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Research Article

A COMPREHENSIVE SCIENTIFIC REVIEW ON DIOSPYROS CHLOROXYLON

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A B S T R A C T

Ebony or persimmon is the common name for Diospyros chloroxylon belongs to Diospyros genus and Ebenaceae family. Traditionally it is used to treat many disorders but very few abstracts are proving its scientific evidence. Hence an attempt has been made to collect the information regarding its cultivation requirements, folklore usages pharmacological action with its phytochemical isolates. With this review it was found that even though many folklore usage are present for this divine fruit but very little research was conducted on this species of Ebenacea family, hence this review will be helpful for plant researchers to work on this species.

INTRODUCTION

Diospyros is a genus of over 700 species of deciduous and evergreen trees and shrubs. The majority are native to the tropics, with only a few species extending into temperate regions. Depending on their nature, individual species are commonly known as ebony or persimmon trees[1]. Some are valued for their hard, heavy, dark timber, and some for their fruit. Some are useful as ornamentals and many are of local ecological importance. The generic name Diospyros comes from a Latin name for the Caucasian persimmon (D. lotus), derived from the Greek dios and pyros[2]. The Greek name literally means "Zeus's wheat" but more generally intends "divine food" or "divine fruit". The genus is a large one and the number of species has been estimated variously, depending on the date of the source[3]. In this present review article, we are providing brief information on Diospyros chloroxylon species which belongs to the Ebenaceae family. Out of all the species of Diospyros chloroxylon was found to have very few scientific evidence in its treatment towards alleviating diseases/ disorders. Hence this review will be helpful for the researchers to carry out further work on this plant.

Folklore Uses

Diospyros chloroxylon are used in siddha medicine[4]. The traditional uses of this plant are used medicinally to cure fever, hepatitis, diabetes,snake bite, diarrhoea, biliousness, ulcer[5] etc The young leaves are ground and mixed with camphor powder and applied over wounds[6]. Leaf paste with those of Diospyros chloroxylon (Illintha) and mud is used as an external application on swellings in animals. During dog bite, slightly warmed stem bark paste is used externally; stem bark paste is administered orally once a day at early morning[7].

Taxonomical classification[8]

Kingdom	plantae
Subkingdom	Tracheobionta
Superdivison	Spermatophyta
Divison	Magnoliopsida
Subclass	Dilleniidae
Order	Ebenales
Family	Ebenaceae
Genus	Diospyros
Species	chloroxylon

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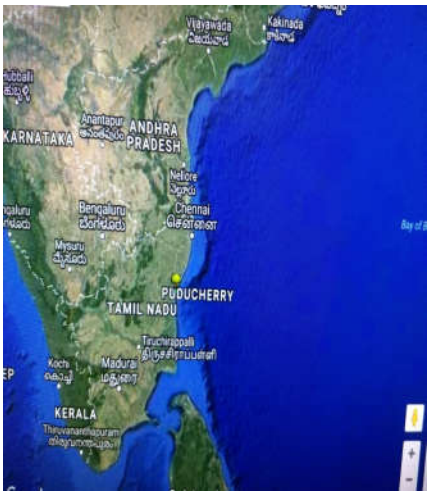
Vernacular names[9]

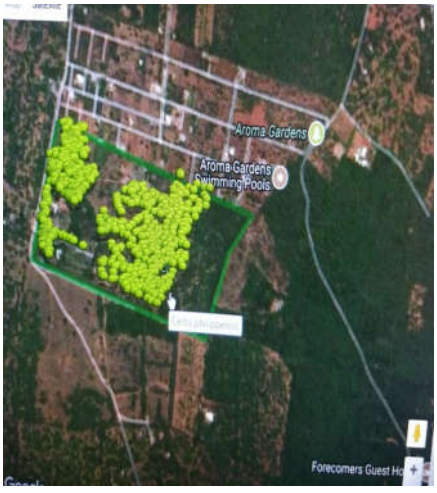
The common names of Diospyros chloroxylon are

1)English	Green ebony persimmon
2)Hindi	Kala tendu,Kinnu
3)Kannada	Jagalaganti
4)Tamil	Karuvakannai,Vakkanai,Vaganai,Periyulinci
5)Marathi	nensi,ninai
6)Telugu	illinda,kavakimanu,kayakimanu,peddaillinda,peddaulimera,

Geographical Distribution[10]

Diospyros chloroxylon is most diverse in the rainforests of Malaysia, India Tropical Africa and Tropical America. In India, this plant is mostly observed in the states of Maharastra- Nasik, pune, Karnataka- kanara, Tamilnadu- coimbattore, cuddalore, kancheepuram, puddukottai, thirvallur, thiruvennemalai, vellore, villupuram, and in Andhra Pradesh - Nallama forests, Hyderabad(chilukur), Srisailam.





Morphological characters[11]***:*** Diospyros chloroxylon is a small tree to 6-10m; deciduous rough bark, thorns found on young growth. It enjoys the full sun, component of deciduous forest type, rarely found in mature evergreen stands.

1. Leaves: Diospyros chloroxylon leaves are green on upper side, alternate, oval or oval-oblong, usually rounded at base and mucornate at apex, pubescent, persistent.
2. Inflorescence: These are yellowish-white, dioecious, cymose, densely pubescent.

- Male flowers are many, tetramerous, with very short pedicles.
- Calyx is campanulate, densely tawny-pubescent, deeply4-fid, glabrous inside.
- Corolla is Inflorescence: 4-fid, glabrous, urceolate.
- Stamens are 16 in 2 rows, nearly equal, hairy.
- Female flowers are solitary, sessile, tetramerous.
- Calyx is campanulate, brownish-yellow, densely pubescent.
- Corolla is urceolate, glabrous.
- Staminodes are 7-9, glabrous, hypogynous.
- Ovary is glabrous, surrounded by 4 erect glabrous styles.

Fig 1 Arrangement of leaf pattern

Fig 2 Diospyros chloroxylon buds and new leaf

Fig 3 Diospyros chloroxylon buds

Fig 4 Diospyros chloroxylon berries: These are edible, globose, glabrous, cherry-like, reddish, 2-8 seeded; fruit, calyx accrescent.

Fig 5 Stem and bark:The bark of Diospyros chloroxylon is rough and light brown-coloured.It is longitudinally deeply fissured and transversally cracked.

Cultivational requirements[12]

Diospyros chloroxylon is able to grow in a wide range of soils but all soils need to be free draining.The tree is propagated by seeds. 24 hours of soaking in water accelerates the seed germination process.

Phenology[13]

Flowering season: From February to June.
Fruiting season: From May to September.
Seeding season: From May to September.
Leaves falling: Evergreen foliage.

Reproduction and Dispersal[14]

Sex distribution

Diospyros chloroxylon is having unisexual (male or female) flowers on the same individual.

Mode of pollination

Diospyros chloroxylon is pollinated by a wide variety of insects (mainly by honey bees).

Seed dispersal

The seeds of Diospyros chloroxylon are mainly dispersed by frugivorous birds and mammals.

Phytochemical review

- G.S.Sidhu[15] and K.K.Prasad has reported the isolation of the binaphthaquinones, Diospyrin and (-) isodiospyrin from the wood of Diospyros chloroxylon. Using colum chromatography of the crude chloroform extract of the wood on a silica gel column with chloroform-benzene(4:1),7-methyl juglone, Diospyrin, Diospyrin-iso-diospyrin mixture and diospyrin-xylospyrin mixture were eluted and identified using chromatography , Mass spectra , I.R and NMR spectral techniques .
- Resmi.P[16], Thomas, Alpha Maria Antony, Anu Annamma Mamen has done comparative preliminary study on the phytochemical estimation of acetone, methanol,ethanol and aqueous extracts of the leaves of Diospyros chloroxylon of family Ebenaceae by using specific colour reaction tests. From their Phytochemical studies it was revealed that the leaf contain a broad spectrum of secondary metabolites like carbohydrates, cardiacglycosides, alkaloids, tannins, aminoacids and proteins, saponins etc. from the results it was concluded that acetone was the best extractive solvent. The acetone extracts of the leaf have shown positive results for carbohydrates, cardiacglycosides, terpenoids, alkaloids, phenols, tannins, and saponins. But flavonoids, quinines, fixed oils and fats are absent in all the four extracts. The presence of these metabolites suggests great potential for the Diospyros chloroxylon plant as a source of useful phytomedicines. For instance, the presence of tannins could also shows that it is an astringent, help in wound healing and anti-parasitic. Tannins bind to proline rich proteins and interfere with the protein synthesis.
- Anand prakash[17], Jagadiswari Rao has reported that Diospyros chloroxylon can be used as insecticide as chloroxylon methanolic wood extract was found to show absolute feeding deterrence to the 3rd instar larvae of the castor semilooper .

Pharmacological review

Georgios tsoulfas[18],Waseem Rizvi and Weiting Wang has reported that the methanolic leaf extract of Diospyros chloroxylon ameliorates oxidative stress, DNA damage and cell proliferation in liver of rats. They also reported that the combination of DMA (dimethyl amine) and DCLE (Diospyros chloroxylon leaf extract) has reduced the weight of rat, suggesting that the potential of a phytochemicals present in the extract for weight regulation. When compared with DMA and MDA (Malon Di aldehyde), DCLE significantly ($p<0.05$) increased SOD(superoxide dismutase) and catalase activities and lowered MDA level in serum and liver against DMA treatment but it significantly lowered DNA fragmentation in the (DCLE+DMA) group. Histological data revealed that DMA caused periportal cell infiltration in hepatocytes whereas the control, DCLE and (DCLE+DMA) groups showed no visible lesions. Immuno histochemical (IHC) staining of CD34 showed a strong expression in DMA group, while DCLE+DMA showed a moderate expression.

CONCLUSION

With this we conclude that Diospyros chloroxylon has got many potential folklore uses but the pace of research is very less on this tree, from the collected review it was found that acetone will be acting as a best solvent for the isolation of chemical compounds from D.Chloroxylon. Astringent property of the chlorxylon was due to the presences of tannins. Wood extracts was found to have larvicidal property hence it could be used as natural pesticidal drug. From the pharmacological review it could be noted that the plant extract has got antioxidant properties which could be able to reduce the DNA damage caused by oxidative stress.

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