

A brief review on some prodigious efficacies of *Artocarpus lakoocha* Roxb.

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ABSTRACT

This review paper deals with an overview of nutritional, medicinal and some other uses of the plant *Artocarpus lakoocha*, which is commonly known as monkey jack fruit. It is one of the staple foods of tribal people of Jharkhand and exhibits such properties which make it stand out from other plants. Studies reveal that this plant shows several medicinal as well as biological activities viz. antibacterial, antiviral, insecticidal as well as antifungal properties. *Artocarpus lakoocha* contains strong antioxidants and these are flavonoids and phenolic compounds. The bark, fruit pulp, heartwood extract of this tree, all shows strong antioxidising properties. The fruit is sweet sour in taste and has immense nutritional value and are generally eaten fresh. The spikes of the male and female flowers are used to prepare curries, pickles and delicious sauce. Different parts of the plant such as leaves and twigs are used as fodder and trunk as timber and firewood

Keywords: *Artocarpus lakoocha*, nutritional value, medicinal value, ethnic uses, other uses.

INTRODUCTION

World Health Organization (WHO) has estimated that about 80% of the human population depends on herbal medicines for curing a disease at preliminary stage (Vijayan *et al*, 2007). The traditional indigenous knowledge has been used for against several ailments. *Artocarpus lakoocha* Roxb. is commonly known as Monkey Jack fruit. It is a member of Moraceae family with an average height of 30-40 m. Being a tropical deciduous tree, its flowering and fruiting time ranges from March to July. *Artocarpus lakoocha* is a source of edible fruits, timber, fodder, fuel wood, dye, shade etc and highly valued plant for its medicinal properties (Bishnoi *et al*, 2017). The fruit of this plant is a natural source of antioxidants, vitamins, minerals and β - carotene. These antioxidants help to maintain the normal health of people by protecting against coronary heart diseases and even against cancer (Hossain *et al*, 2016). The bark of this plant is dark brown, exfoliating in small round woody peels, white latex and milky juice (Pandey, 2009).

We all know that free radical scavenging properties of a plant helps to withstand oxidative stress, thereby, preventing from onset of some diseases and

enhanced aging. The plant *A. lakoocha* contains flavonoids and phenolic compounds which are found to be having strong antioxidizing properties (Pandey, 2009) thereby making this an extraordinary medicinally important plant.

Besides, natural products for designing cosmetic materials are a popular practice since ages because they are easily available, cost efficient and have fewer side effects compared to synthetic agents. These products have tyrosine inhibiting property and antioxidant properties as well. The skin-whitening properties of natural cosmetics are of immense demand and encourage the cosmetic industries for designing new products as well.

We also know that, tropical and local foods always play a significant role in adding nutritional value to the diet and acts as a source of income to the natives of rural places. In spite of, having several nutritional and medicinal value, *A. lakoocha* is being neglected, but now, it is high time to explore all of its nutritional and medicinal values to create awareness among people to consume a healthy life and to cultivated more plants for production of cosmetics and receive its other benefits. This paper points out the different aspects of *Artocarpus lakoocha* uses.

1.1 Geographical distribution

Artocarpus lakoocha shows immense distribution in tropical regions of south and south-east Asia, mainly Bangladesh, Bhutan, Nepal, Sri Lanka, India, Myanmar, Indonesia, Vietnam Cambodia, Laos, Singapore, Malaysia and Thailand. In Thailand the plant is commonly known as 'Ma-haad'.

2. Different uses

This plant has already been reported by several researchers for its medicinal values. Some of it are discussed below.

2.1 Nutritional uses

Monkey jack fruit is highly nutritive seasonal food, which is considered as poor man's food in South-East Asia. It is being reported that, *Artocarpus lakoocha* fruits contain several secondary metabolites like phenols, flavonoids, tannins, saponin, steroids and alkaloids. The edible fruits and seeds also contain carbohydrates, proteins and minerals which qualifies it to be highly nutritious (Akhil *et al.*, 2014). Besides, being an excellent source of Vitamin C and β -carotene its fruit also contains several mineral like zinc, copper, manganese and iron which acts as active antioxidants and has protective role in combating coronary heart diseases (Hossain *et al.*, 2016). The immense source of minerals, vitamins, dietetic fibres and polyphenols not only provide a supplementary nutrient diet but also has several health benefits which help the human civilization of all ages.

2.2 Medicinal uses

Records of the literature reveal that *Artocarpus lakoocha* has several medicinal properties. The bark in methanolic extract exhibits strong antioxidising properties because of the presence of prominent amount of flavonoids and phenolic compounds (Pandey, 2009). Different phytochemicals were reported and it showed antimicrobial activities (Pandey, 2009). The fruit pericarp studies showed antimicrobial activities such as blood type agglutination (Kumar *et al.*, 2010). The dried aqueous as well as hydroglycolic extract prepared from the heartwood of this plant is known as 'Puag-Haad', which has been traditionally used as antihelmintic

(Charoenlarp *et al.*, 1989; Maneechai *et al.*, 2009) which supported strong tyrosinase- inhibitory activities and has potential use as a skin-whitening agent (Likhitwitayawuid *et al.*, 2006; Tengamnuy *et al.*, 2006; Teeranachaideekul *et al.*, 2013). In addition, flavonoids have been found in other species of *Artocarpus*, and they possess strong antioxidation (Toshio *et al.*, 2003), anti-inflammation (Wei *et al.*, 2005), and antiplatelet aggregation (Lin *et al.*, 1996). Unfortunately, there have been few studies of *A. lakoocha* from ethanolic extraction, especially antioxidant activity, or phenolic content, including its toxicity. There are studies which reveal that flavonoids in ethanolic extract from *A. lakoocha*, includes assay activity on GSH and MDA in human blood from AAPH oxidation (Singhatong *et al.*, 2010). The plant of *A. lakoocha* have contained flavonoids and phenolic acids, these are strong antioxidants (Jasprica *et al.*, 2007). Moreover, the roots of *A. lakoocha* also found two new stilbene derivatives, lakoochins A (1) and B (2). It was explored that Lakoochins A (1) was cytotoxic against the breast cancer (BC) cell line whereas compound 2 possessed cytotoxicity against the BC and KB cell lines (Puntumchai *et al.*, 2004). The root of *A. lakoocha* is used as purgative and as astringent and its saturated extract is used as a poultice for skin ailments and bark is used to treat headache (Orwa *et al.*, 2009). The consumed fruit pulp act as a refresher of liver as well as seeds and milky latex can used as purgative (Tomar *et al.*, 2015). The fruit contains β -amurin acetate and lupeol acetate having potential antihyperglycemic and hypolipidemic effects that could be effective in diabetes and atherosclerosis medicine (Hossain *et al.*, 2016). The extracts of the plant also contain liposomes which can effectively enhance the skin permeation (Takahashi *et al.*, 2009; Pinsuwan *et al.*, 2010). Recent studies have proved that the extract from this plant is also effective for treating taeniasis (Charoenlarp *et al.*, 1981, 1989). The crude aqueous solution of *A. lakoocha* contains 2, 4, 3', 5'-tetrahydroxystilbene (THS) which is traditionally used to treat tapeworm infection. The THS structure is similar to halogenated phenolic fasciolocides and can

possibly treat liver fluke infection in cattle and human. *Artocarpus lakoocha* has the ability to inhibit the growth of Herpes Simplex Virus (HSV) (Jagtap et al., 2010).

2.3 Other uses

The fruit pulp is eaten fresh and also used in preparation of curries. The spike of male and female flowers are used to make pickles and delicious sauce (Hossain et al, 2016) and also eaten raw, boiled, steamed or roasted. The leaves and the twigs of the tree are used as fodder. In spite of its slow growth, this tree is cultivated in Nepal as fodder tree especially for lactating animals. The leaves contain 16% crude protein and produce almost 60-200 kg fresh feedstuff in a year (Joker, 2003). Timber and wood of this plant is also used to make furniture, boats and plywood for its hard and termite resistance capacity (Tomar et al, 2015) and also is a good source of firewood as well. . The canopy of the tree provides shade and creates a cool environment for living beings. It is also an ornamental plant grown as bonsai. These trees are cultivated with mixed cropping system along with other crops.

3. CONCLUSION

This plant can contribute to the sustainable livelihood of native communities as an agent of supplementary nutrient diet as well as a source of income generation through plant products. It is a source of edible fruits, timber, fodder, fuel wood, dye, shade etc. and highly valued for its medicinal properties (Bishnoi et al., 2017). Despite of so many uses this fruit is considered as minor fruit due to its less palatability, less consumer preference, less demand, no organized cultivation, mostly collected from natural wild, single end use which is generally not defined and explored. This fruit has a profound regional importance in context of food and nutritional security because of its higher nutrient content than the mainstream fruits. Higher nutrient content is due to the presence of antioxidant properties present in the plant. This review makes a pathway to future study and exploration of *Artocarpus* species as a source of essential nutrients

and bioactive phytochemicals which will categorize it as a bi-functional food and will bring it into the scope of knowledge of people as well as researchers.

4. FOOTNOTES

1. List of abbreviations: Not applicable

2. Availability of data and materials: All the data and materials used in the review article are online sources from different open access journals as well as some books from the library of the University.

3. Declaration of Interest: None

4. Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

5. Author's contribution: The review article so far designed right from review of literature to manuscript writing is done by Miss Sharmistha Ganguly (1st author). The second author has guided the whole procedure.

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