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Conocarpus Tree – A Boon or Bane?

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Abstract

Conocarpus is an evergreen tree and is projected to be the best one for green corridors or green belts in towns and cities. Of late, there is a continuous debate on it's harmful nature such as blocking water and drainage pipelines in the habitations and certain health issues like pollen allergy, asthama etc., Further, the governments started imposing ban on future plantations. On the otherhand, the published literature reveals potential benefits to the mankind. So, the public, intelligentia, policy makers, governments etc., are under confusion regarding future course of action. Hence, it is high time to bring forth the facts and figures regarding merits and demerits of this wonderful pleasure tree.

1. Introduction

The term *Conocarpus* means *'cone shaped fruit'* and is derived from two Greek words *viz.*, *konos* meaning '*cone*' and *karpos* meaning *'fruit'*. It is known as Damas in the Gulf Cooperation Council region. It belongs to the family Combertaceae. It was introduced to Kuwait in 1988 as a part of different greening projects. The tree is known for it's dark green coloured leaves throughout the year, fast growth and ability to withstand harsh environments. It's growth is more revived in summer and endured by low temperatures in winter. This tree can grow in all soil types from sandy to clay. In view of the risk of endangerness of this tree in near future, it is included in the list of Threatened species in the IUCN red data book.

2. *Conocarpus* Species in Detail

The genus *Conocarpus* has two species viz., *C. erectus* and *C. lancifolius* the details of which are furnished hereunder. It can be propagated by softwood cuttings or seeds. A 6 inch long softwood cuttings from actively growing trees during late spring to late summer but not in flowering, have to be collected. The leaves along the lower half of the stem have to be removed. The nodes have to be treated with 0.1% IBA rooting hormone to hasten rooting. Six to eight weeks old seedlings after rooting have to be transplanted.

2.1. Conocarpus erectus

2.1.1. Origin and Distribution

C. erectus is native to the shoreline areas of Africa and across the

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board in the southern drift of Florida, Bahamas, Mexico, West Indies, Galapagos Island and Central America. It's presence could be witnessed between from Ecuador to Brazil. It is a mangrove shrub and grows well on shorelines in tropical and subtropical areas. It is generally found growing in brackish water in tidal lagoons and bays, but can also grow in inland habitats. It can grow up to an altitude of 745 m. *C. erectus* can tolerate salinity above 40 dSm^{-1} (Asif et al., 2014). However, presence of severe salinity in the soil impairs tree growth and development and sometimes it may lead to death of tree too.

2.1.2. Botany

C. erectus is commonly known as button wood or button mangrove (Bashir et al., 2015), buttonbush etc., It is an evergreen tree and can grow upto 6-20 m height with diffused crown. The diameter of well grown trunk of tree is up to 1.0 m. It is a multi trunk shrub. It's bark is thick and has broad plates of thin scales of gray to brown colour. It's wigs are brittle and angled or narrowly winged in cross-section. The leaves are alternate in arrangement, simple and oblong with 2–7 cm length and 1–3 cm width with tapering tip. The leaves are dark green and shiny on top and paler with fine silky hairs underneath. Generally two salt glands are found at the base of each leaf. The fruits are petal less and are button like measuring 5-8 mm diameter. They are produced in stalked panicles of 35-56 flowers. The fruit is a cluster of red to brown, small scaly, two-winged cone-like seeds, 5–15 mm long (Figure 1-4). The seed heads burst when ripe and the seeds are dispersed by water. *C. erectus* var. *sericeus* has silvery leaves and is preferred in landscaping.

2.1.3. Uses

Wood Industry

C. erectus is very popular as a decorative tree globally (Shohayeb et al., 2013). It's wood is used for fence posts, crossties, turnery, vessel building, kindling and landscaping purposes (Carneiro et al., 2010) (Figure 5-7).

Medical uses

C. erectus plant has huge medicinal importance as detailed below.

- This plant can be utilized against iron-deficiency, conjunctivitis, gonorrhea, diabetes, prickly heat, fever, migraine, dying, tumors, orchitis, diarrhea, syphilis and swelling (Shohayeb et al., 2013).
- The extract of *Conocarpus erectus* (leaves, shoot, bark and fruit) parts exhibit hepatoprotective (Abdel-Hameed

Figure 1: An Overview of the *Conocarpus* green barrier on the road side

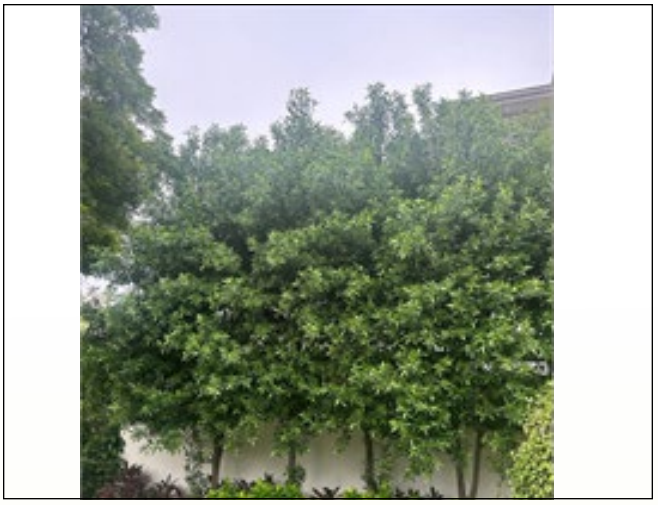

Figure 2: *Conocarpus* tree

Figure 3: Leaves of *Conocarpus*

et al., 2013), antioxidant (Abdel-Hameed et al., 2014), anticancer (Abdel-Hameed et al., 2012) and antimicrobial (Shohayeb et al., 2013) and antibacterial properties. It contains phenol such as tannin and flavonoid as major

Figure 4: Flowers of *Conocarpus*

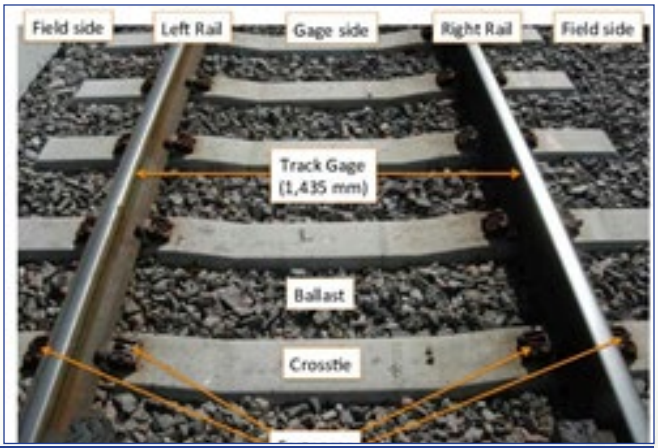

Figure 5: Crosstie

Figure 6: Wood turning

Figure 7: Pile of chopped wood for Kindling

component. Tannin has high antibacterial activity than other compounds. The alkaloids and coumarins were absent (Nascimento et al., 2016).

➢ The ethanolic, n-hexane, chloroform and nbutanolic separates of the plant act as curative agents which help in anticipating or reducing aging and the oxidative anxieties related to degenerative diseases (Raza et al., 2016).

➢ The leaves are eaten and their decoction is drunk against fever

➢ The bark is used for treating wounds, diabetes, haemorrhoids and diarrhea (Raza et al., 2016).

➢ It is known for its folkloristic (traditional) curative potential including treatment of diabetes (Nascimento et al., 2016)

As a Reducing Agent

➢ Leaf extract of *C. erectus* is used in synthesis of copper and cobalt nano particles. Due to it's high phenolic content, *Conocarpus erectus* acts as a high-quality reducing agent and make the whole procedure non-hazardous and green method.

Pollution Indicators

Conocarpus erectus is being grown successfully in the polluted environment as green belts on road sides in different countries of the world. As these trees can absorb heavy metals and brackish water, these were grown to increase natural greenery and remediation of oil-polluted soil after Gulf war in 1911 in Saudi Arabia, United Arab Emirates and Kuwait deserts (Al-Surrayai et al., 2009).

Carbon Sequestration

C. erectus has good carbon sequestration potential (175.86 kg tree^{-1}), however, less than *Azadirachta indica* (187.96 kg tree^{-1}) (Qureshi et al., 2019).

Effect on Crop and Weed Growth

Foliar spray of *C. erectus* ash @ 20% had positive effect on seedling growth and leaf area and insignificant impact on root growth and specific leaf area in cowpea (Arshad et al., 2019). Alsharekh et al. (2022) studied the allelopathic effect and reported that the extracts of leaves and seeds of *C. erectus* inhibited at all concentrations the *Chenopodium murale* and *Amaranthus viridis* grown in either Petri dishes or pots but no negative effect on vegetables like tomato and cucumber. The leaves have the highest contents of gallic acid, caffeic acid and ferulic acid than other parts of this tree. This wonderful property will be useful for suppressing weed growth in organic farming thus eliminating the need for herbicides.

2.2. Conocarpus lancifolius

2.2.1. Origin and Distribution

C. lancifolius is native to Somalia and Yemen, coastal and riverine areas of East Africa and found in some areas of Pakistan. It is cultivated in eastern and northern Africa and the Arabian peninsula.

2.2.2. Botany

C. lancifolius is an ornamental tree. It's mature leaves exhibit glossy appearance. Relatively few trichomes are present on both the surfaces of leaf.

2.2.3. Uses

The plant extracts contain antioxidant, phytotoxicity and anti-urease properties owing to phenolic and flavonoid contents (Saadullah et al., 2016). Further, this species possess therapeutic properties. According to Salem et al. (2023), among 13 local Iraqi tree species screened, *Conocarpus lancifolius*, *Azadirachta indica* and *Nerium oleander* had the highest turbidity removal efficiencies of 75.5% and 67.2% at a concentration of 5000 mg L^{-1} and 57.2% at a concentration of 1000 mg L^{-1}. The leaf water extracts of these species were used as novel green coagulants for water decontamination applications in waste water treatments. They also felt that plant-based coagulants were five times efficient in leaving less residue than chemical coagulants like alum. The polyphenols like vanillic acid, p-coumaric acid, quercetin, rutin hydrate, flavone, t-ferulic acid, sinapic acid and protocatechuic acid obtained from roots and leaves of *C. erectus* and the leaves and fruits of *C. lancifolius* can be used source of bioactive components which are in turn utilized for pharmaceutical purposes and production of functional foods (Afifi et al., 2021).

2.3. Negative Effects, Clarifications and Remedial Measures

Sl. No.	Effect	True/ False	Remarks
1	The pollen of *Conocarpus* causes allergy, respiratory and asthma problems in human beings (Figure 7). *Conocarpus* trees are highly flammable.	True	➢ The research done by the department of botany at the University of Karachi and also in Ahvaz, Iran reveals increases in the number of asthma patients in September and October in *Conocarpus* dominant areas due to pollen production which inturn is responsible for pollution (Rad et al., 2019). As per the skin prick tests by Ramezani et al. (2022), frequency of sensitivity to *Conocarpus erectus* pollen was high (58.6%) and was similar to the pollen allergens of *Citrus×Sinensis* (62.5%), Morus rubra (55.7%) and *Phoenix dactylifera* (53.8%), respectively which are widely grown in southern Iran. It necessitates meticulous planning in rural and urban plantation, which otherwise lead to respiratory allergies due to aeroallergenes. ➢ The news is spread through print and electronic media which has created panic among the public. ➢ Avoid mass planting in sensitive areas like hospitals, habitations etc., ➢ Prune the trees to avoid flowering in already existing plantations irrespective of the location (Figure 8) ➢ Pollen of plants like Parkinsonia, Vernonia, Lantana etc., also cause respiratory problems and allergy issues to few people. But, not everyone exposed to these plants will have respiratory issues.
2	Birds don't take shelter and nest on *Conocarpus*	True	➢ Do not cover the entire area with only *Conocarpus*. It can be a part of mixed plantations which can serve multiple purposes. ➢ Plantations are not always based on their nesting potential

Table: Continue...

Sl. No.	Effect	True/ False	Remarks
3	Animals don't graze on *Conocarpus*	True	➢ The Plumerias, Neeriums and Bouganvilleas are grown in medians having grazing issues. Similarly, *Conocarpus* has to be to grown where grazing is not required. ➢ In other way, it is a positive point. There are several options for tree fodders which are generally not grown in habitations or roadsides.
4	When planted near walls, its deep root system clog the pipelines, communication cables, drainage lines, water systems and even break the walls thus cause infrastructure destruction	True	➢ Some experts also argue that soft root bristles roots of this tree penetrate only damaged pipelines with cracks and holes, otherwise they don't interfere with intact and undamaged ones. ➢ It is true with many tree species like *Ficus*, *Peltophorum*, Gulmohar, Neem etc., Hence, avoid any plantations with spreading roots in proximity to compound walls. Avoid deep rooted plants in podiums where soil depth is low.

2.4. Views of Tree Growers about Conocarpus Plantations

Conocarpus is a preferred plant for gardens only to create green cover with in short time. But, people misunderstood and overused it even in community plantations like Haritha Haram where native species are supposed to be encouraged. It has been even used as a boundary for the properties besides compound walls in spite of it's deep root system and fast growing nature. Of late, people realised and started removing from habitations (Figure 9). There are news that few governments (Iran and Pakistan) have banned planting of *Conocarpus*. Further, the government of Telangana in India also banned it due to its high side effects. However, the ban must be specific. For eg. planting in the human habitations and medical establishments can be avoided but not rest of the areas.

2.5. Right Ways of Utilizing Conocarpus

➢ For providing quick green cover on highways, boundary plantations without compound walls etc.,

➢ Can be planted on both sides of roads and streets for decoration and to give a beautiful appearance to the city and streets throughout the year

➢ It is a good species for making bonsai, topiaries, squares, pyramid shapes or any desired geometric shapes etc., where the tree is pruned regularly so that it avoids flowering (Figure 10)

➢ Industrial uses (wood, cabinets and pharmaceutical)

➢ Its leaves and barks contain tannins which can be used for dying purposes

➢ Like any other plant it is effective in capture of CO_2 and releasing O_2 into the atmosphere due to heavy foliage.

➢ Leaves can be used as feed for cattle and goats. This is an important source of fodder for the African buffaloes and is the source of their acidic urine.

Figure 8: Pruning of *Conocarpus* trees

Figure 9: Uprooting of *Conocarpus* trees from habitations

Figure 10: Topiary of *Conocarpus*

➢ The seeds can be eaten raw or cooked. The dried seeds are powdered and used as thickening agents in stews or making bread.

➢ As a fence and windbreak in farms

➢ Tree is a source of abundant shade

➢ In general, *Conocarpus* plants act as good indicators of heavy metals accumulation (Pb and Mn) and their subsequent effects on the environment. According to Ahmed et al. (2005), the stomata of plants growing on roadside and central district of Karachi are blocked to an extent of 20-50%. It is considered as the best choice as a green barrier so far, for controlling dust and noise pollution. There is no efficient substitute for this.

➢ Branches, stumps, wooden logs can be converted into charcoal for firewood

➢ Very good tree for reforestation and countering global warming

2.6. Resistance to Pests and Diseases

Conocarpus is resistant to diseases as no diseases appeared on these trees. However, it was found that few sucking pests are feeding on the leaves. Further, a parasitic plant called Broomrapes (*Orobanche*) depends on this plant for food.

3. Conclusion

In view of multifarious uses of *Conocarpus* species despite few negative impacts, it should be used only for right purpose and not in undesirable manner. The government and environment advocacy groups have to formulate a policy with the help of researchers/plantations/avenue tree specialists about future course of action. Always preference should be given to plant native tree species neem, sheesham, pongamia etc., Tree growers should always choose multipurpose tree species (MPTs) in lieu of using lone tree species in plantations which helps in maintaining biodiversity.

4. References

Abdel-Hameed, E.S.S., Bazaid, S.A., Shohayeb, M.M., El-Sayed, M.M., El-Wakil, E.A., 2012. Phytochemical studies and evaluation of antioxidant, anticancer and antimicrobial properties of *Conocarpus erectus* L. growing in Taif, Saudi Arabia. European Journal of Medicinal Plants 2, 93–112

Abdel-Hameed, E.S.S., Bazaid, S.A., Sabra, A.N.A., 2013. Protective effect of *Conocarpus erectus* extracts on CCl4-induced chronic liver injury in mice. Global Journal of Pharmacology 7, 52–60.

Abdel-Hameed, E.S.S., Bazaid, S.A., Shohayeb, M.M., 2014. RP-HPLC-UV-ESIMS phytochemical analysis of fruits of *Conocarpus erectus* L. Chemical Papers 68, 1358–1367.

Afifi, H.S., Al Marzooqi, H.M., Tabbaa, M.J., Arran, A.A. 2021. Phytochemicals of *Conocarpus spp*. as a natural and safe source of phenolic compounds and antioxidants. Molecules 26, 1069. https://doi.org/10.3390/molecules26041069.

Ahmed, M.F., Farrukh, M.A., Naqvi, I.I., 2005. Environmental effects on heavy metals in road side plants of Eucalyptus and *Guaiaculm officinale*. Journal of The Chemical Society of Pakistan 27(5), 286–289.

Alsharekh, A., El-Sheikh, M.A., Alatar, A.A., Abdel-Salam, E.M., 2022. Natural control of weed invasions in hyper-arid arable farms: Allelopathic potential effect of *Conocarpus erectus* against common weeds and vegetables. Agronomy 12 (703), 1–15. https://doi.org/ 10.3390/agronomy12030703.

Al-Surrayai, T., Yateem, A., Al-Kandari, R., Al-Sharrah, T.K., Bin-Haji, A., 2009. The use of *Conocarpus lancifolius* trees for the remediation of oil-contaminated soils. Soil and Sediment Contamination 18(3), 354–368. DOI: 10.1080/15320380902772661.

Arshad, S., Iqbal, M.Z., Shafiq, M., Kabir, M., Farooqi, Z.R. 2019. The influence of buttonwood ash application on growth of cowpea seedlings. Asian Journal of Research in Botany 2(3), 1–6.

Asif, M., Saqib, M., Yousaf, B., Adnan, M., Yousaf, A., Ali, A., Sabir, D., 2014. Growth and ionic composition of buttonwood (*Conocarpus erectus* L.) in response to soil salinity and water stress. Advances in Life Science and Technology 19, 42–51.

Bashir, M., Uzair, M., Chaudhry, B.A., 2015. A review of phytochemical and biological studies on *Conocarpus erectus* (Combretaceae). Pakistan Journal of Pharmaceutical Research 1, 1–8.

Carneiro, D.B., Barboza, M.S.L., Menezes, M.P., 2010. Plantas nativas úteis na Vila dos Pescadores da Reserva Extrativista Marinha Caeté-Taperaçu, Pará, Brasil. Acta Botanica Brasilica 24, 1027–1033.

Nascimento, D.K., Souza, I.A., Oliveria, A.F.D., Barbosa, M.O., Santana, M.A., Pereira Junior, D.F., Lira, E.C., Vieira, J.R., 2016. Phytochemical screening and acute toxicity of aqueous extract of leaves of

Conocarpus erectus in Swiss Albino Mice. Anais da Academia Brasileira de Ciências 88, 1431–1437.

Qureshi, M.A., Pirzada, A.M., Qureshi, M.M., Samoon, N.A., Zuberi, M.H., Khurshid, O.A.J. 2019. Comparative study of sequestered carbon stock of different species at Sindh Madressatul Islam University Karachi, Sindh, Pakistan. Sindh University Research Journal 51(01), 91–96.

Raza, M.A., Anwar, F., Shahwar, D., Majeed, A., Mumtaz, M.W., Danish, M., Nazar, M.F., Perveen, I., Khan, S.U.D., 2016. Antioxidant and antiacetylcholine esterase potential of aerial parts of *Conocarpus erectus*, *Ficus variegata* and *Ficus maclellandii*. Pakistan Journal of Pharmaceutical Sciences 29(2), 489–495.

Rad, H.D., Assarehzadegan, M.A., Gholamreza Goudarzi, G., Sorooshian, A., Birgani, Y.T., Maleki, H., Jahantab, S., Idani, E., Ali Akbar Babaei, A.A., Neisi, A., 2019. Do *Conocarpus erectus* airborne pollen grains exacerbate autumnal thunderstorm asthma attacks in Ahvaz, Iran. Atmospheric Environment 213, 311–325.

Ramezani, Z., Mousavi, H., Zamani, M., Ghaderi, F., Tahmasebi, R., Movahed, A., Goreh, A., Keshmiri, S., Darabi, SA., Shokrollah Farrokhi, S., 2022. Reactivity to *Conocarpus* tree pollen in patients with respiratory allergic diseases in the south-western part of Iran, Grana. DOI: 10.1080/00173134.2021.1995782

Saadullah, M., Chaudary, B.A., Uzair, M., 2016. Antioxidant, phytotoxic and antiurease activities and total phenolic and flavonoid contents of *Conocarpus lancifolius* (Combretaceae). Tropical Journal of Pharmaceutical Research 15(3), 555–561.

Salam, M., Mohsin, F., Mahmood, F., Rahman, I.U., Afzal, A., Iqbal, Z., 2015. Lead and manganese accumulation on leaves of road side plants from Mauripor to Hawks bay road, Karachi, Pakistan. Bangladesh Journal of Botany 44(4), 665–668.

Salem, A.K., Almansoory, A.F., Al-Baldawi, I.A., 2023. Potential plant leaves as sustainable green coagulant for turbidity removal. Heliyon 9, 1–10. e 16278.

Shohayeb, M., Abdel-Hameed, E., Bazaid, S., 2013. Antimicrobial activity of tannins and extracts of different parts of *Conocarpus erectus* L. International Journal of Pharma and Bio-Sciences 3, 544–553.