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Full Length Research Paper

Phytomedicinal study of coastal sand dune floras in Puducherry

A. Padmavathy* and M. Anbarashan

Department of Ecology and Environmental science, Pondicherry University, Puducherry-605014. India.

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Coastal dune floras play a key role in dune stabilization and restoration, a part from this, their unique important medicinal values remains unexplored to most of the people, thus results in destruction and removal of dune floras. This communication addresses the composition and distribution of CSD medicinal floras surveyed during March-December 2010 by direct interviews with ethnic groups dwelling in the proximity of CSDs, native traditional healers, Ayurvedic practitioners and botanists dealing with medicinal wild plants in selective coastal villages of Puducherry. Results enumerated with a total of 52 species belonging to 34 families. Fabaceae was found to be the most dominant family and majority of the medicinal plants were herbs. These CSD floras were under constant anthropogenic pressure due to rapid elimination of sand dunes and its associated vegetation; as a result, its associated indigenous knowledge with them is also gradually disappearing. Such biodiversity rich and useful ecosystems need immediate restoration and conservation actions.

Key words: Coastal sand dune, medicinal plants, Puducherry, traditional knowledge.

INTRODUCTION

Coastal sand dunes are distributed throughout the world except in Antarctica; they serve as an ecological niche between marine and terrestrial systems. CSDs are dynamic, but fragile buffer zones of sand and vegetation are formed, where the following three characteristics can be found: large quantities of sand, persistent wind capable of moving the sand and suitable locations for sand to accumulate (Rodrigues et al., 2010). They play various roles as essential store of sediments, protecting the land behind them from storm erosion and potential sea level rise; filter for rainwater and groundwater and in some situations, provided aquatic habitats, such as dune lakes; protection of islands from storm surges, hurricanes and erosion; trapping of the windblown sand and prevention of sand being blown further in land by the vegetation; habitats for specially adapted plants, birds, and animals - several of which are now rare or endangered; a range of unique landforms and processes, which have intrinsic value and are of scientific interest; and nesting sites for sea turtles and birds (Padmavathy et al., 2010).

Many wild plants have their own unique medicinal values, but majority of them were endemic and are found only in specific ecological niche. CSD are special unique ecologically sensitive niches between terrestrial and marine realms, but their floral composition is poorly understood especially in terms of phytomedicial values. Thus it forms a gap in understanding the diversity, ecological, functional, economical value and conservation of coastal dune vegetation worldwide, especially in Indian coasts. These habitats have been severely affected by natural and anthropogenic activities resulting in loss of habitat and dependent flora and fauna (Padmavathy et al., 2011).

*Corresponding author. E-mail: ecopadma@gmail.com.

Indian has a coastal line of about 7,500 km, which comprises many ecologically fragile ecosystems like, lagoons, estuaries, CSD, beaches and mangrove swamps, which supports rich biodiversity and natural resources (Pattanaik et al., 2008). With respect to geographic location and species composition, 22 km of Puducherry coastline comprises great biodiversity and resources in various forms of ecosystems. About 90% of Puducherry coastal zone and its unique ecosystems were under treat due to deforestation, soil erosion and use of coastal vegetation by the local people for their various purposes.

Especially, the coastal biota is under serious threat from human activities that lead to destruction of natural ecosystem in alarming rate. There has been a phenol-menal increase in loss of coastal vegetation during the last few decades (Pattanaik et al., 2008; Rodrigues et al., 2010). Some partial floristic studies on coastal sand dune vegetation were done before, but comprehensive phyto-medicinal studies of sand dune species has not been carried out before in Puducherry coast. Therefore, this paper focuses specially on the popular traditional and medicinal use of most widely known coastal sand dune plants.

METHODOLOGY

Puducherry is located on the Coromandal coast between 11°52' N, 79° 45' E and 11° 59' N, 79° 52' E. It covers an area of 480 sq km. The coastal border has a length of 22 km and a breadth ranging from four to six hundred meters.

Superficially, the coast is flat and sandy. The coastal zone of Puducherry comprises newer and older dunes including saline areas of clayey texture. The study area experiences mean annual temperature of 30.0°C and mean annual rainfall of about 1,311 to 1,172 mm. The mean number of annual rainy days is 55, the mean monthly temperature ranges from 21.3 to 30.2°C. The climate is tropically dissymmetric with bulk of rainfall during northeast monsoon October- December (Padmavathy et al., 2010).

Periodic field surveys were carried out from March-December 2010 in selective coastal villages of Puducherry. The local native traditional healers, Ayurvedic practitioner's people having the indigenous knowledge of the medicinal plants were conducted through frequent field visits in various villages of Puducherry with the help of village head and local traders.

The information was collected by group discussions and interviews with them in their local language (Tamil) (Padmavathy and Anbarashan, 2010).

Each of the plant material was assigned a field note books and documented as to Binomials with family, local name, part used and therapeutic uses, plant parts that were identified as having use in ethnobotany were collected, compressed, the voucher specimens were collected and identified by referring to standard flora (Hooker, 1884; Matthew, 1983).

All the voucher specimens were maintained in the herbarium at Pondicherry University, Puducherry (India).

RESULTS AND DISCUSSION

Plants in CSD are specially adapted to withstand various environmental stresses, which allow them to grow, establish and to trap sand in such harsh conditions of coastal zones.

They are psammophytes and mostly represented by herbs, shrubs, creepers or runners, thus they play vital role in dune stabilization and controls erosion.

Dune species were commonly known to play ecological roles but not economically, and thus they have unique and specialized medicinal values. Fifty two species were distributed among 34 families and 51 genera were enumerated from this study (Table 1). Fabaceae was found to be dominant family with 5 species fallowed by Arecaceae (4), Verbenaceae (4), Papilionaceae (3).

Other families contributed with one or two species. Among all the species, herbs were found to be more (23 sp.) fallowed by trees (13 sp.), shrubs (8 sp.), grass (3 sp.), climber (3 sp.) and creepers (2 sp.). The distribution reveals that the diversity of flora is increasing gradually from seaward to inland.

All the medical plants were taken internally with additives such as oil (sesame, castor and coconut), milk and milk products (butter milk and ghee), common salt, jaggery and honey or applied externally in the form of infusion, decoction, paste or powder. Most of the plants used in medicines are either mixed with other ingredients or single. All these species are known to be used in various treatments, like for curing Jaundice, hepatitis, mumps, eczema, cut, healing wounds, throat infection, diarrhea, itches, skin diseases, cure headache, stomach ulcer, tumor, ear-ache, eye pain, diabetes, colds and coughs in general.

Conclusion

CSD plant species of Puducherry are extremely important resources, which play a vital role in the biodiversity and economically in local livelihoods life. Restoration and conservation of these dune species, especially, medicinal plants must be encouraged and their extinction caused by various anthropogenic activities like over exploitation, urbanization, vegetation clearing etc can be prevented. By this, local villagers get low-cost medicine for their diseases.

The local traditional folklore medical knowledge information was the basic source for preliminary selection of medicinal valued plants, so, the conservation of medicinal plants diversity of this coastal dune is therefore most important for the management and sustainable development in these fragile ecological and life support systems.

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Table 1. List of species and their medicinal uses.

Scientific name	Family	Habit	Uses
Acalypha indica L.	Euphorbiaceae	Herb	A leaf paste, mixed with common salt, is used to cure eczema and chest pain.
Acanthus ilicifolius L.	Acanthaceae	Herb	Leaves are used in snake bites, rheumatism and asthma
Achyranthes aspera L.	Amaranthaceae	Herb	The boiled leaves are consumed to relieve internal piles and the roots are used as a brush to relieve pain and clean the teeth.
Ageratum conyziodes L.	Asteraceae	Herb	Root are Anti-inflammatory, aqueous extract of leaves exhibits antifungal and crude plant extract antibacterial properties and styptic.
Alternanthera sessilis L.	Amaranthaceae	Herb	It is used as a treatment for headache. It is also used to treat hepatitis and asthma.
Anacardium occidentale L.	Anacardiaceae	Tree	Leaves and bark are used as fungicidal, vermicidal, protozoicidal and antimicrobial (used for toothache, sore gums). Karnel eaten for its high protein content. Cashew apple-antiscorbutic. Resinous juice contained in the seeds used in cases of mental derangement, memory disturbances, palpitation of heart, rheumatic pericarditis, sexual debility.
Azadirachta indica A. Juss.	Meliaceae	Tree	Seed oil is used in skin diseases and in lice. Bark is useful in malarial fever. Tender twigs are used as tooth brush. Leaf paste applied for mumps.
Barringtonia accutangula Gaertn.	Barringtoniaceae	Tree	Leaf juice given in diarrhoea. Fruit- bitter, acrid, anthelmintic, haemolytic, vulnerary; prescribed in gingivitis as an expectorant. Powdered seeds are emetic and expectorant. Bark are astringent, used in diarrhoea and blennorrhoea. Febrifuge. Wood used as haemostatic (in metrorrhagia).
Boerhaevia diffusa L.	Nyctaginaceae	Herb	Whole plant was used. Diuretic, anti-inflammatory, antiarthritic, spasmolytic, antibacterial.
Borassus flabellifer L.	Arecaceae	Tree	Root is diuretic and anthelmintic. Fruits are useful in dyspepsia, flatulence, colic and skin diseases.
Calophyllum inophyllum L.	Clusiaceae	Tree	Seed oil applied externally in rheumatism and skin affections. A decoction of it employed for indolent ulcers. Bark juice used as a purgative.
Calotropis gigantea (L) R.Br.ex.Ait	Fabaceae	Shrub	Root bark is diaphoretic and expectorant; acts as mild stimulant. Powered root bark gives relief in diarrhea and dysentery.
Canavalia cathartica Thouars.	Fabaceae	Creeper	Roots are used for skin diseases. Leaves, roots and seeds are used for cuts, purifying blood, worms and skin diseases.
Canavalia maritim	Fabaceae	Herb	Young pods and seeds used as vegetables. Roots are used for skin diseases.
Cassia occidentali	Caesalpeniaceae	Shrub	Roots are used in treating snake bites. Seeds and leaves are used to cure skin diseases.

Table 1. Contd.

Casureneia equisitifoliys L	Casureneiaceae	Tree	Wood is used for house posts, rafters and masts of country made crafts, for fencing. Bark is a tonic and astringent, useful in diarrhea and dysentery
Catharanthus roseus L. and G.Don.	Apocynaceae	Herb	Whole plant is powdered and mixed with cow's milk and taken orally to treat diabetes.
Cissus quadrangularis L.	Vitaceae	Climber	A paste of the whole plant is taken for improving the digestion and inducing appetite.
Citrullus colocynthes L. and Schrader.	Cucurbitaceae	Climber	Dried pulp of ripe fruit cathartic, drastic purgative, irritant and toxic. The pulp is used for varicose veins and piles. A paste of root is applied to various inflammations and swellings. The cataplasm of leaves is applied in migraine and neuralgia.
Clerodendrum inerme L.	Verbenaceae	Shrub	Leaf- febrifuge, alterative. Used as a substitute for *Swertia chirayita* and quinine in remittent and intermittent fevers. The leaf juice is taken orally to relieve muscular pains and stiffness of legs (in tetanus).
Cocos nucifera L.	Arecaceae	Tree	Water from tender fruit is used for fever, urinary disorders, gastroenteritis and as a source of K for cholera patients. Fruit for stomachic, laxative, diuretic, styptic, sedative, useful in dyspepsia and burning sensation. Oil from endosperm- antiseptic; used in alopecia. Root- astringent; used in urinary and uterine and disorders. Shell and fibre-antimicrobial.
Crotalaria retusa	Papilionaceae	Shrub	Used in scabies and impetigo.
Cyperus rotundus L.	Cyperaceae	Grass	Carminative, astringent, anti-inflammatory, antirheumatic, hepatoprotective, diuretic, antipyretic, analgesic, hypotensive, emmenagogue and nervine tonic.
Dactyloctenium aegyptium L and P. Beauv.	Poaceae	Grass	Astringent, bitter tonic, anthelmintic. Used for polyurea; externally for wounds and ulcers. Intestinal, biliary and urinary diseases.
Desmodium trifolium L. and DC.	Fabaceae	Herb	Fresh leaves- used internally as galactagogue and for diarrhoea; applied externally to wounds and abscesses. Root is diuretic, used for cough and asthma.
Evolvulus alisinoides L.	Convolvulaceae	Herb	Brain tonic, an aid in conception, astringent, antidysenteric. Leaf is antiasthmatic. Used in nervine affections (epilepsy, insanity, spermatorrhoea), and duodenal ulcers, also for uterine affections. Flowers used for uterine bleeding and internal haemorrhages. A decoction of the herb is given as a blood purifier.
Gisekia pharnaceoides L.	Aizoaceae	Herb	Antihelmintic. Fresh herb is used for taenia.
Ipomoea pes-caprae L. and R. Br.	Convolvulaceae	Climber	Astringent, stomachic, laxative, antidiarrhoeal, antiemetic, analgesic. Leaf- diuretic, antiinflammatory. Used in colic, prolapsus ani; externally in rheumatism. Essential oil of leaves is antagonistic to histamine. Leaf extract is used for different types of inflammations including injuries caused by poisonous jelly-fish

Table 1. Contd.

Kyllinga triceps Rottb.	Cyperaceae	Grass	Root- febrifuge and antidermatosis. Also used for diabetes.
Lantana camara L.	Verbenaceae	Shrub	Plant- antirheumatic, antimalarial; used in tetanus and ataxy of abdominal viscera. Pounded leaves are applied to cuts, ulcers and swellings; a decoction of leaves and fruits is used as a lotion for wounds.
Leucas aspera Willd.	Lamiaceae	Herb	The vapours from the boiled leaves are inhaled to relieve coughing and colds.
Mimosa pudica L.	Mimosaceae	Herb	Leaf- astringent, alterative, antiseptic, styptic, blood purifier. Used for diarrhoea, dysentery, haemophilic conditions, leucorrhoea, morbid conditions of vagina, piles, fistula, hydrocele and glandular swellings. Root- used in gravel and urinary complaints. A decoction is taken to relieve asthma.
Oldenlandia umbellata L.	Rubiaceae	Herb	Leaves and roots- used in bronchitis, asthma and consumption.
Opuntia stricta (Haw.) Haw	Cactaceae	Shrub	Baked fruit is given for whooping cough.
Pandanus fascicularis	Pandanaceae		Flowers are used to make perfumes. Leaves are used in making mats and baskets.
Pedalium murex L.	Pedaliaceae	Herb	Fruit- used for spermatorrhoea, nocturnal emissions, menstrual irregularities, puerperal diseases, genitourinary disorders, difficult micturition, chronic cystitis, renal calculus. Root as antibilious
Phoenix pusilla L.	Arecaceae	Shrub	Fruit- cooling, laxative. Used in respiratory disorders. Gum- used in diarrhoea and genitourinary diseases. Fresh sap- laxative.
Phoenix sylvestris L and Roxb.	Arecaceae	Tree	Fruits-restorative. Juice- cooling, gastric stimulant. Seeds- used in ague. Root- used for nervous debility
Phyla nodiflora (L.) Greene	Verbenaceae	Herb	Spasmolytic, diuretic, febrifuge.
Pongamia pinnata (L.) Pierre	Papilionaceae	Tree	The seed oil is used to cure rheumatic pains and swellings.
Ricinus communis	Euphorbiaceae	Shrub	Seed oil gel is useful in dermatosis, protective in occupational eczemas and dermatitis.
Salicornia brachiata Roxb.	Chenopodiaceae	Herb	Ash- used in mange and itch.
Sesuvium portulacastrum (L.) L	Aizoaceae	Herb	Sand binder. Young plants are edible after boiling to remove excess of salt.
Spinifex littoreus Burm.f. and Merr.	Poaceae	Creeper	Sand binder. Dried leaves are used as fuels.
Tephrosia purpurea (L.) Pers.	Papilionaceae	Herb	The plant is anthelmintic, alexiteric alterative and antipyretic; it is used in the treatment of leprosy, ulcers, asthma, and tumors, as well as diseases of the liver, spleen, heart, and blood. A decoction of the roots is given indyspepsia, diarrhea, rheumatism, asthma and urinary disorders. The root powder is salutary for brushing the teeth, where it is said to quickly relieve dental pains and stop bleeding.
Terminalia cattap	Combretaceae	Tree	Leaves acts as sudorific, are applied to rheumatic joints. Ripe fruits are edible.

Table 1. Contd.

Thespesia populnea (L.) Soland ex corr.	Malvaceae	Tree	Tender fruit mixed with castor oil and made in to a paste applied externally for skin disease.
Tribulus terrestris L.	Zygophyllaceae	Herb	Fruits- diuretic, demulcent, anti-inflammatory, anabolic, spasmolytic, muscle relaxant, hypotensive, hypoglycaemic. Used in strangury, calculus affections, urolithiasis, crystalluria, urinary discharges, pruritus-ani, as a tonic in sexual inadequacy; also as a supporting medicine in cough and asthma. Leaf- diuretic, haemostatic. Root- stomachic, diuretic.
Triumfetta rhomboidea Jacq.	Tiliaceae	Herb	Leaves and bark- astringent, anticholerin, demulcent. Used in diarrhoea and dysentery. Root- styptic, diuretic, galactogenic. Hot infusion facilitates childbirth and hastens parturition. Pounded roots are given for the treatment of ulcers. Leaves and flowers- used against leprosy.
Vitex negundo L.	Verbenaceae	Tree	Inhale boiled leaves vapour to relieve headache.
Ziziphus mauritiana Lam.	Rhamnaceae	Tree	Ripe fruits are edible, purify blood and aid digestion. Roots are used in fever, cure wounds and ulcers.
Zornia diphylla (L.) Pers.	Fabaceae	Herb	Root is given to children to induce sleep and whole plant is used for dysentery. Used as cattle fodder nd green manure.

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