

# Ethno-Pharmacological Study of *Conocarpus*: An Invasive Mangrove Plant

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**Abstract:** *Conocarpus* is an evergreen, beautiful, and significant ornamental tree that is planted mainly for its aesthetic value, shade, and enjoyment. Because of its resistance to extreme weather conditions, including hot and cold, and ease of trimming and planting particularly in urban areas it spreads quickly. There is an ongoing discussion over its detrimental effects, which include clogging drainage and water pipelines in residential areas and causing health problems including asthma and pollen allergies. Additionally, the state governments in India began to impose bans on newly established plantations. Conversely, extant literature indicates possible advantages for humankind. The civilians, intellectuals, policy officials, governments, etc. are therefore uncertain about the best course of action moving forward. It is now time to present the data and facts about the advantages and disadvantages of this magnificent pleasure tree.

**Key words:** aesthetic, anticancer, HSF-PI 17, mangrove, Red Data Book.

## INTRODUCTION

*Conocarpus* is a genus comprising two species of flowering plants in the Combretaceae family *Conocarpus erectus* and *Conocarpus lancifolius*. Both species are indigenous to tropical areas of the world. *Conocarpus erectus* is a widely distributed mangrove plant, whereas *Conocarpus lancifolius* is only found in a small region in the southern Red Sea beaches where it grows inside seasonal rivers<sup>1</sup>. *Conocarpus* comprising of attractive, evergreen and important ornamental trees that grown primarily for aesthetics, shade, and pleasure. Due to their resistance to environmental conditions including high temperatures and salt, they can also be grown in xeric climatic conditions<sup>2</sup>. Buttonwood plants are valued for their ability to purify the air in addition to their visual value in public gardens, avenues, and roadways<sup>3</sup>. The tree is renowned for its capacity to survive hard settings, quick growth, and dark green foliage that is present all year. In the summer, it grows more vigorously, and in the winter, it resists cold temperatures.

This tree can thrive in sand or clay-based soil of any type. This tree is listed as a Threatened species in the IUCN Red Data Book due to the likelihood that it will become endangered in the near future<sup>4</sup>.

## LITERATURE REVIEW

### *Taxonomical division*

Kingdom: Plantae  
Division: Magnoliophyta  
Class: Magnoliopsida  
Subclass: Rosidae  
Order: Myrtales  
Family: Combretaceae  
Genus: *Conocarpus*  
Common Name: Buttonwood

### *Geographical source:*

The native habitat of the species in this genus is the shorelines of tropical and subtropical region of the world<sup>5-7</sup>. From Florida to North America, the West Indies, and from Mexico to Brazil and Ecuador, it is found in southern and Mid-Atlantic States<sup>8-10</sup>. Because of its tolerance for extreme heat and brackish water, this species is also found in western Africa and was imported to several Arab nations, including Kuwait, Saudi Arabia, and the emirates<sup>5</sup>. This species may flourish practically anywhere, since it can survive adverse environmental conditions including air pollution, bad drainage, trampled soil, salt-containing soil, etc.<sup>11</sup>. Buttonwood plant has been successfully grown in different

urban/rural cities despite of the air pollution and deficiency of water. This plant can tolerate harsh climatic conditions such as extreme conditions of water, heat, moisture; alkalinity, salinity and sun light<sup>12</sup>.

### **Morphology:**

*Conocarpus erectus*, or mangrove buttonbush, is commonly known as button wood or mangrove buttonbush etc.<sup>13</sup>. 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. Bark is thick and has broad plates of thin scales of gray to brown color. 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. 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<sup>4</sup>.

### **Traditional uses:**

*Conocarpus* is a natural purifier and can be used to remove heavy metal contaminants and toxins from water, soil and air. As a biomarker, *Conocarpus* can also be examined quantitatively and qualitatively for the amount of pollutants in different parts of the tree<sup>14</sup>. Because of its magnificent bark and delicate leaves, *Conocarpus* is employed for landscaping, bonsai culture, and residential avenue trees. It is also used for hedging. *C. erectus* wood has the potential to be utilized as a farm forestry tree for its timber and fodder applications<sup>15,16</sup>. In the past *Conocarpus* wood might have been exploited for fire, furniture, charcoal, as it is very hard in nature and strong<sup>17</sup>. Due to slow burning, its wood and bark are regarded as good for smoking fish and red meat. For the treatment of many ailments traditionally local people is using this plant in the management of orchitis, preeckly heat, headache, anemia, bleeding, catarrh, diabetes, diarrhea, conjunctivitis, tumors, gonorrhea, syphilis, and as anti pyretic and anti inflammatory in the treatment of fever (Decoction of leaves) and swellings<sup>18-20</sup>. Bark and fruiting parts are used in the management of diabetes, hemorrhoids, wounds<sup>21</sup>. *Conocarpus* is used in several folk medicinal formulations in different parts of the world. It is used as a diuretic and in the treatment of many diseases, such as worms, acute enteritis, colitis, constipation, tooth decay, general infections, malaria, tuberculosis, respiratory diseases, and cancer<sup>22,23</sup> because it possesses antiplasmodial, antileishmanial, and antitrypanosomal activities<sup>24</sup>, as well as antidiabetic potential<sup>25</sup>.

### **Phytochemistry:**

The plant has reported to have various pharmacological active phytochemicals i.e. conocarpan, conocarpol, gallic acid, ellagic acid, ellagitannin, castalagin, quercetin, myricetin and syringetin etc.<sup>26</sup>. *Conocarpus* contains important polyphenols such as vanillic acid, p-coumaric acid, quercetin, rutin hydrate, flavone, t-ferulic acid, sinapic acid, and protocatechuic acid. Polyphenols found in the leafy and underground parts in *C. erectus* and leaves and fruits are the main source of polyphenols in *C. lancifolius*<sup>27</sup>. Presence of flavonoids, phenols, tannins, glycoside and saponin as active compounds are reported in *Conocarpus erectus* aqueous extracts with lack of alkaloids<sup>28</sup>. *Conocarpus* shows diverse effects as antibacterial and antifungal toward many pathogenic microorganisms, such as *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Bacillus cereus*, *Proteus mirabilis*, and *Klebsella pneumonia*<sup>29,30</sup>. The *Conocarpus erectus* leaf extract shows antioxidant, antimicrobial, hepatoprotective and anticancer properties due to the presence of phenolic compounds. It is suggested that the leaf extract can be employed as a natural food additive instead of artificial additives<sup>31</sup>.

It contains phenol such as tannin and flavinoid as major component. Tannin has more antibacterial activity as compared to others<sup>32</sup>. The phytochemical analysis of the hot methanolic leaves extract of *C. lancifolius* showed important hydrocarbon compounds such as carbohydrates, amino acids, alkaloids, tannins, steroids, and saponins. The potential bioactive compounds present in *C. lancifolius* are 1-(3-Methoxy-2-nitrobenzyl) isoquinoline, Morphin-4-ol-6,7-dione, 1-bromo-N-methyl-, Phytol, Hexadecanoic acid, 2,3-dihydroxypropyl ester, Ethyl iso-allocholate, Caryophyllene oxide, Epiglobulol, Cholestan-3-ol, 2-methylene-, (3á,5à)-, Dasycarpidan-1-methanol, acetate (ester), Campesterol and Oleic acid, eicosyl ester. The FT-IR analysis represented the presence of possible phyto-compounds as amino acids, coumaric acid, ferulic acid, fatty acids, aromatic hydrocarbons, quercetin, tannins, cutins and polysaccharides<sup>33</sup>. The detrimental effects of UV B radiation on HSF-PI 17 skin fibroblast cells are lessened by *Conocarpus* leaf extract<sup>34</sup>.

**Ecological functions:**

Two AM fungi colonizing the roots of *Conocarpus erectus* are reported i.e. *Glomus geosporum* and *Scutellospora gregaria*<sup>35</sup>. *Conocarpus erectus* may be useful in the habitat restoration of damaged wetlands because of its capacity to adapt to floods and/or saltwater soil conditions<sup>36</sup>. *Conocarpus* seedlings cannot be categorized as a high drought tolerant or resistant species, but they can tolerate moderate water stress and also survive at moderately low water potential<sup>37</sup>.

**Economic importance:**

It creates great firewood and is a preferred fuel for smoking fish since it produces so little smoke when burned. Additionally, it has served as a charcoal source. The wood can be used for boats, barges, and other nautical construction because it is hefty and resilient in water. Despite being extremely robust, the wood is prone to attack by dry wood termites<sup>38</sup>. The herb is employed in folk medicine in anemia, catarrh, conjunctivitis, gonorrhoea, diabetes, diarrhoea, fever, headache, bleeding, tumors, orchitis, prickly heat, swellings and syphilis<sup>39</sup>. *Conocarpus lancifolius*, a heat-tolerant plant, may be helpful in the phytoremediation of polluted soil. Due to its capacity to absorb significant levels of nickel (Ni), vanadium (V), and chromium (Cr), which it then store in the roots<sup>40</sup>.

**CONCLUSION**

Horticulturists have long employed exotic invasive plants for urban forestry and landscaping purposes; *Conocarpus* is neither the first nor the only example. After twenty to thirty years, foreign plants undergo significant behavioral changes due to adaptation. When a non-invasive species acclimates to the local soils and climate, it may eventually become an exceedingly invasive species. In a few years, the dropped seeds that don't sprout today may develop and begin to grow. Therefore, dealing with exotic species carries some inherent hazards. Without extensive study and long-term monitoring, propagating attractive low-maintenance plants can be harmful to ecological and human health. From an ecological point of view exotic species should be avoided. Certain indigenous species have similar concerns as *Conocarpus*. Buttonwood is considered to have a high carbon sequestration, which is a welcome improvement in the urban concrete jungles of today.

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