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RESEARCH ARTICLE

Documentation of Exploration, Collection and Extraction of *Chironji* (*Buchanania lanzan* Spreng.): A Potential Nut of Bundelkhand Region, India

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Abstract

Almondette (*Buchanania lanzan* Spreng.), locally known as "*Chironji*," is a dry fruit traditionally used for culinary and medicinal purposes by local communities and tribal groups in the Bundelkhand region of India. This species thrives in various habitats within Bundelkhand and several states in central India. Local communities and tribal groups in the area continue to maintain traditional knowledge regarding the extraction of kernels from *Chironji* nuts. During an exploration conducted in May-June 2024, we documented a traditional practice of kernel extraction with the assistance of local informants. Our visit to Bijawar village in Chhatarpur district, Madhya Pradesh, revealed that the locals have traditionally employed old decorticating tools called «Chhanna,» made of iron, to process *Chironji* nuts. After processing and grading, the *Chironji* kernels are sold in the local market at a high price, ranging from ₹1,800 to ₹2,200 per kilogram. *Chironji* is facing a severe threat to its existence due to extensive exploitation and needs to be protected in *in-situ* conservation areas for sustainable utilization.

Keywords: Bundelkhand region, *Chironji*, Economic Potential, Traditional seed processing.

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Introduction

The Buchanania lanzan Spreng., locally known as '*Chironji*', *Achar'*, "*Char', 'Charoli',* and *'Chawar',* is a potential minor fruit tree species belonging to the angiosperm family Anacardiaceae (Mabberley, 2017). Internationally, it is commonly known as the Chirauli nut, Chirauli nut tree, or almondette in French. In southern India, it is also known as Calumpang nut, Cuddapah almond, and is used as an alternative to almonds, especially in Shrikhand sweetmeats (Wiersema and Leon, 2013; Mabberley, 2017). It is a highly heterozygous and cross-pollinated species (Malik *et al.,* 2010). The Indian subcontinent is recognized as the primary centre of origin of *Chironji* (Zeven and de Wet, 1982; Pradheep *et al.,* 2014). In India, the species is distributed across tropical dry deciduous forests in Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh and ascends up to 1300 m elevation in the sub-Himalayan tract with its sparse presence in Uttarakhand (Shetty and Singh, 1987; Chandra and Mukherjee, 2000).

Chironji has significant potential as a tree component in agro-forestry and social forestry systems in India. It plays an important role in the development of wastelands and dry-land horticulture due to its diverse uses and ability to withstand harsh climatic conditions. Currently, it grows wild in forested areas as a minor potential fruit species, providing economic benefits to tribal communities in specific regions. Therefore, it serves as a valuable

resource and a boon for these communities (Singh, 1982; Singh *et al.,* 2006).

Medicinal plants have been utilized since ancient times and are crucial in generating foreign exchange through international trade (Singh *et al.,* 2006). Non-timber forest products (NTFPs) account for 70% of India's forest product exports. The demand for phyto-chemicals is expected to increase, creating new trade opportunities (Kumar *et al.,* 2013). *Chironji*, an important source of raw materials for various traditional health practices, including Unani, Ayurveda, Homeopathy, Siddha, Sowa-Rigpa, and Naturopathy, is widely used in community-specific folk medicine and by local medical practitioners (Kumar *et al.,* 2013). In Andhra Pradesh and Telangana, its gum is dissolved in cow's milk and used to treat rheumatic pain (Wealth of India, 1988).

Although the distribution of this species occurs in ten states, detailed information on its area and production in India is not readily available. It is primarily cultivated in limited regions such as Jhansi, Lalitpur, Banda, and Chitrakoot in Uttar Pradesh, as well as Chhatarpur, Tikamgarh, and Panna districts in Madhya Pradesh. Production is mostly concentrated in drier areas, where villagers and tribal communities collect and sell the nuts and them in local markets. The kernels are highly nutritious, containing 25 to 30% protein, and are used as a dry fruit in various food products (Singh *et al.,* 2006). *Chironji* has significant potential for inclusion in dry-land horticulture and can be utilized to cover arid and semi-arid areas, resource-poor regions, and rangeland.

Traditionally, the methods for collecting and extracting seeds vary among different crops or fruit species. Kumar *et al.* (2012) mentioned the collection and extraction of *Chironji* seeds. Pamarthi *et al.* (2022) noted that the seeds of *Arivela viscosa* are traditionally extracted and cleaned using locally made winnowers. Dangi *et al.* (2021) have reported the morphological characterization of sweet cherry (*Prunus avium* L.), and Srivastava (2022) has provided a detailed discussion on the management of horticultural genetic resources in India. Scented Amber is collected from silver oak trees (*Grevillea robusta* A.Cunn. ex R.Br., Family Proteaceae) traditionally in Chhattisgarh and Odisha for making dhoop sticks and incense sticks.

Materials and Methods

Study sites

Following a comprehensive gap analysis of the collected germplasm, seven districts in central India were identified for the exploration and collection of minor fruit species, including *Buchanania lanzan* and several others (*Cordia myxa, Embelica officinalis, Feronia limonia, Syzygium cumini, Ziziphus mauritiana,* etc.). The selected districts included Jhansi, Lalitpur, Banda, and Chitrakoot in Uttar Pradesh, along with Chhatarpur, Tikamgarh, and Panna in Madhya Pradesh (Fig. 1). The exploration and germplasm collection activities were conducted between May and June 2024.

Survey and information gathering

The primary objective of this study was to document indigenous knowledge related to *Chironji* by gathering information from local communities through surveys and direct interactions. This included recording the local names of the plant and its various parts, along with their traditional uses. Data were collected using a standardized questionnaire developed by Bhatt and Shah (2016). To ensure comprehensive coverage, we engaged with elderly

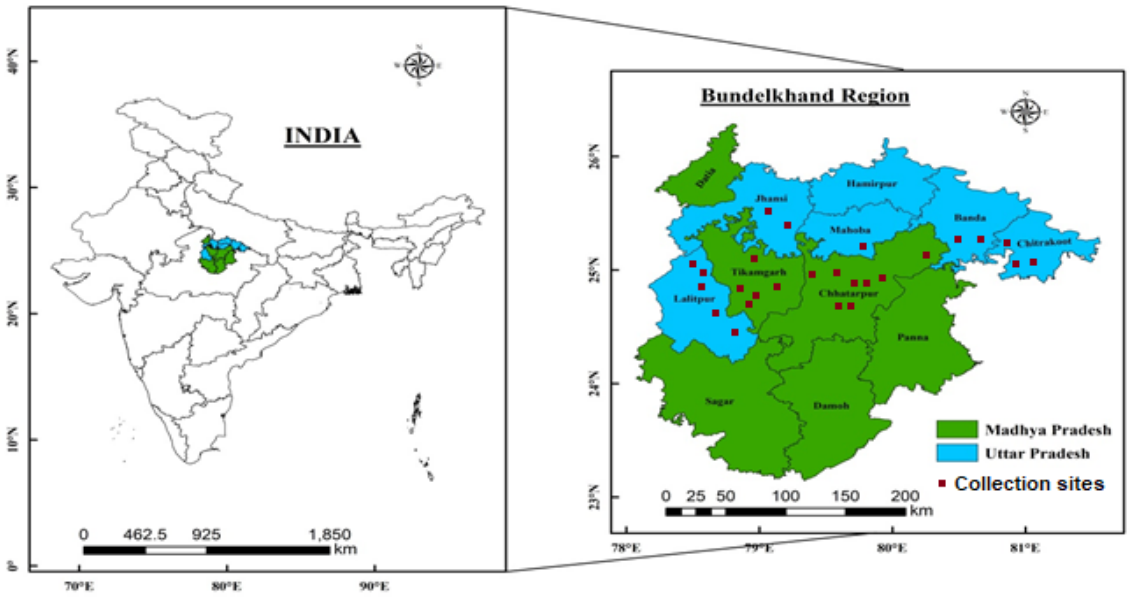

Fig. 1: Germplasm collection sites in the Bundelkhand region, covering districts in Madhya Pradesh and Uttar Pradesh, India

and knowledgeable individuals, including men and women, as well as traditional medicine practitioners. Additionally, relevant literature was reviewed to document the common and vernacular names of the plant and its ethnobotanical uses. A herbarium specimen (HS-26338) was prepared and deposited at the National Herbarium of Cultivated Plants (NHCP), ICAR-National Bureau of Plant Genetic Resources (ICAR-NBPGR), New Delhi (NHCP Database, 2024).

Results and Discussion

Exploration and germplasm collection

A total of 289 accessions of *Chironji*, collected from various regions of India, are conserved in the National Genebank at ICAR-NBPGR, New Delhi (NGB Database, 2025). During an exploration mission conducted from May 30 to June 5, 2024, we successfully collected several minor and rare fruit species, including *B. lanzan* (documented accessions: IC653432, IC653434, IC653435, and IC653436). This exploration took place during an extreme summer, as temperatures reached the highest in the past fifty years. Natural populations of *Chironji* were mainly found in forests, marginal lands, and the field bunds of cultivated areas in Lalitpur, Tikamgarh, and Chhatarpur.

Harvesting, drying and processing of nuts

Fruit harvesting primarily occurs from April to June. The fruits are harvested manually using locally available cord and wood stairs, with small twigs being dragged from the branches (Fig. 2). Tribal inhabitants use baskets of various sizes to collect *Chironji* fruits, which are later stored in large earthen pots. However, it was observed that unorganized harvesting practices, coupled with the frequent cutting of *B. lanzan* tree branches to gather fruits from the natural habitats, contribute significantly to genetic erosion. After consuming the flesh of mature fruits, the nuts are sun-dried (Fig. 2). These dried nuts, locally known as '*Guthali*', are either broken manually or, when available in large quantities, taken to traditional Chhanna (decorticating tools), where the nuts are mechanically split to extract the kernels. Ripe fruits fetch a price of ₹200–300/kg in the local market, while the processed seed kernels were sold at the rate of ₹1,800 to 2,200/kg in the local mandi (unorganized village market). Approximately 70% of local producers sell their harvest at the farm level to local vendors, retailers, and pre-harvest contractors. Some people continue to use traditional methods for extracting the kernel from the nut (Fig. 3).

The *Chironji* nuts are notably hard to crack, and traditionally, dried nuts were broken by rubbing them between stones to separate the kernels from the hulls. During the exploration, an innovative method of kernel extraction was observed in the village of Bijawar, located in Bijawar Tehsil of Chhatarpur district, Madhya Pradesh. In discussions with residents, Mr. Kamlesh Sahoo shared

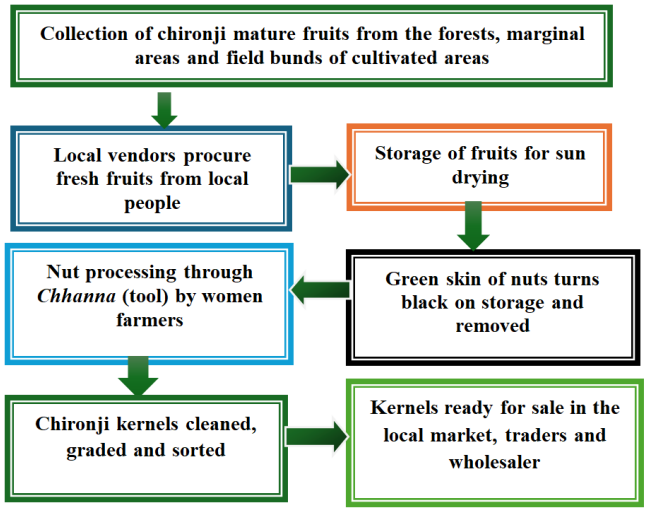

Fig. 2: Flow chart illustrating the processing steps of Chironji nuts

Fig. 3: (A-B) *Chironji* tree in natural habitat; (C) A woman selling *Chironji* fruits in local market place; (D) Close-up view of raw and mature fruits; (E) Display of washed seed; (F) Putting nuts on Chhanna; (G-H) Weighing and separation of kernels; (I) Grading of processed kernels; and (J) *Chironji* kernels ready for sale

insights into a traditional decorticating technique using a tool known as Chhanna. He explained that this method of processing *Chironji* nuts has been practiced in his family for nearly 60–70 years, originally started by his father to sustain their livelihood. In this method, *Chironji* seeds are filled into bags of varying sizes (20, 40, and 50 kg), and both male and female farmers participate in the extraction process using the Chhanna tool (Fig. 3). Each worker, particularly women, has a defined role in the process. The nuts are initially placed in a basket and then fed into a mechanical device that separates the kernels from the hulls, with the kernels collected in steel tubs (Fig. 3). The extracted kernels often contain a mixture of seed coats and shell fragments, which are then handed over to women farmers for final manual sorting. Once cleaned, the sorted kernels are packed and prepared for sale in the local market.

Traditional uses of Chironji in the Bundelkhand region

Chironji possesses significant potential due to its wide range of applications, with various parts of the plant, including roots, leaves, fruits, seeds, and gum, being used for medicinal and cosmetic purposes (Table 1). Among Gujarat's tribal communities, the kernels are traditionally consumed as a brain tonic. An ointment prepared from the kernels is applied to relieve skin itchiness and reduce facial blemishes. The plant's root extracts serve as an expectorant and are also used in the treatment of blood disorders and biliousness. Crushed leaves or leaf powder are commonly applied to wounds as a natural dressing. The seed kernel of *Buchanania lanzan* is an important food source for Bundelkhand region local people. The seed kernel of *Hodgsonia heteroclita* (locally known as Kathai) is an important food source for tribal populations in India's North-Eastern Hill (NEH) region (Semwal *et al.,* 2014). The oil of the kernel also serves as an effective substitute for almond and olive oils (Table 1).

Establishment of in-situ conservation areas

The native wild population of *Chironji* has been under constant pressure for decades due to the absence of standardized management practices and the high market demand for fresh fruits and seed kernels. This has led to extensive exploitation of the species in the wild. Consequently, the genetic resources of *B. lanzan*

Table 1: Documentation of major uses of *Chironji* in India

Major uses	*References*
Food	
The oily kernels are used in the preparation of puddings.	Singh, 1982
The mesocarp of the fruit is edible and particularly enjoyed by children.	Munde *et al.,* 2003
The oil is non-repellent, non-toxic, and suitable for human consumption.	Banerjee and Jain, 1988
Chironji kernels contain 34 to 47% fatty oil.	Rajput *et al.,* 2018
Seed kernel and extracted kernel oil are used for the preparation of several Indian dishes.	Malik *et al.,* 2012
The flesh of ripe *Chironji* fruit is highly palatable and is commonly eaten raw or roasted.	Present study
Local communities prepare refreshing juice from the pulp of *Chironji* fruits.	
Popular dishes *viz.,* halwa and kheer made with *Chironji* kernels.	
Local people use the seeds to prepare "*Chironji* ki burfi.»	
Medicinal	
Treating burns, blood disorders, asthma, diarrhoea, dysentery, fever, ulcers, bodily sensations, and snakebites.	Rajput *et al.,* 2018
In Andhra Pradesh, the gum dissolved in cow's milk is consumed to alleviate rheumatic pains.	Wealth of India, 1988
Extract of the root is also used as an expectorant and for curing biliousness and blood diseases.	Rajput *et al.,* 2018
The gum after mixing with goat milk is used as an analgesic.	Pandey, 1985
Bark or leaf paste of *B. lanzan* and *Diospyros melanoxylon* mixed with a glass of water is given twice daily to treat snakebite.	Shukla *et al.,* 2001
Gum from the cut-bark is soluble in water and used internally for the treatment of intercostals pain and diarrhoea.	Rajput *et al.,* 2018
Other uses	
Chironji provides quality timber for various purposes.	Singh *et al.,* 2010
Varnish is extracted from bark of *Chironji* and used in tanning in Kerala.	

face a significant threat in their natural habitat. These threats have caused a scattered species distribution, low natural regeneration rates, and unsustainable harvesting practices. Local and tribal communities often cut small and large branches of the trees to collect wild fruits for personal consumption or to sustain their livelihoods, further aggravating the decline in *Chironji* diversity.

The genotypic composition of germplasm conserved in the National Genebank (NGB) remains static, whereas global efforts are now shifting towards dynamic conservation methods, such as *in-situ conservation*. *These methods allow* for adaptation to changing climates and the continuation of natural evolutionary processes. Given the high market demand for *Chironji* kernels and the immediate threat to its natural populations, there is an urgent need to identify and establish *in-situ* conservation areas in the Bundelkhand region and other states. This approach will help safeguard this minor yet potentially fruit species before they are lost forever. Additionally, model nurseries should be developed to provide high-quality planting material and agrotechniques suited to diversified farming systems. Efforts should focus on standardizing high-density planting and canopy management under various tropical semi-arid ecosystems across the country.

ICAR-NBPGR has established the first *Citrus Gene Sanctuary* in 1981 in the Garo Hills of Meghalaya, encompassing a vast area of 10,266 hectares (Singh, 1981) and recently, the institute has identified a wild rice (*Oryza rufipogon*) habitat in Borjuli, Tezpur, Assam and a natural stand of guava (*Psidium guajava* L.) in the East Ramganga River Valley, Pithoragarh district, Uttarakhand, as *in-situ* conservation sites (Semwal *et al.,* 2024). These initiatives highlight the Institute's capability and know-how in establishing *in-situ* conservation areas in different parts of the country. Such a conservation site may also be located for *Chironji*.

Conclusion

The tremendous potential of *Chironji* has been documented, owing to its significant food, medicinal and industrial value. The indigenous communities have preserved a wealth of traditional knowledge about their collection, usage, and value addition since time immemorial. However, due to a narrow distribution range, over-exploitation, indiscriminate harvesting (including lopping and branch cutting), and low natural regeneration have seriously threatened its survival. There is an urgent need to implement protective measures, like the establishment of *in-situ* conservation areas, *on-farm* conservation sites and habitat management areas for *Chironji,* on priority. Such initiatives would ensure sustainable livelihood security for local communities while conserving this valuable species.

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