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Domestication and value addition of *Artocarpus lakoocha*

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ABSTRACT

A study has been conducted in Joida taluk of Uttara Kannada district, Karnataka to assess the utilization, constraints and probable outcome expected by the *Artocarpus lakoocha* tree. A semi structured questionnaire survey was conducted among the local people of different villages of Joida taluk. This species acts as a secondary source of income for rural people. The steps involved in the processing and marketing were recorded. The actual market rate and cost of production was assessed and cost- benefit ratio was calculated. The cost-benefit ratio being 1:1.6 or 1:2 shows that value addition of this fruit is economically viable. Though this fruit tree is only semi domesticated it provides plenty of products. Domestication and value addition of this fruit tree will be boon to the villagers as well as small scaled industries.

Key words : *Monkey fruit, Vaate huli, Wild edible fruit, NTFP, Local genetic resource*

Introduction

Artocarpus lakoocha Roxb. is commonly known as Monkey fruit tree belongs to the family Moraceae. This tree is native to humid and sub-Himalayan regions of India. It grows up to 1,200 m altitude. It is also found in Bangladesh, Bhutan, Nepal, Myanmar, Sri Lanka, Thailand, Malaysia, Singapore and Vietnam. *A. lakoocha* is used as fruit, furniture, timber, feed, medicine, dye and for aesthetic purpose.

Artocarpus lakoocha is a medium or large deciduous tree. It can grow up to 15 m in height. The crown is usually well spread and hence it makes an excellent shade and avenue tree. The leaves are oblong, acute,alternate, 10-25 cm long, glossy green on upper side when young and roughwhen old and leathery. The orange-yellow male flowers and reddish female flowers of lakoocha are borne separately on the same trees. Fruits are nearly round or irregular. Fresh ripen fruits are edible. Each fruit contains 20–30 seeds.

The *Artocarpus* species have long been recognized for their medicinal and nutritional values. This fruit contains vitamins which are excellent source of antioxidant which maintain normal health and protects the coronary heart disease. The edible fruit pulp is a good tonic for the liver. Raw fruits and male flower spike are utilized in pickles. Timber is used for construction, furniture, boat making and interiors in home.

Lakoocha fodder is highly preferred for its deliciousness and nutritional qualities. It is also used as a prepared food for lactating animals, which effect in producing more milk. It has many medicinal uses, also shown anti-inflammatory, antiviral, anticancer and anti-HIV properties.

In the Family Moraceae under the genus Artocarpus only two species viz. *Artocarpus heterophyllus* (Jack fruit) and *Artocarpus altilis* (Bread fruit) are cultivated in the tropical countries (Zerega

et al., 2005). Domestication involves accelerated and human induced evolution to bring species into wider cultivation through a farmer- driven and market led process. In spite of the multiple uses of *lakoocha*, it remains an obscure and semi-domesticated tree species whose real potential has not been realized yet (Pandey and Bhatnagar, 2009). Collection, consumption and trading of forest products is a skill for group of people for coping and adapting to poverty, growing food demand and seasonal food scarcity. The indigenous forest foods are of great cultural significance to rural/ tribal population in developing countries including India (Rana *et al.,* 2012).

Materials and Methods

The study has been carried out in the Joida Taluk of Uttara Kannada district of Karnataka (Fig. 1). Questionnaire was prepared based on the objective of the study. Semi structured questionnaire survey as well as field survey has been carried out in the locality and data was collected. The interview was conducted among the local people and information related to availability of *Artocarpus lakoocha* species, its uses, steps involved in processing, marketing channel and cost benefit analysis were collected.

Results and Discussion

The *Artocarpus lakoocha* is one of the important wild edible fruits. This is an income generating source for local people. The people residing adjacent to forest area were mainly dependent on these fruits. They collect fruits from forest and follow the fruit processing and make it into final product and sell in market.

Steps involved in Fruit Processing (Fig. 2).

1) *Tree approach:* The local people approach the *Artocarpus lakoocha* trees when the fruits gets matured in the summer month.
2) *Fruits collection:* The time of fruit collection is very important.The fruits should be collected before ripening. The local people carry equipments such as pole included Sickature, knife or hook like structures to pluck the fruits from the tree branches. Some of the frits were hand-

Table 1.

Sl. No	Cost estimation	Amount
1.	Market rate	250-300 Rs. Per kg-fluctuating
2.	Total cost of	150 Rs. Per kg production
3.	Gross return	250 Rs. Per kg
4.	Net benefit	100 Rs. Per kg
5.	**Cost: Benefit**	1:1.6 or 1:2

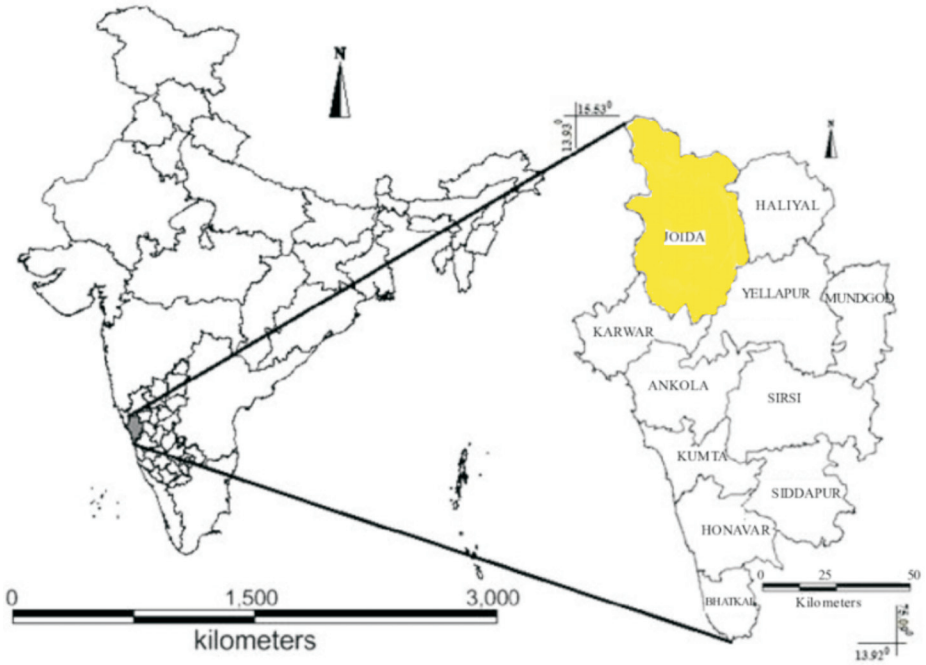

Fig. 1.

picked and other fallen fruits were collected in baskets.

3) *Cut into pieces and make into slices:* The fruits were put in gunny bags and then with help of knife cut into four large pieces and then made into slices.
4) *Drying:* The next step was drying of slices in sunlight and removal of the seeds from the slices. A systematic beating with a wooden mallet frees the seeds and later they can be separated. Then, most important step is to soak the dried slices in salt water for a couple of hours and then sundry it again. This helps in storing and makes them last all year through.
5) *Packing and Marketing:* After effective drying the slices were weighed and packed airtight condition in plastic bags with a help of candle flame and then these products were marketed.

Marketing

Marketing is the vital link between production and consumption. Effective commercialization and market development involves product development, dissemination of product information, product classification and quality standards. Many of the marketing activities such as product planning or market research start much before the actual production ofthe commodity. It proposes that in order to satisfy its organizational objectives, an organization should anticipate the needs and wants of consumers and satisfy these more effectively than competitors.

Fig. 2.

The final products were having high demand in the market as it is used as an alternate for tamarind vinegar. It is used in many dishes specially making fish curry as it adds more taste to the curry. These products were marketed in different quantity packets such as 100 g, 250 g, 500 g, 1kg etc. The cost also depends on the demand of the product. Presently 1kg of *Artocarpus lakoocha* slices cost 250-300 Rs/-. In some places it is directly exported to neigh bouring states also such as Goa and Maharashtra were it is having high demand. The tourists from different places were also buying these local products. The unstable market price, irregular fruiting behaviour and reduced fruit yield and increased dependency of wild animals on these fruits for food such as monkeys affect the fruit supply leads to imbalance in the demand and supply.

Cost benefit analysis

It is calculated by taking the net present value of expected future cash flows from the investment and dividing it by the investment's original cost.The cost-benefit ratio being 1:1.6 or 1:2 shows that this fruit value addition is economically viable (Table 1).

Crop diversification not only mitigates the risks associated with the mono-cropping systems but it also improves income and diversifies the food basket, thereby minimizing the nutritional deficiencies effectively (FAO, 2012). Identification of potential tropical tree species of economically sound and having multiple utility is a feasible option for food security in rural areas. Hossain *et al. (*2016) reported that tropical and local delicious fruits play a significant role by providing supplementary nutrient diet and income generation to the people of rural areas. This extends support for the result obtained from the present study. Domestication of this species will help to achieve not only socio-economic benefits but also give environmental benefits. A similar kind of observation by Orwa *et al.* (2009) reported that *lakoocha* trees are cultivated with mixed cropping systems with other crops.

The fruits are perishable and have low consumer acceptance which can be improved by value additionand in addition to that the species may prove as the base for agricultural diversification, particularly in the underprivileged areas of the country (Bishnoi *et al.,* 2017), this supports the present study. Hence to ensure global food security it is of utmost importance to increase the number of fruit yielding species. In India, where average land holding is relatively small, monsoon dependent, traditional, undomesticated or semi-domesticated or underutilized, plant species are the potential agents of crop diversification and key to sustainable agriculture and livelihood security of the growing population. Considering value addition possibilities and semi domesticated nature in addition to other benefits, domestication of this species will surely help the rural livelihood.

Conclusion

In rural area employment is not available throughout the year. In such situation local people go for collection, value addition and marketing of wild edible fruits such as *Artocarpuslakoocha, Garciniaindica, Phyllanthusemblica* etc. This is a secondary source of income for many people. It creates employment to the women also. Domestication of these species and buy back system or stable market price could provide a good platform in order to minimize the unemployment ratio and to improve the income of the local people.

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