve.

The Horsh Ehden nature preserve in Lebanon looks to be a very worthwhile place to visit and see this species [Fareed, 1999]. The Cedars of Bsharre in Lebanon, now in a World Heritage Site, formerly included some remarkably large trees [Gardner, 2015]. The species is an extremely popular ornamental in Europe and North America, and is almost universal in arboreta and botanical gardens of the temperate zone.

### ***Ethnomedicinal Potential***

Medicinally, the Cedar of Lebanon also made its mark. The pitch of the cedar was utilized for easing the pain of toothaches.

### ***Uses of medicinal tars***

The most frequent uses mentioned by herbalist and producers were against different hair and skin problems like dandruff, eczema, itchiness and skin infections.

It is also used to decorate pottery and to give water a pleasant odour. In rural areas Gatran is sometimes added to drinking water as a disinfectant to improve the quality.

Other important uses are for animals as a treatment against intestinal parasites and as a repellent towards snakes and scorpions.

Ferraga, the traditional women healers, use Gatran when healing small babies [Julin, 2008]. It is used in medicine as an analgesic, disinfectant and towards different skin diseases like psoriasis and dandruff [Anon, 2001]. It is also used in cosmetics like soaps and shampoo, both for its disinfectant properties and as a perfume [FAO, 1998].

Literature sources [Bellakhdar, 1998] indicate that medicinal tars, like Cade oil, in Morocco are made from different conifer species like *J. phoenicea*, *J. thurifera*, *Cedrus atlantica* or *Tetraclinis articulata*.

*Cedrus deodara* (Roxb. ex D. Don) G. Don 1830, Deodar cedar, Himalayan cedar, deodar, devdar, devadar, devadaru (Pinaceae):

### ***Synonyms***

*Cedrus indica* Chambray; *Cedrus libani* var. *deodara* Hook. (Vidakovic, 1991).

*Cedrus deodara*, is a species of cedar native to the western Himalayas in Eastern Afghanistan, Northern Pakistan and India, Southwestern Tibet and Western Nepal, occurring at 1,500–3,200 m altitude. Deodar forests are forests dominated by *Cedrusdeodara* and are found in Western Himalayas from Gandak river in central Nepal to Hindukush in Afghanistan.

A tree up to 50 m high and up to 3 m in diameter. Crown conical when young, with drooping leader and branches drooping at the end, older trees rounded. Branches horizontally arranged, and end of the shoots pendulous. One-year shoots densely pubescent. Needles blue-green, about 30 in a cluster, 3–5 cm long, acuminate. Flowers appear in September and October. Cones solitary or in pairs. ovate or barrel-shaped. 7–10 cm long, 5–6 cm wide, rounded at the apex, bluish when young, reddish-brown when ripe; maturing from September to November; the seed is shed from September to December; seed scales 5–6 cm wide,

usually glabrous on the upper side. Seed about 17 mm long, about 6 mm wide; wing large, light brown [Vidakovic, 1991].

The best trees are found on deep, well-drained soils. High atmospheric moisture is favourable. It is tolerant to shade, but young trees are prone to injury from frosts and cold wind [Vidakovic, 1991]. It is a component of the temperate forest, usually on north-facing valley slopes, where rainfall ranges from less than 1000 mm per year up to 2500 mm per year, mostly in the form of winter snow. In these forests *C. deodara* is associated with a wide array of conifers and some broadleaf trees. Species present may include *Pinus wallichiana*, *Taxus baccata*, *Picea smithiana*, *Abies spectabilis*, and *Abies pindrow*, as well as species of *Quercus*, *Rhododendron*, *Acer*, *Corylus*, *Aesculus* and *Betula*. At somewhat lower and drier (precipitation less than 1000 mm/year, mostly as snow) elevations it commonly occurs with *Pinus gerardiana*, *Quercus ilex* and *Juniperus excelsa* subsp. *polycarpus* [Bhattacharyya et al., 1988]. Hardy to Zone 8 (cold hardiness limit between -12.1°C and -6.7°C) [Bannister and Neuner, 2001].

### **Ethnobotanical Potential**

It is an important timber tree in India. In the West, is widely planted as an ornamental in Europe [Vidakovic, 1991] and the Western United States. It provides an excellent fuelwood. Timber: The wood is white to light yellowish brown, with a characteristic odour and oily feel. It is straight-grained, medium fine and somewhat uneven-textured. Its average weight is 560 kg/m<sup>3</sup>. The heartwood is very durable but insects and fungi attack sapwood. Deodar is an important structural timber tree. Its wood is highly valuable and extensively used for building, railway sleepers, carriage and railway wagon work and other purposes for which durability is required. It is used in house building, beams, floorboards, door and window frames, furniture and general carpentry. It also produces quality plywood [Orwa et al., 2009].

### **Other products**

It is a possible substitute of pines as a Christmas tree.

### **Ethnomedicinal Potential**

The use of *Cedrus deodara* in Ayurvedic medicines is well known. The plant yields a medicinal essential oil by distillation of the wood which is used for treatment of a wide range of ailments from fevers and dysentery, bronchitis, and snake bites. A resin obtained from the wood is used externally to treat

bruises, skin diseases and injuries to joints.

The leaves are used in the treatment of tuberculosis.

Oil obtained from the seed is applied externally to treat skin diseases. The essential oil is used as insect repellent on the feet of horses, cattle and camels.

It also has anti-fungal properties and has some potential for control of fungal deterioration of spices during storage.

Due to its anti-fungal and insect repellent properties, rooms made of *Cedrus deodara* wood are used to store meat and food grains like oats and wheat in Himachal Pradesh.

In Himachal people suffering from asthma or other respiratory problems are advised to sit under a Deodar tree early in the morning.

Cedar oil is often used for its aromatic properties, especially in aromatherapy. Its applications cover soap perfumes, household sprays, floor polishes and insecticides. It is also used in microscope work as a clearing oil [Trees in KKL-JNF Forests].

### **Services**

*Erosion control:* It's a soil conservation and erosion control species in the Himalayas.

*Shade or shelter:* Its shelter woods increases dry land pasture productivity as in New Zealand.

*Reclamation:* It's a good re-vegetation species [Orwa et al., 2009].

*Ornamental:* This species is grown as an ornamental and in amenity plantations in its native range and many countries into which it was introduced.

*Ceratonia siliqua* Linn. Carob, carobtree, locust bean, St John's bread (Fabaceae):

The carob tree, *Ceratonia siliqua* L., is an evergreen shrub or tree cultivated in the Mediterranean area for its sugar-rich pods and gum-containing seeds. It reaches a height of 8–17 m in the wild but cultivated trees are smaller. It has a broad hemispherical crown, a thick trunk and sturdy branches [Ecocrop, 2011; Battle and Tous, 1997]. The carob tree has an extensive root system with a deep taproot and lateral roots. Its leaves are alternate, pinnate, with or without terminal leaflets, and 10–20 cm long. The dark green leaflets have a very thick epidermis containing large amounts of tannins [Shepperd, 2008]. Each tree bears both female and male, or hermaphroditic, flowers (some cultivars may be completely hermaphroditic): plantations should comprise about 12% of pollinators



(male or hermaphroditic trees) [Battle and Tous, 1997; Göhl, 1982]. The small and numerous flowers are borne in clusters that grow directly along the branches [Battle and Tous, 1997]. The fruit is an indehiscent straight or curved pod, 10–30 cm long, 1.5–3.5 cm broad and 6–20 mm thick. The pods have a wrinkled surface that turns dark brown and leathery at maturation. They contain 5 to 18 hard brown seeds (10% of the pod weight) embedded in a sweet thick pulpy substance [Shepperd, 2008; Battle and Tous, 1997]. The seeds, all being the same size, are used as weights in eastern Mediterranean countries: the word "carat" comes from qirān, the Arabic name of the seeds [Göhl, 1982].

The carob tree is native to the Mediterranean region, including Southern Europe, Northern Africa, the larger Mediterranean islands, the Levant and Middle-East of Western Asia into Iran, and the Canary Islands and Macaronesia in the Atlantic Ocean.

#### **Ethnobotanical Potential**

The carob tree is a very useful resource.

Traditionally, carob pulp has been used for food: roasted and eaten as a snack, roasted and ground to make a cocoa substitute, fermented to make alcohol, or diluted to make carob syrup [Battle and Tous, 1997]. The pods themselves are used as a famine food, as the tree survives and keeps fruiting during periods of scarcity [Freedman, 2009].

The most important industrial carob product today is the carob gum, a galactomannan extracted from the seeds, which is a common food thickener and stabilizer. Feed products derived from the carob trees are the whole ground pods which can be fed to ruminants and non-ruminants, the dried, deseeded sugar-rich pulp, and the carob germ meal (the by-product of gum extraction). Carob leaves are relished by browsing livestock [Battle and Tous, 1997]. The ripe, dried, and sometimes toasted pod is often ground into carob powder, which is sometimes used to replace cocoa powder. Carob bars, an alternative to chocolate bars, as well as carob treats, are often available in health food stores. Carob pods are naturally sweet, not bitter, and contain no theobromine or caffeine.

Carob trees also provide a wood used for making utensils and slow-burning charcoal (Shepperd, 2008) and extracted to yield algarrobin, a textile dyeing agent [Morton, 1987].

Carob trees are used as an ornamental evergreen species and are helpful in afforestation [Battle and Taus, 1997].

#### **Environmental impact**

It is nitrogen fixing legume. Carob was long believed to be unable to fix nitrogen, but bacteria thought to belong to the *Rhizobium* genus have been isolated from carob root nodules [El Idrissi et al., 1996]. It is being used in agricultural diversification, afforestation and soil erosion control. Carob trees may also be helpful in degraded areas threatened by soil erosion and desertification [Battle and Tous, 1997].

#### **Other environmental services**

Carob trees are used as windbreaks around orchards. Because of their dense foliage, they are also helpful buffers against noise from factories, roads and railways [Battle and Tous, 1997]. It is widely cultivated for its edible pods, and as an ornamental tree in gardens and landscapes. The carat, a unit of mass for gemstones, and a measurement of purity for gold, takes its name from the Greek word for a carob seed, keration, via the Arabic word, qirān.

#### **Products**

**Food:** Carob pulp is high in total sugar content (48–56%). In addition, it contains about 18% cellulose and hemicellulose. Mineral composition consists of potassium, calcium, magnesium, sodium, iron, copper, iron, manganese and zinc.

In some countries, Egypt for example, carob syrup is a popular drink, obtained from carob kibbles with water. Unicellular organisms convert carob pulp into a high-protein feed; sugar solutions extracted from carob pods are an excellent substrate for culturing fungi such as *Aspergillus niger* and *Fusarium moniliforme*, and the dried mycelium is a palatable and nutritious feed, containing up to 38% crude protein by weight. The carob product most widely used, especially in the food industry, is carob bean gum (CBG), or locust bean gum (LBG). This gum comes from the seed endosperm and chemically is a polysaccharide, a galactomannan. 100 kg of seeds yield 20 kg on average of pure dry gum.

The mucilaginous gum, known as 'tragasol', is used in a wide range of commercial products as a thickener, stabilizer, binder and gelling or dispersal agent. The food industry uses CBG for the production of a large number of different commodities: ice cream, soups, sauces, cheese, fruit pies, canned meats, confectionery, bakery products and petfoods. Technical applications of CBG include cosmetics, pharmaceuticals, film emulsions, paints, polishes, ceramics and adhesives.

Pulp extracted and purified produces sugar and molasses. Powdered pulp is used as a food ingredient and cacao substitute and for preparing dietary products. Carob powder consists of 46% sugar, 7% protein and small amounts of numerous minerals and vitamins and is thus quite nutritious. Carob 'cocoa' has an advantage over chocolate in that it has fewer calories and neither caffeine nor theobromine. Ground seed embryo and endosperm can be used for human consumption; the latter, containing CBG and E-410, is a food additive and a dietary fibre.

**Fodder:** *C. siliqua* pods provide fodder for ruminants and non-ruminants. Endosperm and embryo of the seed can be ground and used for pet food. The fodder is now being used in zero-grazing in Mediterranean countries.

**Fuel:** The wood produces a slow-burning charcoal and can also be used for firewood.

**Timber:** *C. siliqua* timber is hard and close-grained and has been used to make utensils.

**Gum or resin:** Currently, the main use of the seed is gum extraction.

**Tannin or dyestuff:** Ripe carob pods contain large amounts of condensed tannins (16–20% of dry weight).

**Alcohol:** A high sugar content and its relatively low cost have made carob pulp among the earliest horticultural crops used for the production of industrial alcohol by fermentation in several Mediterranean countries.

### Services

#### Shade or shelter

Widely planted as a shade tree, also recommended as a windbreak around orchards.

#### Reclamation

Since it requires little if any cultivation, tolerates poor soils and is long lived, *C. siliqua* is often recommended for reforestation of degraded coastal zones threatened by soil erosion and desertification.

#### Ornamental

A popular ornamental in California, Australia and elsewhere; male trees are preferred as they do not provide litter from pod fall. However, the value of *C. siliqua* as a drought-tolerant, air-pollution tolerant, low maintenance tree for street landscape

planting could be limited by its large size when mature and its strong, invasive roots.

#### Intercropping

Frequently planted with species such as olive, grapevines or almond. Young *C. siliqua* orchards are intercropped with early-bearing species such as peach, almond or even vegetables; an annual perennial crop between the rows may give early returns to the investment.

#### Pollution

*Ceratonia siliqua* could help buffer noise from factories, roads and railways because of its dense foliage.

#### Ethnomedicinal Potential

Carob (*Ceratonia siliqua*) is one of the important crops over Western Asia and North Africa. Its nutritional value has been acknowledged for millennia but its medicinal properties were practically studied only in the last four decades, despite the fact that some of them were used in traditional medicines for centuries. Modern food industry is just starting to discover the great potential of this plant. Carob has outstanding antioxidant capacity along with other important medicinal activities. Some of these have been extensively studied and reported in the last decades, but very few review articles were published about this plant, that summarize and discuss the findings [Azab, 2017].

**Medicine:** Tannins extracted from the pulp act as an anti-diarrhoeic. Ground pulp and seed endosperm are used in the preparation of pharmaceutical products.

The medicinal uses of this plant are diversified in different regions viz., in Cyprus it is used as laxative [Ozkum et al., 2013]; in Egypt it is used in diarrhoea through infusion [Abouzid and Mohamed, 2011]; in Greco-Arab it is used in diabetes, herpes and lip sore through leaf decoction [Saad and Said, 2011]; in India it is used as an anti-obesity [Fatima et al., 2017]; in Iran it is being used in menorrhagia where the patient has to sit in a container of a decoction of several plants including Carob [Tansaz et al., 2016]; in Iraq abdominal pain and diarrhoea is being cured by eating ripe fruits [Ahmed, 2016]; in Israel it is being used as antidiabetic by leaf decoction [Said et al., 2002] and against viral and bacterial infections and fevers are cured by fruit syrup mixed with sesame paste [Landau et al., 2014]; in Italy dry fruits are given as an animal food [Guarrera et al., 2016] and as a cure for emollient through fruits decoction

with *Ficus carica* and *Malva sylvestris* [Montesano et al., 2012]; in Jordan it is being used as an antidiabetic through consumption of leaves decoction [Afifi-Yazar et al., 2011] and cough is cured through hot/cold infusion of fruits [Oran and Al-Eisawi, 2015]; in Lebanon molasses of ripe fruits is used as sweetener [Baydoun et al., 2015] and also used as medicinal [Baydoun et al., 2017]; in Morocco fruit, bark, and leaves are used in diarrhoea, to kill fish during fishing [Ennabili et al., 2000] to kill intestinal parasites through use of fruits/leaves decoction [El-Hilaly et al., 2003] and for relief of skin, digestive system and nervous system there is infusion/decoction of fruit powder or oral [Ouhaddou et al., 2014] or fruit powder [Orch et al., 2017]; in Palestine for food, fruits are eaten raw, cooked or ripe [Ali-Shtayeh et al., 2008]; in Sicily for food, fruits are eaten raw, cooked or ripe [Lentini and Venza, 2007]; in Spain for chocolate, coffee substitute and olive preservative the ripe fruits and leaves are used [Tardio et al., 2006]; in Tunisia for food the ripe pods are consumed [Kaderi et al., 2015] and in Turkey fresh pods are used as diuretic and purgative [Fakir et al., 2009].

*Cinnamomum camphora* (Linn.) Presl. Camphor Tree, Camphorwood, Camphor laurel • Bengali: karpur • Hindi: Kapur • Kannada: chandara, davala, dhavala, kappara, kapura • Malayalam: chutakkarpuram, ghanarasam, himamsu, himavaluka • Manipuri: Karpura • Marathi: kapoor • Oriya: ramokorpuro • Sanskrit: candraprabha, chandrabha, gandhadravya • Tamil: chukantamaram • Telugu: candramu, candrasanguyamu • Urdu: kafoor (Lauraceae):

### Synonyms

*Camphora officinarum*, *Laurus camphora*

Camphor tree is a large evergreen tree that grows up to 20-30 m tall. The leaves have a glossy, waxy appearance and smell of camphor when crushed. Alternately arranged 1-4 in long oval leaves dangle from long stalks. Each leaf has three distinct yellowish veins. The outer margins of the leaves tend to be somewhat wavy and turn upward. The new foliage starts out a rusty burgundy colour, but the leaves soon turn dark green on the upper sides and paler green underneath. New branches emerging from the shallowly fissured greyish brown trunk are smooth and green. Twigs are usually green, but may be tinged with red when young. The inconspicuous tiny cream coloured flowers are borne in the spring on branching 3 in flower stalks. They are followed by large crops of fruit, comprised of round pea sized berries attached to the branchlets by cuplike little green

cones. The berries first turn reddish, then ripen to black. Camphor tree can be readily identified by the distinctive odour of a crushed leaf. Camphor Tree is native to China, Japan, Korea, Taiwan, and adjacent parts of East Asia. It is now cultivated in many parts of the world. The plant is grown commercially in China and Japan as a medicinal tree and also for its essential oil, though most camphor oil on the market nowadays is produced synthetically [Uphof, 1959; Australian Tropical Rainforest Plants Publication]. It has also been widely planted in other areas of the tropics, subtropics and warm temperate zones [World Agroforestry Centre Publication]. At one time it was heavily exploited as a source of camphor, but the availability of cheap, synthetic camphor has meant that there is now only modest international demand for the natural form [World Agroforestry Centre Publication]. Camphor produced from Cinnamon species is often considered superior to synthetic because the molecules are dextrorotatory, whereas synthetic camphor (produced from pinene) contains both dextro- and laevorotatory forms and is considered by many Pharmacopoeia's it is to be more toxic [Duong, 1993]. *Cinnamomum camphora* is invasive in parts of Kenya (CABI CPC, 2007) and Tanzania

### Ethnobotanical Potential

Young shoots and leaves are cooked and consumed [Tanaka and Nakao, 1976; Kunkel, 1984]. Some caution is suggested because there is a report that the plant is poisonous in large quantities.

The old leaves are dried and used as a spice [Tanaka and Nakao, 1976; Kunkel, 1984]. An essential oil obtained from the plant is used as a food flavouring in baked goods, candy etc [Facciola, 1998]. The essential oil obtained from camphor can vary quite considerably. On distillation, the wood from different groups of trees may yield camphor, linalool, safrole or cineole as the major chemical [World Agroforestry Centre Publication]. The essential oil 'camphor' is obtained from the leaves and twigs [Chittendon, 1951; Grieve, 1984; Uphof, 1959; Sherry; Usher, 1974].

It is extracted commercially by passing a current of steam through the wood chips, 30 kilos of wood yields about 1 kilo of camphor [Vines, 1987]. Camphor is used medicinally, in perfumes, as an insecticide and also to make celluloid and as a wood preservative [Hill, 1952]. It can also be put in shoes to cure perspiring feet [Stuart, 1911] probably by acting as a deodorant rather than preventing perspiration [Fern, 2014].

Fractionation of the camphor-free oil obtained from the tree provides an oil rich in safrole (80% or more), usually called Chinese sassafras oil [World Agroforestry Centre Publication].

The use of the tree as a source of leaf oil has expanded in recent years, and it is now an important source of natural linalool (which is still preferred over the synthetic form for some fragrant applications) [World Agroforestry Centre Publication]. The wood has been burnt as a fumigant during epidemics [Genders, 1994]. Its aroma helps to repel insects [Australian Tropical Rainforest Plants Publication].

The heartwood is brownish-yellow with a green cast, or olive to light olive-brown to blackish-brown; the sapwood is whitish or brownish. The texture is medium to coarse; the grain straight to roes; there is a satiny or silky lustre; the odour is spicy and acts to repel insects. The wood has excellent working qualities and takes a good polish. It is thought by many to be beautifully grained, though some people find it a bit garish. It is used for making furniture, cabinets, the interior finish of buildings etc. [Grieve, 1984; Uphof, 1959; Flora of China, 1994; World Agroforestry Centre Publication; Australian Tropical Rainforest Plants Publication]. The essential oil obtained from camphor can vary quite considerably. On distillation, the wood from different groups of trees may yield camphor, linalool, safrole or cineole as the major chemical [World Agroforestry Centre Publication].

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### *Ethnomedicinal Potential*

Camphor has a long history of herbal use in the Orient with a wide range of uses. It has occasionally been used internally in the treatment of hysteria, but in modern day herbalism it is mainly used as the essential oil and internal use is not advised [Chevallier, 1996].

The wood and leaves are analgesic, antispasmodic, odontalgic, rubefacient, stimulant. An infusion is used as an inhalant in the treatment of colds and diseases of the lungs [Uphof, 1959; Sherry.; Yeung, 1985; Stuart, 1911; Bown, 1995].

The plant is more commonly used in the form of the essential oil which can be obtained by distillation of the chipped branches, trunk and wood of the tree, or from the leaves and twigs. Wood 24-40 years old is normally used [Stuart, 1979]. The essential oil is anthelmintic, antirheumatic, antispasmodic, cardiotoxic, carminative, diaphoretic, sedative and tonic [Grieve, 1984; Duke and Ayensu, 1985; Bown, 1995; Chopra et al., 1986]. It is used externally in liniments for treating joint and muscle pains, balms for chilblains, chapped lips, cold sores, skin diseases etc and as an inhalant for bronchial congestion [Bown, 1995]. Some caution is advised, excessive use causes vomiting, palpitations, convulsions and death [Bown, 1995]. It is possible that the oil can be absorbed through the skin, causing systemic poisoning [Bown, 1995].

The essential oil is used in aromatherapy. Its keyword is 'Piercing' [Westwood, 1993]. It is used in the treatment of digestive complaints and depression [Bown, 1995].

*Citrullus colocunthis* (L.) Schrad & Indrayan, colocynth, bitter apple, bitter cucumber, desert

gourd, egusi, vine of Sodom, or wild gourd (Cucurbitaceae)

### Synonyms

*Cucumis colocynthis*, *Colocynthis vulgaris*

*Citrullus colocynthis* (L.) Schrad with many common names is a desert vinyl plant native to the Mediterranean Basin and Asia, especially Turkey, and Nubia. *Citrullus colocynthis* is a valuable cucurbit plant, widely distributed in the desert areas of the world. *Citrullus colocynthis* fruits are usually recognized for its wide range of medicinal uses as well as pharmaceutical and nutraceutical potential. Bitter Apple is an annual plant resembling the common watermelon. The stems are herbaceous and beset with rough hairs. Leaves, on long stalks, are alternately arranged. They are triangular, many times cut, variously undulating, blunt, hairy, a fine green on upper surface, rough and pale on the underside. Flowers are yellow, appearing singly at axils of leaves. Fruit is round, size of an orange, yellow and smooth, when ripe contains within a hard-leathery rind, a white spongy pulp enclosing numerous ovate compressed white or brownish seeds. This species is globally distributed from Africa, Mediterranean, except Spain, to Indo-Malesia. Within India, it is found wild in the warm, arid and sandy parts throughout, up to an altitude of 1500 m.

### Ethnobotanical Potential

The plant was also shown to be rich in nutritional value with high protein contents and important minerals as well as edible quality of seed oil [Hussain et al., 2014].

Fruit are consumed cooked [Facciola, 1998]. Fruits are first boiled in several changes of water to remove a bitter principle, and then made into pickles and preserved [Facciola, 1998].

The fruit is 5–8 cm in diameter [Cucurbitaceae Publication]. Seeds are consumed cooked [Facciola, 1998]. Eaten roasted or ground into a meal and used to make chapattis [Facciola, 1998]. An edible oil is obtained from the seed [Facciola, 1998]. The seeds contain 30–34% of a pale-yellow oil, which contains an alkaloid, a glucoside and a saponin [Cucurbitaceae Publication].

The plant contains a number of potentially toxic compounds and can be harmful if used in quantity. These compounds include elatermidine, glycosides, resin, dihydric alcohol, heltiacantane, citrullin and citrullinic acid. Taken in excess they can cause gastrointestinal pain, diarrhoea,

vomiting, hypothermia, cardiac disorders, cerebral congestion and necrosis of liver and renal cells [Mohamed et al., 2006].

### Ethnomedicinal Potential

Parts used are roots, fruits and dried pulp.

Roots are purgative. Fruits are bitter, acrid, cooling, carminative, purgative, antipyretic and anthelmintic. Roots are useful in treatment of enteralgia, mammalities, rheumatologic, visceromegaly in children, ophthalmia, ascites, jaundice and uropathy.

Fruits are used for tumours, ascites, leukoderma, ulcers, asthma, bronchitis, urethrorrhagia, jaundice, dyspepsia, constipation, elephantiasis, tubercular glands of the neck and splenomegaly. Fruit-juice contain alpha-elaterin, citrulline, citrullines and citrullinic acid. Dried pulp & unripe fruit: dihydric alcohol, citrullol, p-hydroxybenzyl and methyl ether. The peel-free flesh of ripe fruits contains a yellow, bitter oil, citbittol [DOMAP, 2016].

It is a powerful drastic hydragog cathartic producing, when given in large doses, violent griping with, sometimes, bloody discharges and dangerous inflammation of the bowels. Death has resulted from a dose of 1 1/2 teaspoonfuls of the powder. It is seldom prescribed alone. It is of such irritant nature that severe pain is caused if the powdered drug be applied to the nostrils; it has a nauseous, bitter taste and is usually given in mixture form with the tinctures of podophyllum and belladonna. Colocynth fruits broken small are useful for keeping moth away from furs, woollens, etc.

The plant has been reported to possess a wide range of traditional medicinal uses including in diabetes, leprosy, common cold, cough, asthma, bronchitis, jaundice, joint pain, cancer, toothache, wound, mastitis, and in gastrointestinal disorders such as indigestion, constipation, dysentery, gastroenteritis, colic pain and different microbial infections [Hussain et al., 2014].

Several bioactive chemical constituents from fruits were recorded, such as, glycosides, flavonoids, alkaloids, fatty acids and essential oils. The isolation and identification of curcubitacins A, B, C, D, E, I, J, K, and L and Colocynthosides A, and B were also reported. The fruit of *Citrullus colocynthis* has been studied extensively for its wide range of biological activities, which include antioxidant, cytotoxic, antidiabetic, antilipidemic, insecticide, antimicrobial and anti-inflammatory [Hussain et al., 2014]. The dried, unripe fruit pulp constitutes

the drug 'colocynth', which is a very strong laxative [Huxley, 1992; Cucurbitaceae Publication].

It is also used as an antirheumatic, anthelmintic, hydrogogue, and as a remedy for skin infections [Uphof, 1959; Plant Resources of Southeast Asia]. The fruits and seeds are used in the treatment of diabetes [Mohamed et al., 2006]. The roots have purgative properties and are used in the treatment of jaundice, rheumatism and urinary diseases [Cucurbitaceae Publication]. Some caution should be employed in the use of this remedy because the same is toxic.

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