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Ethnobotany of *Acacia jacquemontii* Benth. - An Uncharted Tree of Thar Desert, Rajasthan, India

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Abstract

The present ethnobotanical study describes the traditional knowledge related to the use of *Acacia jacquemontii* and its derived products used by the tribes and communities reside in the Thar Desert of Rajasthan, India. *Acacia jacquemontii* is a versatile tree suitable for afforestation, social and agro-forestry. In addition to their normal utility in wood production, soil improvement, nitrogen fixation, these provide certain other products like fodder, fruits, gums, fibers and roofs. During the survey, it was noted that tree parts such as bark, roots and gum were commonly used by the tribals to cure various diseases and disorders. Indigenous healthcare practices, provide low cost alternatives in situation where modern health care services are not available or too expensive. This preliminary study about this unexplored tree would be valuable resource for humankind.

Key words: Abortion, Agroforestry, Gum, Renal disorder, Snake bite, Tribal.

Introduction

The Great Indian Desert, or Thar Desert, extends over about 0.32 million km^2 forming approx. 10% of the total geographic area of India. More than 60% of the desert lies in the State of Rajasthan

(Fig. 1). This desert forms the eastern extremity of the great arid and semi-arid belt of the world. Owing to strong variations in climatic, physiographic, topographic and geological characteristics, the Thar Desert shows a wide diversity of habitats. Thar Desert is home of several tribes and communities who have got a rich culture heritage and colorful traditions. Various tribes and communities such as Bhils, Sansis, Kalbelias, Raikas, Banjars, Sindhis, Gadolia lohars and Bolochis live in Thar Desert. (Fig 2). The natural flora, hide and wool are subsistence and earning sources for communities in Thar Desert. The desert communities are traditionally raised, from an early childhood, knowing of plants. Due to few or sometimes in-existent opportunities to access modern healthcare facilities, the use of effective herbal resources through generations of old traditional knowledge is applied. Recognizing the vital importance of flora of the Thar Desert, it is imperative to review the conservation status of the precious plant resources of the area.

Figure 1. Area investigated for present work.

Figure 2. Various tribes Thar Desert of Rajasthan.

Acacia jacquemontii Benth. is a member of family fabaceae, locally called as Bhu-banwali, Raati-banwali (Red colored) Baonli or Bhunwali. It is a rigid xerophytic shrub or small tree upto 2.5 m high (Fig. 3). It has characteristic stiff, smooth, brown, zig-zag branches (Fig 4). It has spiny stipules, glabrous ovary, peduncle with a distinct joint. This plant is distributed throughout semi-arid regions. The flowering and fruiting in *A. jacquemontii* takes place in months of February to May (Bhandari 1978). Flowers are yellow colored and sweet-scented with head inflorescence. Pod of the plant are short and broad, 5-7.5 cm long; 8-17 mm broad with compressed, sutures straight and constricted seeds (5-6 seeds per pod).

This plant grow relatively quickly, coppice readily and are a source of nitrogen in desert ecosystem. The plant have a fast growing tap root that enables them to utilize moisture stored in lower soil layers to remain green long in to the dry seasons. The extensive root system makes them ideal for dune stabilization and preventing soil erosion. Stem exudates gum out of an injured site on the trunk or branches of trees, drying into tears or vermiform masses (Fig. 4). It occurs at Johars, Beeds, Talabs, Oorans, Conservatries, farmer fields and it provides valuable ecological and economic values.

Acacia is the most significant genus of family: Leguminosae, first of all described by Linnaeus

in 1773. It is estimated that there are roughly 1380 species of *Acacia* worldwide, about two-third of them native to Australia and rest of spread around tropical and subtropical regions of the world (Maslin *et al.*, 2003; Orchard and Maslin, 2003).Gamble, (1918) have reported more than 40 species of this genus in India in his 'Flora of Madras Presidency.' *Acacia* species are commonly known as ‘Babool’ in India and ethnomedicinally have long been used for the treatment of skin, sexual, stomach and tooth problems. Still many herbal products derived from *Acacia species* are sold in market in their pure or mixed form such as: Babool tooth pest, Ayur Shampoo, Nyle Shampoo etc. The scientific efforts in field of

Figure 3. Tree/Shrub of *Acacia jacquemontii.*

pharmacognosy and pharmacology during last fifty years have revealed that many species of this genus have been reported to be used against a variety of disease. *Acacia nilotica* has been proved as effective medicine in treatment of malaria, sore throat (aerial part) and toothache (bark) (Jain et al., 2005; Kubmarawa *et al.*, 2007). The methanolic extracts of *A. nilotica* pods have been claimed against HIV-PR (Bessong and Obi, 2006). The antiplatelet aggregatory activity of this species was reported in animal model by Shah *et al.* (1997) that were possibly due to blockade of calcium influx through membrane calcium channels on target cell. Currently, one group of researchers has tested the antiplasmodial activity of *A. nilotica* ethyl acetate extract against different chloroquine resistant and sensitive strains of *Plasmodium falciparum* (El- Tahir et al., 1999). The fresh plant parts of this species have been reported to be most active against Hepatitis C virus by Hussein et al., (2000). Currently, numerous herbal products derived from *Acacia* species are available in market. Thus, there is need to explore rest of under estimated *Acacia* species, so that this information may be valuable resource for mankind. In present exploration, *Acacia jacquemontii* Benth were undertaken for preliminary ethnobotanical medicinal investigation.

Figure 4. Stems of *A. jacquemontii* showing production of gums and pods.

Methods

Ethnomedicinal survey of selected *A. jacquemontii* species were carried out during July 2007 to July 2008 in Thar Desert of Rajasthan, India, including nine districts: Barmer, Bikaner, Churu,

Jaisalmer, Jalore, Jodhpur, Nagaur, Pali and Sikar. This area was selected because here *A. jacquemontii* has coexisted with the people for millennium.

Diverse research methodologies have been used in order to understand the ethnobotany of this shrub/tree. The interviews were conducted with local Ayurvedic vaidyas, tribal peoples and knowledgeable individuals, ranging in age between 35 and 70 years old. The persons to be interviewed were selected randomly and no appointment was made prior to the visits. Tribal peoples and Vaidyas that consented were asked to give their knowledge about the diseases against which they use *A. jacquemontii.* Questions were asked about the method of preparation of the remedies, details of administration, including the approximate amounts and number of doses per day or week. The healers were also asked if the remedy had any adverse effect. Tribal peoples were asked for various traditional uses of plant. The conversations were performed in the "marwari" language which was fluently spoken by both traditional tribal peoples and interviewers, and the information was directly translated and written in English. All the information regarding plant species, biological forms, habitat, local names and uses were documented. The information obtained was compared with the published literature about plant.

Results and Discussions

This research contributes to a better understanding of the uses of *A. jacquemontii* in traditional practice of Thar Desert. During present investigation it was found that *A. jacquemontii* is multipurpose of tree suitable for agro-forestry, social forestry and every part of tree is used for myriads of purposes by tribes and communities of Thar Desert.

Ethno-Medicinal Uses

The bark of tree is used to induce spontaneous abortion in women in any stage of pregnancy. For treatment 100g of fresh bark collected from older trees are boiled in one glass of water. When ¾ of the liquid remains, the decoction is strained, cooled, and drunk. The standard treatment is to administer three such doses per day for three days. It was mentioned that this treatment is used only when the fetus is suspected of being malformed or the water sack ruptures prematurely.

The bark of tree is also used for snake bites. The dried bark is converted in form of paste with water. The paste is applied on cut by snake bite. Fibers extracted from bark are also used to tie on the spot where scorpion has stung. This is supposed to give relief to the poison.

A. jacquemontii produces dried gum on stem. Gum is copious exudate, which is a nearly transparent fluid, comes out of an injured site on the trunk or branches of trees, drying into tears or vermiform masses. Gum of *A. jacquemontii* is a complex and variable mixture of arabinogalactan oligosaccharides, polysaccharides and glycoproteins. It is a highly branched, globular, glycoprotein, which possesses a flexible but compact conformation. *A. jacuemontii* gum has been extensively used

by tribal for kidney and renal disorder.

Figure 5. Ethano-medicines extracted from roots and bark of *A. jacquemontii*.

For this gum is dried in sun light and grinded into fine powder by stone. Two to three dose of 5g gum powder is given daily to patients. It was confirmed from various local renal patients who were cured by this treatment. It was found treatment for six month is sufficient to cure chronic renal malfunctioning. Gum of this plant is also added in various food preparations to serve as heath tonic. Especially such food preparation is used by patients in case of fatal illness, accidents leading to severe injury or by women after child birth. It is believed that incorporation of gum helps in fast recovery from such conditions. Gum also has demulcent and astringent properties and often added for medicine for this purpose. For curing asthma Gum is boiled and given once a day for one month duration. Gum is also eaten in sores in mouth.

Eco-conservation by stabilizing sand dunes

The vast sandy tracts which are distributed in the Western and Northern plains of the state, form the dunes and the plain. The dunes are of two type - the embryonic, and the stabilized ones. There is no vegetation on the embryonic dunes except some ephemerals like *Gisekia pharnaceoides, Euphorbia prostrata, Mollugo cerviana, Polycarpaea corymbosa* and others which are the pioneers. When the embryonic dunes are gradually stabilized due to the growth of sand binders like *Leptadenia pyrotechnica, Calotropis procera, Aerva tomentosa, Saccharam munja,* and others , they provide a suitable habitat for the growth of plant species like *Convolvulus, Heliotropium, Indigofera, Tephrosia, Polygala,* and perennials like *Echinops echinatus, Crotalaria medicagenia,* and Shrub like *Acacia jacqumontii. A. jacqumontii* play a major role in stabilizing sand dunes due to its extensive root system. Tribal peoples and communities in investigated area give much emphasis on growing *A. jacquemontii* on sand dunes for their stabilization.

A Potential Tree for Agro-forestry

Agro-forestry is an approach to land use based on deliberate integration of trees with crop and/or livestock production systems (Kang et al. 1999). Agro-forestry is an ancient practice in Thar desert. More efficient sharing of site resources between trees and other intercropping components together with nitrogen fixation and micro-climate modification by trees may significantly increase the overall net production of phytomass (Sharrow and Ismail 2004). The communities in Thar Desert use *A. jacquemontii* at the boundaries and with crop so as to improve and protect natural base. Gum from tree is also collected for economic purposes.

Source of fodder, Fuel and Fibers

The leaves are good source of fodder for goats and camels. The leaves and pods are thrashed out and used as cattle fodder. The wood of this plant is a very useful fuel in Indian sub-continent due to its high calorific value. The wood when burned gives out the intense heat and therefore employed by the Goldsmith, Silversmith and Gadulia lohar (Ironsmiths). The roots of *A. jacquemontii* are pulled carefully by tribal to harvest pleurome (Roots without bark). Extracted pleurome were used as high tensile ropes or strings for variety of applications. Single rope may be 30 feet in length. Dried stems and branches are used for thatching huts, cattle shed and making boundary of agricultural fields. The bark of the root is used as inocula for fermentation and making local spirit.

Conclusion

The traditional knowledge system in India is fast eroding. There is an urgent need to invent and record all ethnobiological information among the diverse ethnic communities before the traditional culture is completely lost (Jain *et al*., 2007). It is necessary to collect information for important plants from tribal peoples and communities. Various plants have remained unexplored because on one has initiated investigation on them. We found that literature research on the traditional uses of *A. jacquemontii* in India and other countries is very poor. There is as such, no information available prior to this investigation work. During this information it was found that *A. jacquemontii* gum has various ethnopharmacological applications. The leaves are used as fodder. Wood of tree is source of fuel. Bark is used for snake bite, scorpion stung and induce spontaneous abortion in women in any stage of pregnancy. The tree is suitable for stabilization of sand dunes and used in agro-forestry. Definitely the information provided about this unexplored tree would be valuable for society and human kind.

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