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*Phoenix pusilla*Gaertn. - A Review

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ABSTRACT

To treat various diseases and disorders prevalent amongst people,it becomes necessary to develop herbal medicines because of their easy local availability and low costs. Herbal medicines are getting more popular and demanding in developing and developed countries because of their efficacy and economic costs. There has been tremendous growth in field of herbal medicine as therapeutic agents. The genus *Phoenix* has been reported to contain 13 species.The fruits known as dates are edible andoften consumed as food and medicine.Since there are few reports regarding *Phoenix pusilla*, an attempt has been made to analyse the literature available for phytochemistry and biological activities that may make this plant major potential source of nutraceuticals and bioactive compounds to be considered as an herbal medicine.

KEYWORDS:*Phoenix pusilla*, Phytochemistry, Herbal medicine, Ornamental plant, Flavonoids.

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INTRODUCTION

The genus *Phoenix*has been reported to contain 13 species.[1] Most of the species are used for ornamental purposes. The fruits of the plant known as dates, from approximately eighty percent of the species are edible and are often consumed as food and medicine[2]throughout the world. Some of the countries reported are Sikkim Himalayas[3], Canary Islands (Spain),[4] Hong kong,[5] Taiwan,[6] Andhra Pradesh (India),[7] Southern Africa,[8] Pakistan,[9]and Kuwait.[10] The use of palm-kernel oil in Ayurveda has been traced back to about 4000 years.[11,12] Different parts of the plant *Phoenix* are used to treat various metabolic disturbances and diseases like fever, paralysis, inflammation, nervous disorders, loss of consciousness, memory disturbances, cystitis, gonorrhoea, oedema, abdominal problems and in counteracting alcohol intoxication.[13,14,15] Various species of *Phoenix* are known to possess anti-microbial, anti-oxidant, antidiabetic, antitumor and hepatoprotective activities.[16]An attempt has been made to study *P. pusilla*for phytochemistry and biological activities from the available literature that may make this plant a major potential source of bioactive compounds to be considered as an herbal medicine.

*Phoenix pusilla*Gaertn. (Family Arecaceae) is commonly known as small wild date-palm / Ceylon date palm / Asiatic Grewia in English; in Hindi: Palavat and in Sanskrit: Parusakah. This species has a restricted global distribution occurring only in Sri Lanka (formerly known as Ceylon) and India. In Sri Lanka it is commonly known as indi-gaha. It is distributed in the dry forests of Kerala, Karnataka and Eastern Ghats of Tamilnadu in India, at low elevations, ridges and hills. However, it is also found to be present inland at the margins of marshes and raised banks along borders of paddy fields, up to an altitude of 700 m. At the times of food shortage, trunk serves as the major source of edible starch.[17]The tender part of the palm is often eaten by low income group people as a meal called kanji. The leaflets are used locally to be woven into ornamental baskets, brooms, pouches and sleeping mats. [10,17-19]Fruits are attracted by birds during the fruiting seasonthat cause easy propagation of this palm.[10]Various other environment protective and biological properties of the plant/fruits have been discussed here.

Morphology

P. pusilla is an evergreen, solitary or clustering, shrubby soloniferous palm tree with a very short unbranched stem up to 3-6 meters tall and 30 cm in diameter that is thickly clothed with old leaf sheaths.[18]The leaves are 3 meter long pinnate. Leaf sheath is fibrous and reddish brown. Rachis is with one or more pairs of spines. Leaflets more or less irregularly arranged (subopposite), on each side of the rachis, quadrifarious proximally, sword-shaped with very sharp needle-like apices, rigid, pale grey with an orange-red pulvinus at the junction with the rachis. Staminate flowers are ovoid,

yellow-white, calyx 1-1.5 mm high; petals 4-5 x2-3 mm ovate, with rounded apices. Pistillate flowers are greenish mostly in the distal half of rachilla; calyx 1.2 mm high; petals 2 x 3-4 mm. Fruits aremoderately fleshy, sweet with a flavour of chestnut,ovoid, 11-15 x 5-8 mm, dull purple, black when ripe in the months of July and August.[20,21]Seeds are ovoid 8-12 x 6 mm,with round apices, pinkish-brown when fresh, drying glossychestnut-brown. They are cartilaginous, grooved longitudinally with a small elevation on the middle of the back. Endosperm is homogeneous. *Phoenix* is propagated by pre-soaking seeds for 24 hours before sowing. The optimal temperature for seed germination is 21-27° C.[22] The flowering season is from November to January. The Palm produces a mat of fibrous roots that anchors it firmly to the substratum.

Taxonomic classification of *Phoenix pusilla*Gaertn. :

Kingdom – Plantae
Phyllum – Tracheophyta
Class – Liliopsida
Subclass – Arecidae
Order – Arecales
Family – Arecaceae
Subfamily –Phoenicoideae
Tribe – Phoeniceae
Genus – *Phoenix*
Species – p*usilla*Gaertn.

Farhanazand co-workers (2017)demonstrated organoleptic featuresthat are supposed to be the fundamental way of analysing plant species, more commonly practiced by herbalists, practitioners, local population and herb sellers.[16] The analysis include features like odour, shape, size, texture, weight, height, taste, structure, visibility etc.

Phytochemicals Reported

The bark of *P. pusilla* contains erythrodiol, taraxasterol, beta-sitosterol and its glucoside: beta-amylin, betulin, lupeol, lupenone and friedelin. Friuts possess pelargonidin-3, 5-diglucoside, quercetin, quercetin-3-O-beta –D-glucoside, naringenin-7-O-beta-glucoside and amino acids - proline, lysine, glutamic acid, and phenylalanine. Leaves contain quercetin, kaempferol and their glycosides.[23]

Methanol extract of fruit and seed have been reported to contain flavonoids, phenols, tannins, carbohydrates and amino acids. High lipid content was reported in methanol seed extract

whereas carbohydrates, pigment and protein content was high in fruit extract.[16]VijayaBharatialong with Co-workers (2018) reported that ethanol extract of dried root powder possess maximum secondary metabolites like alkaloids, saponins, flavonoids, triterpenoids, tannin, phenolic compounds, glycosides and primary metabolites.[24] Steroids have been reported in the hexane extract of root powder of *Phoenix*.[25.26]

Reported Biological and Pharmacological Activities

Traditional medicinal use of various parts of the plant have been practiced and elaborated by various ancient Ayurvadacharyas. In Kerala (India), the fruits of *P. pusilla* are used as Parushaka.[23]Charaka demonstrated and prescribed the use of fruits alone or a decoction of the leaves, roots and bark to treat fever, cough, diseases of the spleen, alcoholism and rheumatism.[23] The fruit is small, fleshy and sweet with flavour like chestnutsthat possess laxative, cardiotoinc, aphrodisiac, carminative, purgative and roborant properties.[14,23] The fruit is also used for hyperdipsia, burning sensation, fever, consumption (a wasting disease especially pulmonary tuberculosis), cardiac debility, seminal weakness, gasteropathy and general debility.[14]Sushruta prescribed fruits to have cooling and appetizing effects and be used as astringent for treating haemoptysis.[23] In folk-medicine the root-bark is used internally and externally in rheumatism.[23] A refreshing summer drink, well known as Sharbat-e-phaalsaa (Unani squash) is used as a cardiac tonic and appetizer. Leaves were found to be effective against pustular eruptions.[23]

Antidiabetic activity was known to be associated with ethanol extract of unripe fruit. Sankar and Shoba (2017) reported that oral administration of ethanolic unripe fruit extract of *P. pusilla* (PFE) @ 100 and 200 mg/kg along with glibenclamide @ 6mg/kg for 21 days in streptozotocin –induced diabetic rats resulted in improved body weight and normalization of carbohydrate and lipid metabolizing enzymes and lipid profile.[27] The cause was attributed to high fiber content and pancreatic regenerating ability of the extract that increased insulin secretion and restored tissue and muscle proteins. PFE increased the activity of enzyme hexokinase in liver that increased the utilization of glucose resulting in lowered blood sugar levels.[27,28] Sankar and Shoba (2014, 2015) in another study reported that PFE inhibited the activities of α-amylase and α-glucosidase that could be useful in the management of post-prandial hyperglycemia. This might be attributed to the presence of phytochemicals-phenols, flavonoids, proteins, saponins, steroids and tannins.[29,30]

Antioxidant and anti-tumouractivity - Many health benefits are associated with flavonoids like antioxidant and free radical scavenging activity, reduction and prevention of cardiovascular and chronic diseases.[31,32]Sankar and Shoba (2017) reported that oral administration of ethanolic unripe fruit extract of *P.pusilla*(PFE) in rats exhibited antioxidant activity by increasing the activity of

enzymes reduced glutathione and superoxide dismutase that act as free radical scavengers. [27]VijayaBharati*et al (*2018) reported that ethanol extract of dried root powder also possess potential scavenging property and anti-tumour activity that might be attributed to the presence of maximum secondary metabolites like alkaloids, saponins, flavonoids, triterpenoids, tannin, phenolic compounds, glycosides and primary metabolites.[24] Flavonoids are known to possess antioxidant, antibacterial, antiviral, anti-cancer and anti-inflammatory activities.[25,26,33-35]

Antibacterial and antifungal activity - Ethanol, acetone and hexane root extract of *P. pusilla* possess antibacterial activity against Gram positive bacteria *Enterococcus faecalis* and Gram negative bacteria *Escherichia coli* and *Serratiamarcescens.*[24] The ether extract of leaves possess anti-bacterial activity against *Staphylococcus aureus* and *E. coli*.[23] Ethanol root extract is known to possess anti-fungal activity. *Candida albicans* (fungus) was found to be more susceptible to ethanol root extract.[24]

Other activities / Effects

Xenic and metaxenic effect- Sudershan*etal* (2010) reported xenic and metaxenic effect of *P. pusilla* on three date palm cultivars- Barhi, Majdool and Sultana. Pollen from*P.pusilla*(closely related to date-palm) fertilizes the date palm flowers similar to the date palm pollen. Fruit maturity was delayed and the fruits were seedless at maturity.[36]

Environmental protection – The plant have the ability to grow on open desert land in Kuwait as well as in the coastal regions. The crown of leaves surrounding short clustering stem lying on the soil surface could be used to protect soil against erosion. Due to their environment friendly nature both male and female *P. pusilla* were introduced and established successfully in the Kuwait Institute for Scientific Research (KISR) Campus in Kuwait.[10] It has also been reported that the date palm crop has been introduced for landscape beautification, crop improvement programs and ornamental purposes in Kuwait.[10]

Weather tolerant -Sudhersan 2004 reported that Palms planted in Kuwait tolerated and survived the harsh climatic variations pertaining to extremes of cold (4° -10°C) and hot (46° – 48°C) temperatures.[10]

CONCLUSION

Phoenix pusilla is known to possess various bioactive agents that can be made into various formulations to be used as herbal medicine for treating various diseases and disorders. Moreover it can also be grown in various climatic conditions to reduce soil erosion. So there are various possibilities to employ this plant for the service of mankind that needs to be further elaborated.

CONFLICT OF INTEREST- None

REFERENCES

1. Barrow SC.A monograph of *Phoenix*L. (Palmae: Coryphoideae). Kew Bull. 1998; 53(3): 513–575.
2. Rivera D, MatillaG, Obón C,et al. Plants and humans in the Near East and the Caucasus, Ancient and Traditional uses of plants as food and medicine, A Diachronicethnobotanical Review, 2 Vols.(2: The Plants: Angiosperms, Murcia, 2012; 1400p.
3. Sundriyal M, Sundriyal R, Sharma E, et al. Wild edibles and other useful plants from the Sikkim Himalaya, India., Oecol. Mont. 1998; 7: 43–54.
4. Webb P, Berthelot S. Histoire naturelle des îles Canaries, Minist. Instr. Publique: Paris, France; 1836; 3.
5. Hu S. Food plants of China, Chinese Univ. Press: Hong Kong, China; 2005.
6. Lin Y, Chen T, Tseng H, et al.Neural cell protective compounds isolated from *Phoenix hanceana*var. *formosana*, Phytochem. 2009; 70: 1173–1181.
7. Pavani M, Rao M, Nath M, et al.Ethnobotanical explorations on anti-diabetic plants used by tribal inhabitants of Seshachalam forest of Andhra Pradesh, India. Indian J. Fund. Appl. Life Sci. 2012; 2: 100–105.
8. Van Wyk B, Gericke N. People's plants. A guide to useful plants of southern Africa.Briza Publ.: Pretoria, South Africa; 2000.
9. Abbasi A, Khan M, Khan N, et al. Ethnobotanical survey of medicinally important wild edible fruit species used by tribal communities of Lesser Himalayas, Pakistan. J. Ethnopharmacol. 2013; 148: 528–536.
10. Sudhersan C. Introduction of a multipurpose Palm, *Phoenix pusilla*, in Kuwait. PALMS. 2004; 48(4):191-196
11. Hedrick UP. Sturtevant's Edible Plants of the World. Dover Publications: New York; 1972.
12. Jones DL. Palms throughout the World. Smithsonian Institution Press, Washington; 1995.
13. Nadkarni KM (Ed). Indian Materia Medica. Bombay Popular PrakashanPvt. Ltd.: Mumbai; 1976: 1.
14. Varier PS. Indian Medicinal Plants. Orient Longman: Chennai, 1995; 4.
15. Barh D, Mazumdar BC. Comparative nutritive values of palm saps before and after their partial fermentation and effective use of wild date (*Phoenix sylvestris*Roxb.) sap in treatment of anaemia. Res. J. Medicine and Med. Sci. 2008; 3: 173-176.
16. Farhanaz By, Anuradha V, Suganya V, et al. Pharmacognosy of South Indian Date palm – *Phoenix pusilla*. World J. of Pharma. Res., 2017. 6(16):806-819.

17. Gamble JS (Ed). A manual of Indian Timbers. Publisher: Bishen Singh Mahendra Pal Singh: Dehradun; 1972.
18. Trimen H (Ed). A Handbook to the Flora of Ceylon. Publication continued by Hooker JD. Dulau and Co.: London; 1898.
19. Uphof JC Th(Ed.). Dictionary of Economic Plants.Weinheim, Germany: HR Engelmann (J Cramer); 1959.
20. Mayuranathan PV. The flowering plants of Madras City and its immediate neighbourhood. Revised by C. Livingstone and A. N. Henry. Bulletin of the Madras Government Museum, New Series, Natural History Sec., Madras; 1994:10.
21. Facciola S (Ed). Cornucopia II. Kampong publications: California; 1998.
22. Huxley A, Griffiths M, Levy M. The new Royal Horticultural Society dictionary of gardening. Mac Millan Press: Great Britain; 1992.
23. Khare CP (Ed.) Indian Herbal Remedies: Rational Western Therapy, Ayurvedic and other Traditional Usage, Botany. Springer Science and Business Media, Science 27 June 2011; 524.
24. VijayaBharathi S, Anuradha V,Rubalakshmi G. In vitro antioxidant and antimicrobial activity of *Phoenix pusilla* root extract. Asian J. Pharm.Clin. Res**.** 2018; 11(2): 194-197.
25. Kumar S, Pandey AK. Chemistry and biological activities of flavonoids: An overview. Sci. World J. 2013; Article ID 162750. 2013: 1-16.
26. Goveas SW, Abraham A. Evaluation of antimicrobial and antioxidant activity of stem and leaf extracts of *Cosciniumfenestratum*. Asian J. Pharm.Clin. Res. 2013;6:218-27.
27. Sankar V, Shoba FG. Antioxidant and antidiabetic activity of *Phoenix pusilla*Gaertn. unripe fruit extract in streptozotocin-induced Sprague dawley rats. J.Phytopharmacol. 2017;6(2):66-72.
28. Chanda M, Rajkumar V, Debidas G. Antidiabetogenic effects of separate and composite extract of seed of Jamun (*Eugiajambolana*) and root of Kadali (*Musa paradisiaca*) in streptozotocin induced diabetic male albino rat: A comparative study. Int. J.Pharmacol. 2006; 2:492-503.
29. Sankar V, Shoba FG. Quantitative and qualitative analysis of various phyto-constituents in *Phoenix pusilla* unripe fruit ethanolic extract. Asian J. Pharm.Clin. Res. 2014; 7(5): 216-219.
30. Sankar V, Shoba FG. Inhibitory effect of *Phoenixpusilla*unripe fruit on the enzymes, α-amylase and α-glucosidase. Int. J.PharmTech. Research. 2015; 8(1): 123-126.
31. Tapas AR, Sakarkar AM, Kakde RB. Flavonoids as nutraceuticals: A review. Tropical J. Pharma. Res. 2008; 7(3): 1089-1099.

32. Elgindi MR, Singab AN, El-Taher EMM, et al. A Comprehensive Review of *Phoenix* (Arecaceae). Res. J. Pharma. Biol.Clin. Sci. May-June 2015; 6(3): 966-974.
33. Kandaswami C, Lee LT, Lee PP, et al. The antitumor activities of flavonoids. In Vivo. 2005; 19(5): 895-909.
34. Rammal H, Bouayed J, Hijazi A, et al. Scavenger capacity of *Momordicacharantia* for reactive oxygen species. J. Nat. Prod. 2012; 5: 54-9.
35. Mirghani MES, Liyana Y, Parveen J. Bioactivity analysis of lemon grass (*Cymbopogancitratus*) essential oil. International food research journal. 2012; 19: 569-575.
36. Sudhersan C, Jibi Manuel S, Al-Sabah L. Xenic and metaxenic effect ofP*hoenix pusilla* pollen on certain date palm cultivars. ActaHortic. 2010; 882: 297-302.