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Ethnopharmaco-botanical review of Padmaka – *Prunus puddum* Roxb

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ABSTRACT

Padmaka, Prunus puddum Roxb usually called as the Himalayan Cherry tree is a drug with a significant ethno botanical & therapeutic importance. It was in use since time immemorial for medicinal and other uses & it has got religious importance in Hindu culture. Several phyto-constituents have been isolated and identified from different parts of the plant such as Genistein Prunetin, Puddumin, Padmakastein etc. It is used in the treatment of stone and gravel in the kidney, bleeding disorders, burning sensation and skin diseases. It is a best anti-abortifacient. Very limited studies have been undertaken till date to prove its Pharmacological activities. This article reviews the details of the drug such as Morphology, Distribution, Ethno botanical claims, and pharmacological activities.

Key words: : ***Ayurveda, Dravya Guna ,Padmaka, Bleeding Disorders***

INTRODUCTION

Herbal drugs have become the main subject of attention and global importance since a decade. They are said to possess medicinal, therapeutical and economical implications. The regular and widespread use of the herbal drugs is getting popular in the present era creating new horizons. Prunus is a large genus of deciduous or evergreen trees and shrubs, distributed chiefly in the temperate regions of the northern hemisphere belonging to the Family Rosaceae. A large number of them are valued as ornamentals on account of their showery flowers [1]. The genus also includes a large number of stone fruits, apricots, cherries, plums, peaches, as well as the almonds. *Prunus cerasoides* is one among them and it has been identified as an excellent 'framework tree species' for restoring evergreen forest in seasonally dry tropical forestlands. [2] It is a very common tree of the middle hill forests and is chief representative of the Himalayan Cherry tree. [3] It is a sacred plant in Hindu Tradition. It is beneficial in many ailments such as leprosy, leucoderma, erysipelas, burnings, asthma etc.

Table no. 1
Taxonomical Classification: [4]

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliospida
Order	Rosales
Family	Rosacae
Genus	Prunus
Sub genus	Cerasus
Species	*Prunus puddum* Roxb, ex Wall. (*P.cerasoides* D. Don.)
Classical name	*Padmaka*

Synonyms: [5], [6], [7], [8], [9]

Charu, Hima, Kaidara, Kedaraja, Malaya, Maleyo, Padmagandhi, Padmaka shtha, Padmaksha, Padmavhaya, Padmavriksha, Patalapushpavarnaka, Patalaputrasanibha, Pita, Pitaka, Pitarakta, Rakta, Shitala, Shitavirya, Shubha, Sugrabha, Suratbhav, Suprabha

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Table 2
Vernacular names: [10]

Language	Names
Eng.	*Himalayan wild cherry, Bird cherry.*
Hindi	*Padmakastha, Puddum, Phaya, Padamakha, Padmakath, Padamak, Phaja, Padmaka shta, Pajia, Paya.*
Bengali	*Padmak, Padmakashtha.*
Gujrati	*Padmaka thi,Padmaka nu lakadu, Padmakashtha, Padmak.*
Kannnda	*Padamaka.*
Marathi	*Padmakastha, Padmaka , Padmakasta.*
Punjabi	*Paja, Chabheearee,Amalguckr, Chamiari, Puddum, Pajja, Pajia.*
Tamil	*Patumugam.*

Part(s) used:
Bark[12], Heart wood, stem, seed [5]

Botanical description

A middle sized or a large tree, ***bark*** smooth, brown, peeling off in horizontal strips exposing a shining copper colored surface. ***Sap wood-*** Whitish and lustrous; ***Heart Wood-*** is reddish brown, closely grained, moderately hard and strong, durable and seasons well. It is resistant to fungus and insect attack and works to good finish. [1] ***Leaves -*** membranous, ovate - lanceolate or elliptic-lanceolate, blade 7.5-12.5 cm, glossy, nearly glabrous, margin sharply serrate, with one or more conspicuous glands on the petiole. ***Stipules*** long, 3-5 parted, glandular, and fringed. ***Flowers:*** white, pink [13] or crimson 2.5 cm in diameter in umbellate fascicles, peduncles and are the rich sources of nectar and pollen for bees. [11] ***Drupes*** ovoid, oblong or ellipsoid, 1.25-2 cm long, obtuse at both ends, yellow or reddish; ***Stone*** [13] - *rugose, pony,* ovoid, wrinkled and furrowed, pulp very little. ***Flowering and Fruiting*****:** October – May [1], [14], [15], [16], [17], [18], ***Pollen*****:** Grains 3 – zonicolporate, colpus broad, lip pointed, endocolpium indistinct. Exine surface finely straite striae thick. Exine 2.5 µm thick, ecto exine as thick as endoexine; columella indistinct; AMB circular, triangulate 39x28 µm. Shape sub-prolate. [11] Fig 1-Fig 17

Fig1: The tree in full bloom

Fig 2:-Flowers

Fig-3-Fruits

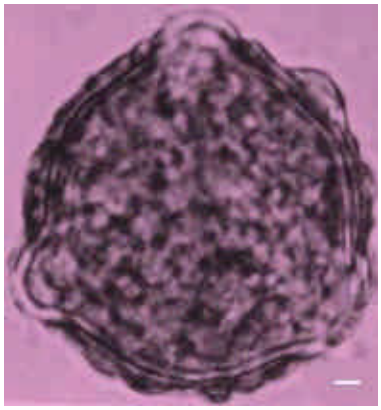

Fig 5:- Light microphotograph of pollen (polar view).

Fig 6: SEM microphotograph: in polar view

Fig 7:-SEM microphotograph in equatorial view

Fig-8:- Leaves

Fig:-9- Heartwood

Fig.10

Fig.11

Fig.12

Fig.13

Fig.14

Fig.15

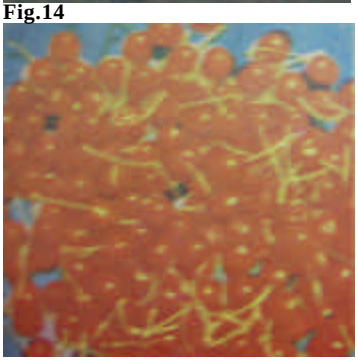

Fig.16

Fig.17

Fig.18

Fig 10-18 -Prunus-Fruits of Different Species

Distribution

Indigenous and wild in the temperate Himalaya extending from Kashmir to Bhutan, Garhwal, Sikkim in Akai and Khasia hills in Assam, Manipur at altitude of 900-2300m. [1] It is also found in, Nepal,Myanmar &West China [18], [19], [20] In India the plant is restricted to regions of Himalaya ranging from 1500-2400 m asl. In Garhwal Hills it is distributed abundantly in temperate zones of Pauri, Tehri, Chamoli and Uttarkashi districts. Locally it is known as 'Panyyan'[11]. It is also found in the districts of Chamba, Kangra, Manipur, Bilaspur, Kullu, Sirmour and Simla in Himachal Pradesh up to elevation of 1800m., upper Burma [10] Kodaikanal, Ooty. Also cultivated in the North eastern part of India [21], [22], [23]

Ethnobotanical claims

The heartwood is bitter, acrid, anodyne, refrigerant, demulcent, antipyretic, vulnerary, constipating, and causes flatulence. It is diuretic, emmenogogue, depurative, anti abortifacient, analgesic, carminative, conceptive, expectorant, febrifuge and tonic. It is useful in stomach trouble, seminal weakness. [24] It is beneficial in leprosy, hallucinations, leucoderma, erysipelas, burnings, vomiting, asthma, hiccough and thirst. It is also useful in sprains, wounds, ulcers, skin discolouration, diarrhea, cardiac debility. [25],[10] Seed kernal is used in the treatment of stone and gravel in the kidney [26],[27] It is also useful in Bleeding disorders, burning sensation and skin diseases.[28] The smaller branches are crushed and soaked in water and taken internally to stop abortion. [1] It is also beneficial in Scorpion stings. [10], [29] Decoction of stem bark is concentrated at low temperature and applied to cure joint pains.[30] The bark is used in the preparation of hair oil for massage.The paste of the bark is applied over the forehead for hemicranias and is also used as plaster for fractures and dislocations.[31] It is beneficial in Neuralgia and is given to check over sweating in the body.[32] *Padmaka* is used along with other fragrant drugs as a medicated smoking wick[33].

Other Uses

Although the plant is conserved for religious purposes, it is used in rituals by the local inhabitants, especially in Gharwal Himalaya [34] yet have some other uses such as, leaves for fodder [35], and fruits for making sauces. The heart wood is occasionally used for buildings and for making ornamental furniture. The wood of saplings, branches and root suckers makes excellent walking sticks and umbrella crooks. It is also used in the construction of beds and seats. [37] It deserves attention as a turnery wood and also as a suitable alternative to wal nut in the manufacture of gun stocks. [1] A gum exuding from trunk and branches is used by honeybees as honeydew. The bark paste is applied on contusions. [38]The fruits are the main food for the barking deers in Nepal especially in rainy season. [39].The ripe fruits are edible and the seeds are used in necklaces.

Chemical constituents

Heartwood: Dihydrotectochrysin, dihydrowogonin, pinocembrin, chrysin, naringenin, kaempferol, aromadendrin, quercetin, taxifolin, 7-hydroxy-5, 2´, 4´-trimethoxy flavanone(Carasinone), 2´-hydroxy 2, 4, 4´, 6'- tetramethoxy chalcone (Carasidin),2´,4´ dihydroxy-2, 4, 6´- trimethoxy-chalcone (carasin) [40]

Stem: Narigenin, apigenin, ß-sitosterol, sakuranetin, prunetin, genkwanin

Sapwood: A flavone glycoside puddumin A [7-O-(ß-D-glucopyranosyl)-5-O-methylnaringenin], genistein [41], [42] prunetin[43], n-pentacosane, triacontane, noctacosanol, ß-sitosterol, ursolic acid , oleic, palmitic and stearic acids, afzelin, kaempteritrin, naringenin, ß-sitosterol-ß-D-glucoside ,[41]

Stem bark: Padmakastein and its derivatives, ß-sitosterol behenate, tectochrysin, genistein, leucocynidin, 4´-glucoside of genkwanin, chrysophenol, emodin, 8ß-D glucosides, orientalone, physcion, ß- sitosterol glucoside,[42] amygdalin, prunasetin (isoflavone), sakuranetin, puddumetin, flavanone [43], [44] sakuranetin (5, 4´-dihydroxy-7-methoxy flavone) and its 5-glucoside, neosakuranin (2, 4´-dihydroxy-4-methoxy-6- glucosidoxy chalcone), leucocyanidin [45] puddumin B (naringenin-4´-methyl ether-7-O-ß-D-galactoside) [41], Taxifolin[1]

Root bark: Ursolic acid, stigmasterol, prunetinoside, glucogenkwanin, [46]

Seed: Naringenin-5-O-a-L-rhamnopyranoside,4´-O-methyl-liquiritigenin-7-O-a-L rhamnopyranoside, naringenin 4´-methylether 7-xyloside, ß- sitosterol-3-O-D-galactopyranoside [47]

Branches-These are substitute for Hydrocyanic acid., amygdalin

Leaves: Quercetin-3-rhamnoglucoside, kaempferol [48]

Pharmacological activities:

Plant was reported to have antispasmodic [51] and antioxidant activities. [52]

Toxicology

Many *Prunus* species produce hydrogen cyanide, usually in their leaves and seeds. This gives a characteristic taste in small (trace) quantities, and becomes bitter in larger quantities. The cyanogenetic glycosides found in *Prunus* species are amygdalin, prulaurasin, and prunasin. This makes some *Prunus* species toxic, although the fruit usually is safe. Bitter almonds, produced from *Prunus amygdalus* var. *amara* can be dangerous if eaten raw because they yield significant amounts of prussic acid (hydrogen cyanide), from the enzyme emulsin acting on a soluble glucoside, amygdalin. [53]

Therapeutic evaluation

Puddu-min-A a flavonone glucoside from *P. ceresoides* showed the increased diuretic activity. Plant is not much explored but studies on behavioral approaches after ingestion of plant are going on.

Substitutes and adulterants

Var. *rubeus* Ingram and var. *majestica* Ingram, grown in some area like Darjeeling hills are used as substitute or adulterants. [1]

Propagation and cultivation

The tree reproduces freely from root suckers and can be grown from cuttings with a heel in July/August. Natural regeneration of the plant is by seeds and Regeneration can be achieved by direct sowing or by transplanting nursery raised seedlings. [11] The seeds germinate readily it prefers temperate climate. Seeds of the plants require 2-3 months cold stratification and is best sown in cold frame as soon as it ripes. Stored seeds sown as early as in the year, sometimes takes more than 8 months to germinate The seedlings are also used as a rootstock for the propagation of sweet cherry by the orchardists [1], [11]

Apicultural Value: All the four species of *Apis* present in India namely *Apis cerana indica, A. dorsata, A. florae* and *A. mellifera* visit the flowers of *Prunus cerasoides* for its rich nectar (N1) and pollen (P1). The honey is slightly bitter in taste but medicinal in properties. Inhabitants of this region use *Prunus cerasoides* honey to treat eye ailments. [11]

Cultural importance

It is worshipped in all auspicious occasions by the inhabitants. People never cut the whole tree and use only its twigs in rituals as the wood are forbidden to be used as fuel. The plant is strongly recommended for plantation as rich source of pollen and nectar to honeybees besides its religious value. Thus it is common to observe quite old trees of *Prunus cerasoides* in the area. But the potential of the plant as rich source of pollen and nectar for honey bees is not tapped adequately. [11]

Ayurvedic properties[32]

***Rasa* (Taste):** *Kashaya* (Astringent), *Tikta* (Bitter).
***Guna* (Quality):** *Laghu* (Light for digestion).
***Vipaka* (Post digestion effect):** *Katu (*Pungent*).*
***Veerya (Potency)**: Sheeta* (Cold).
***Doshghnata (*Effect on *Dosha):** Kaphapittashamaka (Mitigates Kapha and Pitta)*
Pittashamaka (Mitigates pitta).

Table no.3

Karma: *[54], [55], [56], [57], [58]*

S.No.	Property(sanskrit)	Property (English translation)
1.	*Varnya*	Enhances complexion
2.	*Kandughna*	Prevents itching
3.	*Kushtaghna*	Avoids skin diseases
4.	*Dahaprashamana*	Pacifies Burning sensation
5.	*Vedanasthapana*	Relieves pain
6.	*Raktastambhana*	Styptic
7.	*Mootrala*	Diuretic
8.	*Garbhasthapana*	Anti Abortifacient
9.	*Jwarghna*	Relieves fever

Table No. 4

Rogaghnata: *[54], [55], [56], [57], [58]* [59]

Sl.No	Disease	Equivalent English Term
1.	*Shirashool*	Headache
2.	*Kandu*	Itching
3.	*Kushtha*	Skin ailments
4.	*Visarpa*	Herpes
5.	*Daha*	Burning Sensation
6	*Nadishoola*	Cramping pains
7	*Vamana*	Vomiting
8	*Trishna*	Thirst
9	*Raktapitta*	Bleeding Disorder
10	*Ashmari*	Calculi
11	*Visha*	Poisoning
12	*Jwara*	Fevers

Sl.No	Disease	Equivalent English Term
13	*Prameha (Pittaja)*	Diabetes
14	*Rajyakshma*	Tuberculosis
15	*Shotha*	Swelling
16	*Grahani*	Amebiasis
17	*Hikka, Shwasa*	Hiccough, dyspnoea
18	*Kasa*	Cough
19	*Urusthambha*	Stiffness of the muscles of Thigh
20	*Vrana*	Wounds
21	*Bhagandar*	Fistula in ano
22	*Vasti*	Urinary tract disorders
23	*Agada*	Antidote of poison
24	*As Dhupan*	For fumigation
25	*Netraroga*	Eye disorders
26	*Rakta vikara*	Blood disorders
27	*Arsha*	Hemorrhoids
28	*Urah kshata*	Consumptive cough
29	*Swara Kshaya*	Decrease in tone in voice
30	*Parshwa shoola*	Back pain may be due to respiratory origin
31	*Yakrit*	Hepatomegaly
32	*Pleeha*	Splenomegaly
33	*Upadamsha*	Gonorrhoea
34	*Mutrakrichra*	Dysuria
35	*Netra roga*	Eye disease
36	*Keetavisha Vrana*	Wound due to insect bite
37	*Nadi Vrana*	Sinuses
38	*Sadyo vrana*	Fresh wound
39	*Unmada*	Mania
40	*Apasmara*	Epilepsy

Doses:
Powder 1-2 gm (5-15 Ratti) [60]
Decoction 50-100 ml [61]

Method of administration:
Padmakashtha should always be used fresh in order to retain the pharmacological activities. *Padmaka Kwatha* should never be used because on boiling, all the volatile principles in it are lost. It should always be made in the form of *Phanta* using Luke warm water. [60]

Table no. 5 Formulations and preparations: [62]

S. No.	Type of Dosage form	Name of formulation
1.	***Asava and Arista***	*Ushirasava, Chandanasava, Dashmoolarista, Mritasanjivani sura,Sarivadyasava.*
2.	***Arka***.	*Karpuradyarka*
3.	***Kvatha Churna***	*Draksadi Kvatha churna, Guduchyadi ghana Kvatha churna.*
4.	***Ghrita***	*Kasisadi ghrita, Maha Kalyanaka ghrita, Shatavaryadi ghrita, Brhatcchagaladya ghrita ,Mahatiktaka ghrita* (CS Ci.7.145), *Chandanadya ghrita* (CS Ci.15.126), *Manashiladi ghrita* (CS Ci.17.145),
5.	***Churna***	*Sudarshana churna. Kirathadya churna* (CS Ci.15.138), *Phalatrikadi churna* (SS U.52.14),
6.	***Taila***	*Arimedadi taila, Kumkumadi taila, Chandanadi taila, Jatyadi taila, Triphaladi taila, Bala taila, Bhringaraja taila, Madhuyastyadi taila, Ashvagandha taila, Guduchyadi taila. Madhuparnyadi taila* (CS Ci.29.93), *Mahapadma taila* (CS Ci.29.112).
7.	***Vati and Gutika***	*Khadiradi Gutika (Mukharoga)*
8.	***Avaleha***	*Padmakadileha* (CS Ci.18.174),

CS - *Charaka Samhita*, SS – *Sushruta Samhita*

DISCUSSION & CONCLUSION:
The drug *Padmaka* called as Himalayan Wild Cherry is often confused with the drug padma due to similar names. Some of the authors refer *Padmaka* as padma. But this controversy is cleared by the botanical description provided. *Padmakashtha* (stem) is the main useful part mentioned in all Ayurvedic classics. *Padmaka* is referred to as the *Kathinatama Dravya* (hard drug) in *Sharangadhaa Samhita*. [63] Classically many therapeutic uses have been elaborated but all these are yet to be tested practically. Very few works are attempted on the therapeutic utility of the drug except for few pharmacological activities such as anti oxidant, analgesic, anti spasmodic activities. Hence there is a large scope for the researchers to explore and evaluate the pharmacological activities of the drug.

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