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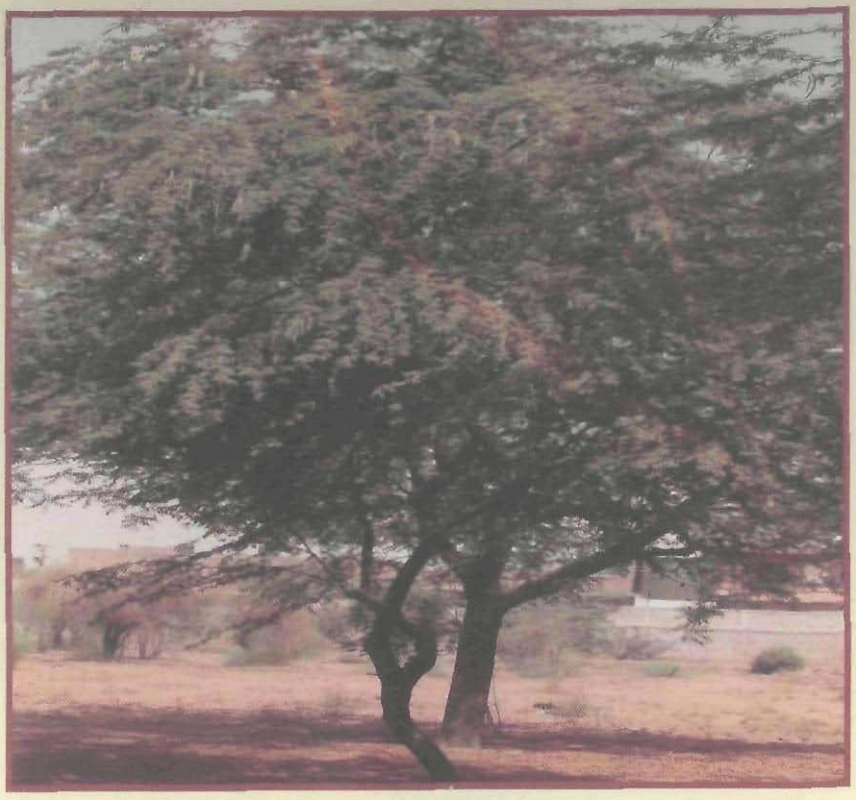
Prosopis juliflora

A rich Source of Antioxidant Product



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2011

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Introduction

Prosopis juliflora (Wartz) DC, locally known as Vilayati babool, first introduced in 1877, has naturalized well and spread over large parts of India. Due to its wide ecological amplitude and rapid colonizing ability it has occupied large parts of the arid and semi-arid tracts of the country and is thought to inhabit more than a million ha land.

In India, *P. juliflora* is presently used as fuel wood and in some places for making charcoal. The utilization of *P. juliflora* for edible products like coffee, bread and others is gaining increasing importance. Its acceptability as coffee substitute derives mainly from its organoleptic characteristics. Additionally, its physico-chemical characteristics are very compatible with the legal requirements set forth in the standards for extracts obtained from fruits or cereals, such as coffee and malt. In Peru, Argentina and Mexico, its pod flour is used for producing different edible products like coffee, biscuits, health tonic, beverages etc. Recently, *P. juliflora* has been reported to contain an antioxidant named as (-)-mesquitol.

Importance of Antioxidant Compounds

There is considerable epidemiological evidence indicating association between diet rich in fruits and vegetables and a decreased risk of cardiovascular disease and certain forms of cancer. It is generally assumed that the active principles contributing to these protective effects are primarily the antioxidant phytochemicals.

Research in the past decades have accumulated enough evidence to show the beneficial effect of free-radical scavengers/antioxidants as antimutagenic, antiinflammatory, antiatherosclerotic, antidiabetic, antihepatotoxic, antiageing agents, with applications in a variety of neurological disorders. The search for new antioxidant principles is becoming therefore, essential to improve the pharmacological treatment of pathological conditions related either to free radical/oxidative damage or to imbalance between antioxidant/oxidant homeostasis such as cataract, rheumatic diseases, atherosclerosis, Alzheimer's disease and other neurodegenerative conditions. The medicinal importance of plants bearing rich proportion of antioxidant principles is therefore rising.

Extraction and Isolation

Prosopis juliflora heartwood (Fig.1b) and sapwood (Fig.1c) were collected and separated. Before extraction, the woody material was ground to fine powder and dried at 60° C for 24 hours. Powdered material was extracted with petroleum ether (60°-80° C) for 24 hours and subsequently with ethanol for another 24 hours using soxhlet extractor. Ethanol extract was concentrated under reduced pressure and dried under vacuum. The heartwood and sapwood yielded 6-8% and 1-2% of the compound (Fig.1d), respectively.

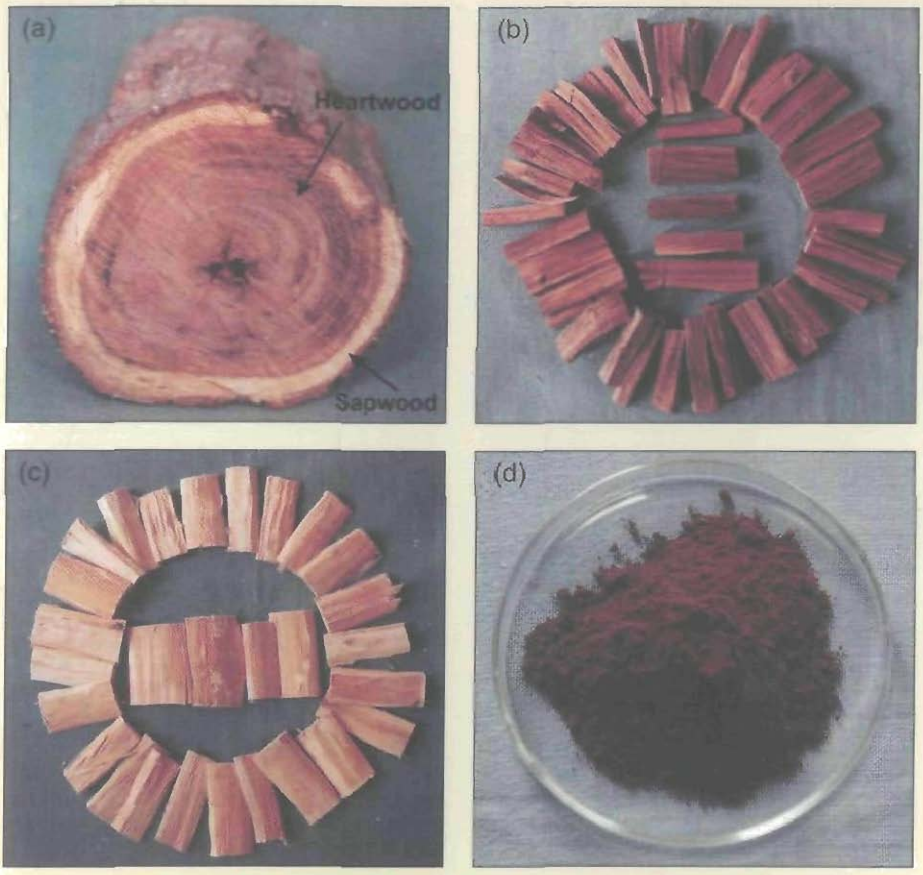


Figure 1. Components of *Prospis julifora* wood and their extract

Identification of the Antioxidant Compound

The antioxidant compound present in concentrated form in the wood (Fig. 1a) of *P. juliflora*, has been identified as (-)-mesquitol ($C_{15}H_{14}O_6$). It has flavonol structure assigned as 2, 3-trans-3', 4', 7, 8-tetrahydroxyflavan-3-ol and has close similarity to (+) - Catechin and (-)-Epicatechin (Fig 2). It is brown to pale yellow in colour having melting point 81-83^{0}C. Its silica gel TLC has Rf value of 0.45 with ethyl acetate.

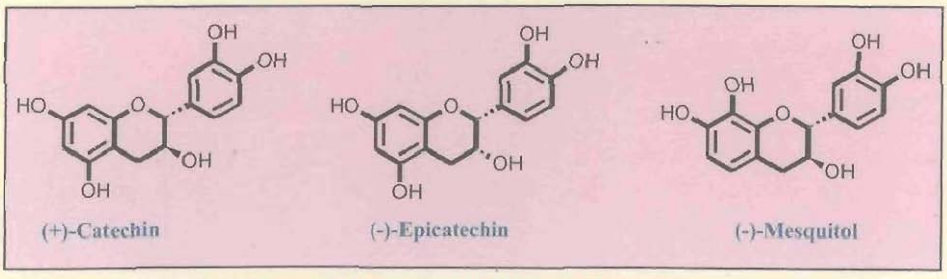
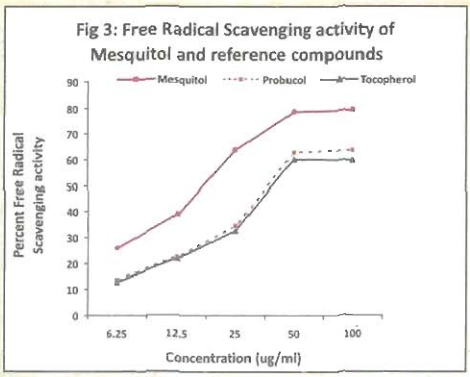
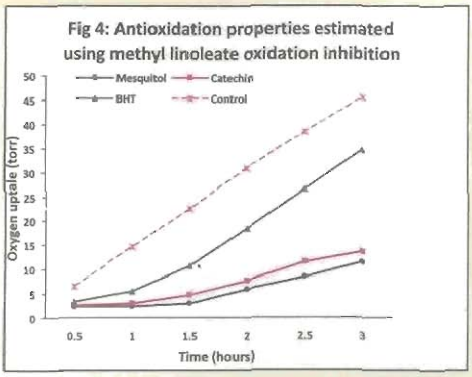


Figure 2. Structure of the different flavanols.

Antioxidant/Free Radical Scavenging Activity of (-)-Mesquitol

(-)-Mesquitol has been compared with existing pharmacologically / therapeutically accepted antioxidant probucol and α-tocopherol. It was found that (-)-mesquitol is better than the above mentioned reference drugs (Fig. 3). In another experiment oxidation of methyl linoleate induced by AIBN, was carried out. Oxidation inhibition of (-)-mesquitol was compared with (+)-catechin and BHT. (-)-Mesquitol possessed better antioxidation properties than (+)-catechin and BHT (Fig. 4).





Source :- Sirmah et al. 2009. Nat. Prod. Res. 23, 183. Source :- Madhusudhna et al., 2004. USP, 20040116716.

Conclusion

Much attention is currently being directed to harness and harvest the antioxidant compositions and/or compounds from natural resources. *Prosopis juliflora* heartwood contains unusually high (-)-mesquitol content (6-8%) . Other source of (-)-mesquitol is the bark of *Dichrostachys cinerea* but the yield is only 1.5%. The unusual high yield and high purity of the crude extract of *P. juliflora* makes the plant a potential source of this flavonol, which has been described as a powerful antioxidant. It may be used with pharmaceutically/therapeutically acceptable additives. It has been proved to be useful and better antioxidant molecule than the presently used medicinally important lipophilic antioxidants probucol and α-tocopherol. Perhaps it may have better therapeutic potential in inflammatory disease conditions, atherosclerosis, diabetic complications, cancer, hepatotoxicity and variety of disease conditions mediated through or fostered by oxidative stress and/or overt oxidative burden due to increased generation or under scavenging of free radicals.

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Published by Director, Central Arid Zone Research Institute, Jodhpur (Rajasthan), INDIA

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