

Chironji (*Buchanania lanzan*): A Retreating Valuable Resource of Central India

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ABSTRACT

Minor forest products have been a source of livelihood of millions of forest dwellers in India and other developing and third world countries. The seeds of *Buchanania lanzan* (*Chironji*) - a tree species belonging to the family Anacardiaceae are commercially very useful for rural tribal people in various parts of India. The seeds/kernels of the plant yield fatty oil which is a substitute for olive and almond oils and widely used in confectionery as well as in the Indigenous Medicine System (IMS). Due to unsustainable extraction of the seeds natural regeneration of *Chironji* has become a major issue among environmentalists and field biologists during the last few decades. The species listed in the Red Data Book of IUCN as a vulnerable medicinal plant species. The present article deals with the assessment of the nutritive/economic value of *Chironji* and regeneration techniques which might be helpful in the conservation and enhancement of this valuable species. The study reveals that the species have great nutritive values having indigenous and industrial significance. Vegetative propagation has shown good results compared to direct seed sowing. The conservation of the species can be promoted by adopting better regeneration techniques and creating awareness among primary collectors and suggesting appropriate scientific harvesting practices.

Keywords: Chironji, Regeneration, Conservation, Nutritional Content, Kernel

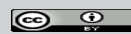
Buchanania lanzan, was first reported by Francis Hamilton in 1798 belongs to family Anacardiaceae. It has diverse common names depending upon the region, Charoli (Gujarat), Chawar, Achar, Cuddapah almond (Bengali), Piyal (Assam) Charu (Oriya), and Char (Telugu). The species is a native of the Indian sub-continent¹ and is found in the tropical deciduous forests of north, western and central India. *Chironji* is a hardy plant and thrives well on rocky, gravelly red soils and also on saline and sodic soils but does not survive under water logged conditions. It grows in pockets of soil between crevices of barren rock and degraded rocky areas including salt-affected soils. For better growth and productivity, well-drained deep loam soil is ideal and it prefers tropical and subtropical climate and withstands drought admirably. It is found growing naturally in the forests of north, western and central

India mostly in the states of Madhya Pradesh, Bihar, Orissa, Andhra Pradesh, Chhattisgarh, Jharkhand, Gujarat, Rajasthan and Maharashtra². The species is closely associated with Sal (*Shorea robusta*), Teak (*Tectona grandis*) and *Anogeissus* species.

Buchanania lanzan is a medium-size tree, and grows up to 40-50 ft. with a straight trunk. The trees are found up to an altitude of 900 meters above mean sea level. Trees have the alternate bearing nature as present in the mango which flowers from January to March and fruits ripen in the month of April-June³. The leaves are 6-10 inches long, with oblong, obtuse, flowers whitish green, sessile, fruit drupe, green when immature and dark black at the ripened stage.

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Fruits are juicy with moderate sweet and acidic pulp generally collected at the green stage to extract the kernels. Chironji is one of the most common dry fruits in India which contains a high calorific value and sweetish in flavor. It used frequently as snacks and as an ingredient in several traditional sweets of India. On average, 40–50 kg of fresh fruits are produced per tree, which remains 8–10 kg on drying, resulting in 1–1.5 kg of finished product per tree. The price of the dry seed of Chironji is about ₹ 1200-1500 per kilogram.

Use of this vegan product:

- ♦ **Food:** Charoli seeds are a popular ingredient in Indian sweets (Chironji ka Barfi, Piyush, shrikhand, kheer and halwa), meaty kormas, lamb pepper with Chironji, Gajar ka Meetha, Hyderabad Haleem, Charoli mutton, Malai kofta and as a flavoring for batters and sauces.
- ♦ **Medicine:** Medicine: Ayurvedic medicine uses all the parts of this tree including its bark, fruits, roots, leaves, nuts and kernels for its varied medicinal properties in treating cold, bowel disorders, premature ejaculation, fever and rheumatism. The gum extracted from the bark of this tree and powder of the roots and dried leaves mixed with buttermilk is a traditional remedy for treating diarrhea. In the folklore medicine of Andhra Pradesh, Chironji gum was mixed with cow's milk for relieving rheumatic pain and they also used the leaves as a tonic for supporting cardiac functions. The leaf powder was also used in encouraging the quick healing of wounds. The juice or the decoction of the Chironji leaves is being used in Unani medicine for purifying the blood, treating loss of libido, impotency and also as a tonic for the digestive system.
- ♦ **Cosmetic:** Powdered seeds blended with milk and turmeric powder is used in India since as a natural face pack for augmenting the glow, complexion and suppleness of the skin.

Nutritive Value

Buchanania lanzan is nutritional, palatable and used as a substitute for almonds in confectionery. The edible seed kernels of Chironji contain a pleasant, slightly acidic flavor, and are eaten raw or roasted.

It yields fatty oil known as Chironji oil which is the best substitute of olive and almond oils in both confectionery and indigenous medicine used for glandular swellings of the neck. Fruits are laxative and also used as an alternative medicine to relieve fever. Kernels of fruits are also used as an ointment in skin diseases⁴. It has great potential in employment generation, particularly for forest dwellers. An estimate tells that the total potential of Chironji in undivided Madhya Pradesh yields about 5000 tonnes per annum that can generate 8 lakh man-days of employment. (<http://jhamfcofed.com/resources/chironji.htm>). Based on the economic potential of the species, the Planning Commission adopted the species for enterprise development for central India under 12th five years plan. The nutritional assessment of Chironji is presented in table 1.

Table 1: Nutritional content in Chironji (per single unit of Kerenel)

Fat	59 g
Protein	63-72 %
Starch	12.1 %
Phosphorus	528 mg
Riboflavin	0.53 g
Niacin	1.5 g
Vitamin C	5.0 g
Oil	34-47 %
Mineral like calcium	279 mg
Vitamin like Thiamene	0.69 mg

Source:⁵

Regeneration potential

The species is naturally regenerated through seed but natural regeneration is limited due to the high extraction of seeds. People often cut branches to maximize extraction. Scientific studies on sustainable harvesting protocols need to be developed to enhance the regeneration of the species. Apart from this best harvesting period of Chironji fruit/seed needs to be determined. A study Sharma⁶ found that the best results in terms of seed size, seed weight, germination percent, oil content, etc., in the fruits harvested is obtained in the 2nd week of May⁶.

The major problem in the artificial regeneration of *Buchanania lanzan* is the low germination rate of seeds due to fungal contamination associated with

the storage of seeds. Moreover, the fungal attack by *Fusarium sp.* (wilting disease) is common after sowing the seeds. The seedlings are also attacked by *Fusarium moniliforme var. subglutinans*, *F. semitectum* present in soil⁷. Humidity and high temperature are also conducive to fungal contamination. At higher humidity and seeds exposed to sunlight for longer periods fail to germinate and lose their viability very soon. The hard seed coat is another problem that leads to low germinating capability⁸ but about 83% germination could be achieved by the mechanically breaking of stony endocarp before sowing in beds. Plant survival of 93-96 % with satisfactory plant growth is obtained when one-year seedling is planted in 60×60×60 cm pit filled with red soil and 10 kg of well rotten FYM coupled with proper mulching around plants during winter and summer season and with or without thatching⁹. To avoid water logged conditions, seeds can be sown on raised beds or in polythene bags. The long gestation period of 15-20 years is another problem with Charonji plants along with large genetic variability. Therefore, to ensure future regeneration of the species, some breeding operations are required. Plant tissue culture might be one of the most useful technologies to propagate the germplasm in a mass volume.

Vegetative propagation

Vegetative propagation always considered a means of large scale production of germplasm under various forestry operations. The following methods of vegetative propagation could be viable for the regeneration of Chironji.

Soft wood grafting-method is useful for establishing *in situ* Chironji orchard in gravelly soils and drier tracts where mortality of nursery raised grafts is very high. Freshly extracted seeds are sown in polythene bags for germination. After attaining a height of 5-10 cm, it can be directly planted in the field at the desired distance. These vigorous seedlings, attaining pencil thickness after one year are soft wood grafted with scion sticks of suitable genotype. The main advantages of this method are better plant growth and minimum mortality.

Chip budding: It is reported as one of the successful methods of vegetative propagation¹⁰ of Chironji. In this method of budding, a healthy bud is selected in the axil of 2 months old leaf emerging on a new

flush. The leaf-blade is removed with the help of a sharp blade leaving petiole intact. Upper cut is given about 2 cm above bud which goes downwards, taking wood portion with simultaneously, up to 1.0-1.5 cm below the bud, then the lower cut is given about 1.0 cm below bud to take out bud with wood. Some rectangle cut is made on root stock and the bud is placed at the juncture. Bud is pressed by hand to remove open space if any and tied tightly with a white polythene strip. After union, top of seedlings is cut a little above bud union and polythene strip are carefully removed. If the selection of scion and root stock is proper, appreciable success may be obtained during July –August.

Root cutting-ensured varying degree of success as poor viability of seeds and slow growth of seedlings, *Buchanania* specie has not so far been raised in plantation despite the high price of kernels in the market. Rooting in root cuttings is difficult however, with the use of some growth hormones like auxins, appreciable success is obtained. Two year old root cuttings having a thickness of 3.6-5.5 cm, treated with IAA (1600ppm) recorded 67.66% rooting¹¹. Root cuttings are successful, but the method has limited use as it results in serious injury to the plant when a large amount of root cuttings are taken. Moreover, tap root is also absent which affects longevity. Under this method, one should always follow the protocol to remove few roots on opposite sides.

Root-stock- controls vigor and equilibrium between yield and quality therefore considered as a good means of vegetative propagation of Charonji.

Conservation

B. lanzan is included in the Red Data Book published by the International Union for Conservation of Nature and Natural Resources (IUCN) as it is a vulnerable medicinal plant. The species is facing severe genetic erosion as a result of activities related to afforestation in tribal inhabited areas¹². In most of the central Indian states, it declares a non-nationalized NTFP and it is free for harvesting. Local inhabitants take advantage of and diminish the trees. Things went worst as collectors are not bothering about the cultivation.

Many workers reported that indiscriminate harvesting; cutting branches to the rampant

collection of seeds and lopped trees attract the infestation of insect pests which adversely affect the growth and productivity. Moreover, trees have suffered due to mortality caused by some biotic factors i.e. grazing, repeated fire, indiscriminate harvesting (lopping and cutting), disease and insect pests^{13,14,15}. No organized cultivation of Chironji is practiced and fruits are directly collected from the wild trees occurring in the forest and marginal lands by un-scientific manner, therefore, the species is facing a great threat. Occasionally the trees are cut partly or completely by the tribals to collect the fruits. Trees have been completely wiped off in the recent past due to developmental activities and the expansion of agricultural land. Such condition has led to the demolition of natural patches of the species. There are no standard cultivars available in Chironji since little work has been done to exploit genetic resources.

At present processing of Chironji nut is done manually and some time by locally made machine. This traditional process involves soaking in the water for 24 hrs, skin removal by hand rubbing followed by drying. Dried nut is broken by rubbing between a pair of stone-slab or hammer followed by separation of the kernel from the hull. In some areas local artesian developed motorized machines for breaking and separating, but the machines were not specifically designed. So, they are again manually separating. Therefore, there is a need for developing the machinery for Chironji decorticating¹⁶.

CONCLUSION

The above mentioned facts reveal that the species have a good nutritive value and economic potential. Although, regeneration is poor due to unscientific exploitation of seeds but vegetative propagation could be a viable means of reproduction. Several seedling strains with a lot of variation provide scope for selection of better varieties¹² and when propagated by seed for root stock preparation, 80-85% germination is achieved. Conservation of Chironji has emerged as a big issue amongst conversationalists and environmentalists in India. The species listed in the vulnerable group of the Red data book of IUCN. As Chironji is a highly nutritious seed having potential industrial and domestic uses therefore, conservation approaches for this valuable species should be cultivation-oriented.

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