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ETHNOBOTANICAL ASPECTS OF *AEGLE MARMELLOS*: A REVIEW

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ABSTRACT

Aegle marmelos of family Rutaceae is an important plant for mythological and ethnobotanical purposes. It has a wide range of habitat and can be cultivated on wastelands. In this study, origin of ethnobotanical studies and various traditional and ethnomedicinal uses of *A. marmelos* (Bael) by indigenous people from different regions of India and some other countries have been discussed. Through this review, it has been found that not only the fruit of the tree but the other parts such as, roots, leaves, stem and bark are also being used for ethnobotanical and medicinal purposes. It is an economically important tree to be cultivated by poor and landless farmers, as it can tolerate a wide range of climatic conditions and can easily grow on wastelands.

Keywords: *Aegle marmelos*, Mythological, Ethnobotanical, Ethnomedicinal, Indigenous People

INTRODUCTION

The term 'Ethnobotany' was first coined by Harshberger in 1895. It deals with anthropology, archaeology, botany, ecology, economics, medicinal, religious, cultural and several other disciplines [1]. It is the study of interaction between local people and their natural environment [2]. This interaction was classified by Jain (1996), 'father of Indian Ethnobotany', into two categories [3]. One is 'abstract' that includes taboos, avoidance, sacred plants,

worship and folklore. The other category is 'concrete' which deals mainly with the material use and the acts of domestication, conservation, improvement or destruction of plants. Mostly the tribal population is involved in its practical application in areas such as biodiversity prospecting and conservation biology. Men from time immemorial have been dependent on the plant world for innumerable needs. This dependency on plants urged him to identify

and classify the plants which were important into different groups, such as food plants, poisonous plants and medicinal plants. This led to the beginning of plant taxonomy. The tribal people from indigenous communities have played a vital role in understanding the various uses of natural resources and their long term conservation strategies [2]. Due to the increasing awareness among the people towards natural products, natural medicine is attracting more attention than the allopathic system. *Aegle marmelos* (L.) Corr. is one of those, which plays a vital role in day to day usage. It is an important aromatic medicinal tree of Indian origin. Almost all parts of bael tree are used in preparing herbal medicines. This plant is very significant for ethnomedicinal and religious purposes [3]. In this study traditional medicinal and other ethnobotanical uses of this tree have been discussed. It can grow wild and tolerates a wide range of temperature. So, this study will help to inculcate the interest in its cultivation even on wastelands and popularize this mythological important tree for pharmaceutical and commercial purposes, which have immense ethnomedicinal uses in curing various ailments.

Origin of Ethnobotany

Ethnobotany came into existence when the earliest man observed the animals mostly

the apes and monkeys eating certain plants often to satisfy his hunger and at other times to heal his wounds and get rid of pains and sufferings. Apes and monkeys are very close to human beings in morphology and also in anatomy and physiology. So, eating certain plant parts - roots, stems, leaves, flowers, fruits and seeds and the beneficial effects on their body gave a food for thought to these early men and it started the genesis of basic thoughts in human brain. Gradually, such observations provoked them to use plants for maintenance of life and alleviation of diseases. Thus, on the basis of the uses of plants, first by animals and later by human beings, gave birth to ethnobotany. It assumed new significance and a new dimension today, when the modern civilization realized that the plant products they are using today, either as a food or as a medicine are gifted by their ancestors, who often experimented with their own body and evaluated the utility of those plants.

Indigenous People

Indigenous people such as, rural communities, tribes, ethnic societies are an invaluable bank of knowledge, which is passed on verbally from one generation to another. Both the indigenous culture and biodiversity are inseparable. The world's remaining areas of high biodiversity are found on indigenous people's lands and in

their waters [4]. Due to the fact that plant-based derivatives are safer than the costly modern medicines, about 80% of the world population has taken recourse to traditional medicines for their primary healthcare needs [5, 6].

At present about 1500 plant Spp. are being used in the ancient Indian system of medicine, i.e., Ayurveda [7]. It is an established fact that this ancient science of human health had its origin in India – the land of ‘Rishies’ and ‘Munies’. The Indian sub-continent is inhabited by over 53 million tribes belonging to over 573 indigenous communities of 227 ethnic groups. The indigenous people of India are called tribes. Covering 5000 villages in India, mostly located in the central and peninsular region and in the northeast, with sporadic pockets in the north-western plains, the Himalayas in the north and in the Andaman and Nicobar islands in the extreme south. They constitute about 7.7 percent of India’s population. It is spread over 19 percent of the total area of the nation.

The Tribes of Rajasthan [1]

The total tribal population of Rajasthan is 12.44 per cent of the total population of this state. The tribes of Rajasthan constitute 8.07% of the total population of tribes in India. On the basis of the distribution of various tribes, the state can be divided into

four different zones. Different zones/districts of Rajasthan are;

There is a majority of the Meena population (3, 68025) in Jaipur district and other tribal population e.g. ‘Bhil’, ‘Kalbelia’, ‘Gadia-Lohar’, ‘Banjara’, ‘Kanjar’, ‘Sansi’ and ‘Bauria’ resides in the minority, they are more common in the western part of Rajasthan. They use several wild plant species as fodder.

Ethnobotanical Status of Bael Fruit

The bael fruit has been known from prehistoric times in India. As already described about its mythological importance, its trifoliolate leaves are used as sacred offerings to “Lord Shiva” according to Hindu customs. In the epic times of “Ramayana” bael fruit was a well known tree and found growing in the Chitrakuta Hills and Panchavati [8]. Mentions of the bael fruit were found in Vedic times (ca 800 to ca 200 B.C.) by Om Prakash (1961) and also in early Buddhist and Jain literature (ca 800 to 325 B.C.) [9]. It is also described in a ‘Sanskrit treatise on silviculture’ “Upavana Vinoda” [10] and in the “Brihat Samhita” [8]. Its medicinal properties and uses were described in “Charak Samhita”, an early medical treatise in Sanskrit.

Ethnobotanical Uses of Bael

Bael is used as an important tree species in various indigenous medicinal systems of India, China, Burma and Sri Lanka. There

are various ethnobotanical uses of bael, almost all the plant parts are used for medicinal purposes.

The medicinal uses of bael fruit described in **Table 1** are not supported by any experimental or clinical data. These are just the common practices used by tribal communities and aboriginals.

Ethnobotanical Uses of Bael in Different Regions

In central and western parts of Nepal, ripe fruits of bael are collected in the months of March-June. In Nepal it is a plant of ritual importance. Pulp of ripe fruits is eaten fresh and also taken as syrup by local people. Unripe fruits are taken to treat diarrhoea. Bael fruit juice is used for fish poisoning [11]. In 2010, Sharma & Khandelwal reported that the tribal and traditional communities from Dang region of Rajasthan have a deep knowledge about ethnobotanical plants from their surroundings. The Dang region includes Karauli, Sawai Madhopur, and Dholpur districts, which are rich in forests as well as in tribal and traditional communities. The main tribe of Dang is Meena. Meena represents about 50% population of tribes in Rajasthan. While traditional communities are Gurjar, Mali, Chamar, Jogi etc. Bael pulp is used by these tribes and also the pulp powder is eaten either directly or mixed with the curd [12].

In Madhupur area of Bangladesh, ethnobotanical study was done on ethnic community "Garo". During the survey information gathered and found that 86 plant taxa belonged to 84 genera under 46 families and all of those had economic importance. The tribes of this region used *A. marmelos* (locally known as Belathi phang) spines as traditional needles to pierce ears and nose. Bael leaves are used in various religious purposes [13].

The Tripura tribe of Bangladesh which is the third largest tribe from the country also uses all the tree parts to treat various diseases and in making sherbet of the fruit pulp. People from Rajshahi district of the country use unripe bael fruit in indigestion. They slightly burn the inner part of the fruit on fire and use it to prevent the indigestion problems [14].

The Bheel tribe of Guna district and people of Jhabua, which is predominantly a tribal district in Madhya Pradesh, use bael tree to treat various ailments [15]. They use *A. marmelos* leaves in the treatment of jaundice [16]. Pulp of unripe or half ripe fruit mixed in water is used to treat diarrhea and pulp of ripe fruits mixed in water is used to make sherbet, which acts as a soothing agent. Pulp mixed with water kept in 7-8 days is applied on the roof for plastering and checking seepage of water [17]. *Aegle marmelos* is also a dye yielding

plant used by the local people of Sabang areas in Paschim Medinipur district, West Bengal, in making two famous handicrafts - 'Patchitra' in Pingla and 'Mat craft' in and deliberation their act of living. The fruit shell is crushed and boiled in water to obtain the yellow color which is used for coloring cotton garments. Gum obtained from this plant is applied to the cloth /paper for painting. The indigenous knowledge of using the natural dye from plants has been carried out their tradition from generation to generation without any transformation.

The study done by Das and Mondal focused on the usefulness of natural dyes in the traditional jobs in the district and to make a conscious of the actual need of conservation of indigenous knowledge through natural dye yielding plants [18].

In an ethnobotanical study of Wild Flora at G. Udayagiri Forest In Eastern Ghat, Odisha, it was found that the dried powder of unripe fruit taken daily twice cures chronic dysentery and ulceration in the stomach. Leaves juice is taken thrice a day to reduce fever. Root paste is used there to cure rheumatism [19]. Rural and Tribal communities of Jalgaon District, Maharashtra use bael leaves against respiratory disorders. 10-20 ml decoction of leaves is given to the patient at bed time [20]. Aboriginal and tribal communities of Surguja district, Chhattisgarh use *Aegle*

marmelos fruit in medicinal and agricultural implements [21]. Bael leaves are used in treating abscess, backache, diabetes, eye complaints, fever, jaundice, vomiting, dropsy, beri-beri, fodder of domestic animals, in the worship of Lord Shiva. Fruit is astringent, useful in diarrhoea, breast-pain, constipation, and dysentery and also used as a laxative. Unripe fruit rind is used in making a yellow dye. Root is used in the bite of mad dog, gastric troubles, palpitation of heart and fish poisoning. Bark is useful and popularly used in cases of diarrhoea, dysentery, snake bite, fish poison and stomach disorders. In funeral pyre of rich its wood was used and the beads made of its wood were worn by lower castes. Seed mucilage was used in plastering the wall [22].

In Indonesia, bael pulp, dressed with palm sugar is eaten for breakfast. The pulp is often processed as nectar. Beating the seeded pulp together with milk and sugar makes a popular drink called sherbet in India. A beverage is also made by combining bael pulp with that of tamarind. Indian food technologists view the prospects for expanded bael fruit processing as highly promising. Confection, bael fruit toffee, is prepared by combining the pulp with sugar, glucose, skim milk powder and hydrogenated fat. In Thailand the young leaves and shoots are eaten as a vegetable.

They are said to reduce the appetite. An infusion of the flowers is used as a cooling drink [23].

CONCLUSION

Mankind is dependent on plants for food and medicine and other purposes. They experimented with their own bodies to evaluate the utility of those plants either as food or as medicines. Indigenous people are invaluable source of knowledge and this knowledge from a long time has been passed on verbally from one generation to the next. Plant based derivatives are safer than the costly modern medicines about 80% of the world population has taken recourse to traditional medicines for their primary healthcare needs. Hence, Ethnobotany is nowadays becoming a subject of more concern due to the increasing interest in the natural medicine system. From the ancient times, India has been the origin of natural medicine system and it is inhabited by a large population of indigenous communities. At present about 1500 plant Spp. are being used in the ancient Indian system of medicine, i.e., Ayurveda. *Aegle marmelos* (L.) Corr. is one of those, which plays a vital role in day to day usage. It is an important aromatic medicinal tree of Indian origin. Bael has been known for its religious and ethnobotanical importance from pre-historic times. Mentions of its presence in epic times

are also available in various writings, such as “Ramayana”, “Upavana Vinoda”, “Charak Samhita” and “Brihat Samhita”. This review has been done to find out the traditional and ethnobotanical uses of bael tree. It was found that not only the fruit part but all other tree parts are of immense importance throughout world and in various regions of India. This study will help to inculcate the awareness towards the wide prospects and potential of bael for various purposes. This plant can be grown on large scale especially on unproductive and wasteland. This will help in financial upliftment of the poor and landless farmers besides providing base for the research and development of best, cheap and efficacious drugs.

REFERENCES

- [1] Sharma M and Kumar A, Ethnobotanical Uses of Medicinal Plants: A Review, Int. J. Life Sci. & Pharma Res., 3 (2), 2013, 52-57.
- [2] Martin GJ, Ethnobotany: A Methods Manual, Chapman & Hall, London, 1995.
- [3] Jain SK, Ethnobiology in Human Welfare, Deep Publ., New Delhi, 1996.
- [4] Alcorn JB, Is Biodiversity Conserved by Indigenous People?, Ethnobiology in Human Welfare, In:

- Jain S. K. (ed.), Deep Publ., New Delhi, 1996, 233-238.
- [5] Tyler VE, Plant Drugs in the Twenty First Century, *Econ. Bot.*, 40, 1986, 279.
- [6] Wambebe CON, Natural products in developing economy, In: Iqbocchi, A. C. & Osisign I. U. W. (eds.), National workshop on Natural products, Univ. of Benin Press, Nigeria, 1990.
- [7] Bhatnagar P, Marketing and Trade of Medicinal Plants, *Sustain For.*, 11, 1997, 4-11.
- [8] Aiyer AKYN, The Antiquity of Some Field and Forest Flora of India, Printing and Publishing Co. Ltd., Bangalore, 1956.
- [9] Om Prakash, Food and Drinks in Ancient India, Munshi Ram Manohar Lal, Delhi, 1961.
- [10] Majumdar GP, Upavana-Vinoda: (A Sanskrit Treatise on Arboriculture), Indian Research Institute, Calcutta, 1935.
- [11] Yadav U, Poudel RC, Shrestha KK, Rajbhandary S, Tiwari NN, Shrestha UB and Asselin H, Diversity of Use and Local Knowledge of Wild Edible Plant Resources in Nepal, *J. Ethnobiol. and Ethnomed.*, 8, 2012, 1-16.
- [12] Sharma L and Khandelwal S, Traditional Uses of Plants as Cooling Agents by the Tribal and Traditional Communities of Dang Region in Rajasthan, India, *Ethnobot. Leaflets*, 14, 2010, 218-224.
- [13] Anisuzzaman M, Rahman AHMM, Harun-Or-Rashid M, Naderuzzaman ATM and Islam AKMR, An Ethnobotanical Study of Madhupur, Tangail, *J. Appl. Sci. Res.*, 3 (7), 2007, 519-530.
- [14] Hossan MS, Hanif A, Khan M, Bari S, Jahan R and Rahmatullah M, Ethnobotanical Survey of the Tripura Tribe of Bangladesh, *American-Eurasian J. Sustainable Agri.*, 3 (2), 2009, 253-261.
- [15] Wagh VV, Jain AK and Kadel C, Role of Non-Timber Forest Products in the Livelihood of Tribal Community of Jhabua District (M.P.), *Biological Forum - An Int. J.*, 2 (1), 2010, 45-48.
- [16] Choudhary MS and Upadhyay R, A Study on Indigenous Herbal Remedies Used to Cure Jaundice by Tribal's from Central Narmada Valley of Madhya Pradesh, *Life Sci. Leaflets*, 1, 2012, 1-5.
- [17] Jain AK, Vairale MG and Singh R, Folklore Claims on Some

- Medicinal Plants Used by Bheel Tribe of Guna District Madhya Pradesh, Indian J. Traditional Knowledge, 9 (1), 2010, 105-107.
- [18] Das PK and Mondal AK, The Dye Yielding Plants Used In Traditional Art Of 'Patchitra' In Pingla and Mat Crafts In Sabang With Prospecting Proper Medicinal Value in the Paschim Medinipur District, West Bengal, India, Int. J. Life Sc. Bt & Pharm. Res., 1 (2), 2012, 158-171.
- [19] Shadangi AK, Panda RP and Patra AK, Ethnobotanical Studies of Wild Flora at G. Udayagiri Forest in Eastern Ghat, Odisha, J. Environmen. Sci., Toxicol. and Food Technol., 2 (2), 2012, 25-37.
- [20] Patil GG, Mali PY and Bhadane VV, Folk Remedies Used Against Respiratory Disorders in Jalgaon District, Maharashtra, Natural Product Radiance, 7 (4), 2008, 354-358.
- [21] Kala CP, Aboriginal Uses and Management of Ethnobotanical Species in Deciduous Forests of Chhattisgarh State in India, J. Ethnobiol. and Ethnomed., 5 (20), 2009, 1-9.
- [22] Yadav S, Verma AK and Sharma RK, A Review on *Aegle marmelos* (L.) Correa, Herbal Tech. Industry, 2010, 11-13.
- [23] Orwa C, Mutua A, Kindt R, Jamnadass R and Simons A, Agroforestry Database: A Tree Reference and Selection Guide Version 4.0, 2009, (<http://www.worldagroforestry.org/af/treedb/>)

Table 1: Ethnobotanical Uses of *A. marmelos*

Plant Part	Traditional Uses	Ethnomedicinal Uses
Root	Fish poisoning, dog bite,	In Gastric troubles, heart disorders, intermittent fevers, hypoglycaemia, rheumatism
Stem	Pestles of oil and sugar mills	
Bark	Fish poison, yellow dye	stomach disorder, intermittent fevers, heart disorder; bark decoction is administered in cases of malaria
Wood	Beads worn by lower castes, special couches for rheumatic patients, utilized for carving, small-scale turnery, tool and knife handles, pestles and combs, taking a fine polish	
Leaves	hair tonic, child birth, veterinary medicine for wounds, killing worms, fodder for cattle	Abscess, backache, abdominal disorders, vomiting, cut and wounds, ulcer, dropsy, beriberi, heart problems, cholera, diarrhoea, blood sugar, injuries caused by animals, nervous disorders. The bitter, pungent leaf juice, mixed with honey, is given to allay catarrh and fever. With black pepper relieves jaundice; leaf decoction alleviates asthma, hot poultice of the leaves used in the treatment of ophthalmic and various inflammations, also febrile delirium and acute bronchitis.
Flower	Expectorant, Cologne is obtained from the flowers	epilepsy, decoction of the flowers is used as eye lotion and given as an antiemetic
Fruit rind	Limonene-rich oil has been distilled from the rind for scenting hair oil, fashioned into toys, pill and snuff boxes, sometimes decorated with gold and silver. Peel of unripe fruit is employed in tanning and also yields a yellow dye for calico and silk fabrics.	
Fruit pulp	Acts as detergent and used for washing clothes, edible and used to make jams, eliminates scum in vinegar making; fresh ripe pulp of the higher quality cultivars are used to make sherbet; psoralen in the pulp increases tolerance of sunlight and maintains the normal skin colour.	Acts as an Astringent when unripe; digestive, stomachic; used in diarrhoea, gastric troubles, constipation, dysentery, ulcer, gonorrhoea, epilepsy; show antiviral, antiparasitic activities; ripe fruit pulp is laxative, and tonic for brain and heart
Seed	Febrifuge, seed mucilage is used in making Plaster for walls	
Gum around seed	Abundant in wild fruits and especially when they are unripe. Used as household glue and used as an adhesive by jewellers, resorted to as a soap-substitute. It is mixed with lime plaster for waterproofing wells and is added to cement when building walls. Artists add it to their water colours and it may be applied as a protective coating on paintings to improve adhesive strength of water paints	
Seed oil		A Bitter, light-yellow oil extracted from the seeds is given as a purgative