

## ***Diploknema butyracea* (Roxb.) H. J. Lam (Chyura): A Viable Livelihood Option for Hill Communities of Uttarakhand**

L.R. Lakshmikanta Panda<sup>1\*</sup>, Neelu Singh<sup>2</sup>, Arun Uniyal<sup>1</sup>, Jyoti Kukreti<sup>1</sup> and Ritu<sup>1</sup>

<sup>1</sup>Non-Timber Forest Product Discipline, Silviculture and Forest Management Division, Forest Research Institute, Dehradun (Uttarakhand), India.

<sup>2</sup>Tropical Forest Research Institute, Jabalpur (Madhya Pradesh), India.

(Corresponding author: L.R. Lakshmikanta Panda\*)

(Received: 12 December 2023; Revised: 28 December 2023; Accepted: 11 January 2024; Published: 15 February 2024)

(Published by Research Trend)

**ABSTRACT:** *Diploknema butyracea* is a deciduous tree belonging to the family Sapotaceae. It is about 15 to 25 m in height, widely distributed in the sub-Himalayan region at an altitude of about 300 to 1550 m. It found mostly on areas such as hill slopes and river side. This tree is economically important but underutilized, multipurpose tree of Uttarakhand. A Field survey was conducted during July 2021-September 2023 to collect data on distribution and uses of this tree by the local peoples. In this study 9 population sites of Chyura tree namely Okalkanda, Jamradi, Paitna, Mankot, Matoil, Bhatari, Matila, Kanth and Nawali has been identified. Seeds are the most useful part of the plant, which is used to obtain Chyuri ghee or Chyuri butter. Local peoples of this region used this tree as a food, fuel wood, timber and fodder purpose. Butter produced from chyura seed is also used for making a variety of value-added products like soap, lipbalm, foot crack cream and candles. This paper focus to identify the distribution and socio-economic importance of Chyura (*Diploknema butyracea*) trees by local communities of Uttarakhand.

**Keywords:** Chyura, Livelihood, Butter, Uttrakhand.

### **INTRODUCTION**

Non timber forest products play a very important role among the local people of Uttarakhand and provide a source of income for living. In Uttarakhand Himalaya most of the NTFPs are essential part of livelihood activities for rural population (Maikhuri *et al.*, 2004). The harvesting and collection of NTFPs is a major economic activity and about 500 million people living near forest fringe area are dependent upon for meeting their needs (Sundriyal and Sundriyal 2003). Trees are valued for the many tangible and intangible benefits they provide in rural, as well as in urban landscapes throughout the world. Some tree species have special importance for Indigenous peoples, as they are associated with cultural and spiritual practices (Benner *et al.*, 2021).

Rapid socio-economic deviations over the past few decades have caused a marked deterioration in the share of Indigenous peoples engaging in social practices and knowledge transmission, hence threatening biodiversity conservation. A number of multipurpose plants are found in Uttarakhand, which are lesser known and underutilized. *Diploknema butyracea* locally known as Chyura is one of such underutilized multipurpose tree species that distributed in the kumaun region of the state (Bahar, 2011).

Worldwide, the genus *Diploknema* Pierre of Sapotaceae is represented by eleven taxa, with eight species and three synonyms. Out of these only three species are

found in India, viz., *Diploknema butyracea* (Roxb.) H.J. Lam, *Diploknema butyracea* var. *andamanensis* P. Royen, and *Diploknema butyraceoides* (M.B. Scott) H.J. Lam. Of these, *Diploknema butyracea*, called as 'Indian Butter Tree' by William Roxburgh in 1805, is indigenous to the sub-Himalayan tracts of India, Bhutan, China and Nepal (Majumder *et al.*, 2012). It distributed generally in the tracts on narrow valleys, steep slopes and cliffs at an altitude ranging from 300 to 1500 meters (Rijal, 2011). In India, it occurs in subtropical forests of Himalaya across Kumaon Hills, Sikkim, Darjeeling, Arunachal Pradesh and Assam (Chowdhury *et al.*, 2020). It is a medium sized, hardy plant species with economic age of 80-100 years (Upriety and Asselin 2023). Tree attains a height of 15 m and girth 1.8 m, fruits are berries, 1-3 seeded and contain about 2.0 cm long almond shaped kernel. The population of this trees in Uttarakhand is mainly restricted in Pithoragarh district particularly the areas neighboring Nepal and adjoining areas of Almora, Bageshwar and Champawat (Joshi *et al.*, 2018; Tamta and Tewari 2018).

Chyura seed is an important source of fattyoil. The oil is known as phulwara which is used as a substitute for ghee and butter in cooking and burning diyas. Hence, it is famous as Indian butter tree (Tag and Tsering 2012). The bark having tannin properties is used as dyeing. The green leaf is used as a good fodder, branches for fuel wood and trunk for timber. The nectar from the flowers is collected through honeybees or directly to

produce jiggery which is highly valued in Uttarakhand (Bahar, 2011). The fleshy fruits are harvested for edible purpose (Aryal *et al.*, 2009). It is also used in preparation of medicines and cosmetic creams. The defatted cake can be used as fertilizer as it has pesticide properties (Chikanbanjar *et al.*, 2021).

The purpose of the present study was to assess the distribution and indigenous use of the Chyura (*Diploknema butyracea* Roxb) by local peoples in the Kumaon region of Uttarakhand where it occurs generally in the warm valleys and river/stream sides. In this view, this study was conducted to know the multipurpose benefits of Chyura plants.

Besides being such an important tree, it is facing a great habitat loss in the study area due to many factors including establishment period, eroding traditional knowledge, heavy pruning for fodder purpose, we

attempt to document the uses of this tree as done by the villagers of the study area along with the identification of various reasons for its habitat loss in the study area.

## MATERIAL AND METHOD

The current study has been carried out in different regions of Kumaon, Uttarakhand during different months of 2021-2023. Survey was made through available literature, Field visit, Personal interviews/ telephonic interview for collection of population of Chyura. In this study 9 population sites of Chyura tree in kumaon region (Okalkanda, Jamradi, Paitna, Mankot, Matoil, Bhateri, Matila, Kanth and Nawali) has been identified. Basically Chyura tree is located in valley area and catchment area of river. The details of the selected areas are as follows:

Sr. No.	Districts	Area	Elevation	GPS Coordinates
1.	Nainital	Okhalkanda	1203 m	N 29° 20' 09.30" and E 079° 45' 21.8"
		Jamradi	1244 m	N 29° 21' 28.20" and E 079° 44' 44.45"
		Paitna- I	1209 m	N 29° 21' 02.44" and E 079° 45' 05.95"
2.	Bageshwar	Mankot	1510 m	N 29° 49' 37.44" and E 079° 49' 06.11"
3.	Pithauragarh	Matoli	1112 m	N 29° 40' 22.45" and E 080° 20' 52.69"
		Matila	917 m	N 29° 31' 05.90" and E 080° 07' 39.70"
		Kanth	1201 m	N 29° 30' 48.90" and E 080° 08' 11.40"
		Bhateri	1212 m	N 29° 35' 22.57" and E 080° 22' 34.61"
		Nawali	1212 m	N 29° 66' 90.52" and E 080° 355' 98.97"



Fig. 1. Distribution of *Diploknema butyracea* Tree in Uttarakhand.



Fig. 2. *Diploknema butyracea*.

## STUDY AREA

**Methods of data collection and analysis.** Population data of *Diploknema butyracea* were collected from different sites of kumaon region of Uttarakhand. Field visits were carried out in different phases from July 2021 to September 2023. Population survey work conducted by using different methods like, personal interviews of local villagers, site visit, and community level interview. Semi questionnaires were prepared for collecting data on population states of *Diploknema butyracea* by household surveys with the help of local assistants. We have selected groups of 15 people in each site for community level interview. Market survey also conducted in the local areas nearby to the patches of the butter tree in order to know about the value,

demand and supply of Chyura ghee in local communities.

## RESULT AND DISCUSSION

The tree is usually found scattered in wastelands, pastures and cultivated fields near the villages. The tree also occurs separately or in small groups as a natural element of broadleaved forests. The Chyura tree is used in several ways by the local people in the study area. This is a tree of whose nearly all the parts are useful

(Chhetry *et al.*, 2022). The main product of this tree is extracted from the seeds which is known as Chyura ghee or butter. It produces oil seeds, rich in oil contents which at lower temperature transforms into fat and looks like butter or ghee which has a great nutritional and medicinal value (Pandey *et al.*, 2021). Some of the main uses of the tree as done by the study community are as follows:



**Processing of Chyura Butter.** For preparation of chyura butter, the fruits are first harvested and collected in a basket and their pulp is removed. The seeds obtained are then washed and sun dried for 4-5 days. Traditionally, two methods are used. In the first method, the seeds are roasted and in another the seeds are boiled in water for some time. After this, the butter is extracted using a traditional method called “Kolhu” (oil crushing machine). The butter thus obtained is pale yellowish in color and is unrefined. For edible uses, it should be refined. The percentage oil yield obtained using the traditional method is around 30-40 %.

to its pesticidal properties. Cosmetic items like lipbalm, foot crack cream are also prepared from butter.



**Fig. 6.** Process of Oil extraction from Chyura seeds.

One more method for preparation of butter is chemically in the laboratory. For this, the seeds are first dried for 2-3 days and their seed coat is removed. The kernel is then powdered; this powder is then used for preparing the butter by hot extraction method using petroleum ether as solvent. The percentage oil yield obtained using this method is around 50-60 %. Usually, 100 gram of chyura powder produces 30mL of butter.

**Products from Chyura Oil.** The chyura seed is used for making various products like soap which is prepared through saponification reaction using lye due to its high saponin content, candles are made by mixing chyuri butter and beewax in a proportion and some fragrance. Mosquito repellent is prepared by the residue obtained after extracting butter and other additives like cow dung, coconut husk, saw dust, charcoal, camphor, lemongrass leaves etc and the remaining part left after butter extraction can be used directly as a fertilizer due



**Fig. 7.** Soap prepared from Chyura oil.



**Fig. 8.** Candles prepared from Chyura oil.

**Household Uses.** The fruits and seeds are edible part of the plant. The fruits are sweet in taste and are used for making sugar candies, jam and squash. The butter is extracted from the seeds, locally known as “Makkhan” which can be further processed to make ghee which is used for edible purpose and for lightning lamps (diya). The leaves can be used for making disposable plates. The wood of the tree is used in making furniture. The local households are benefitted by beekeeping. The nectar is collected by honey bees to produce honey (Joshi and Pechhacker 2002).

**Agricultural and other uses.** The residue left after butter extraction can be used directly as a fertilizer due to its pesticidal, homicidal, nematocidal, molluscicidal and rodenticidal properties (Tewari *et al.*, 2015). The tree bark is used as fish poison due to its tannin content. The large spread roots of the tree prevent soil erosion and helps in water and soil conservation. The villagers collect the leaves from chyura tree and use as green fodder, which has resulted in high exploitation of the

trees, however nowadays awareness has increased for its conservation and restoration.

The study indicates that the shift from traditional practices to modern is very slow and even though after awareness and introduction of modern appropriate technologies the large proportion of the community is

still conserving the traditional knowledge and practices. The traditional uses of chyura are continued with diversification to an extent for better income and improvised livelihoods. The awareness level of communities has increased and approach to conserve chyura is well taken.



**Fig. 9.** Beekeeping near Chyura Tree.



**Fig. 10.** Chyura residue used as fertilizer.



**Fig. 11.** Looping of Chyura tree for fodder.

## CONCLUSIONS

*Diploknema butyracea* is a plant with unlimited benefits for local farmers to generate livelihood opportunities. The use of oil is found in different fields such as plant based ghee production, candle manufacturing, pharmaceuticals and soap making. Existing Self help groups and NGO's can work as a bridge between locals farmers to support agribusiness such as bee-farming, better price for honey, butter and livelihood support. Local harvester can make profit by adopting the techniques for honey production during flowering of chyura plant. Training should be provided to local self help group, NGO's, for making value added product from chyura seed for livelihood generation. *D. butyracea* can be suggested as an important source for vegetable oil demand in the hill region.

**Acknowledgement.** The help and support extended by the Director of Forest Research Institute, during the study is greatly acknowledged. The financial support was extended by the Indian Council of Forestry Research & Education, Dehradun, India. [Project ID:75/2019/ICFRE(R)/RP/SFRESPE (CAMPA)/AICRP-29/Main File/59].

**Conflict of Interest.** None.

## REFERENCES

- Aryal, K. P., Berg, A. and Ogle, B. (2009). Uncultivated plants and livelihood support- A case study from the chepang people of Nepal. *Ethnobotany Research and Applications*, 7, 409-422.
- Bahar, N. (2011). Cheura [*Diploknema butyracea* (Roxb.) H. J. Lam.]: an important tree for poverty alleviation. *Indian Forester*, 137, 1344-1345.
- Benner, J., Nielsen, J. and Lertzman, K. (2021). Using traditional ecological knowledge to understand the diversity and abundance of culturally important trees. *Journal of Ethnobiology*, 41, 209–228.
- Chhetry, A. K., Dhakal, S., Chaudhary, L., Karki, K., Khadka, R. B., Chaudhary, G. P., Bastola, T., Poudel, A., Aryal, P. and Pandey, J. (2022). Study of antibacterial activity of rootbark, leaves, and pericarp extracts of *Diploknema butyracea* and evaluation of prospective antioxidant activity. *Journal of Tropical Medicine*, 5, 1-12.
- Chikanbanjar, R., Pun, U. K. and Bhattarai, B. (2021). Status and types of Chiuri (*Diploknema butyracea* (Roxb.) HJ Lam) owned by Indigenous Chepang communities in Makwanpur, Nepal. *For. J. Inst. For. Nepal*, 18, 119–126.
- Chowdhury, M. Q., Bhattarai, T. R., Ridder, M. D. and Beeckman, H. (2020). Growth-ring analysis of *Diploknema butyracea* is a potential tool for revealing indigenous land use history in the lower Himalayan foothills of Nepal. *Forests*, 11(2), 1-12.
- Joshi, N. C., Chaudhary, A. and Rawat, G. S. (2018). Cheura (*Diploknema butyracea*) as a livelihood option for forest-dweller tribe (Van-Raji) of Pithoragarh, Uttarakhand, India. *ESSENCE International Journal for Environmental Rehabilitation and Conservation*, 9(1), 134-141.
- Joshi, S. and Pechhacker, H. (2002). Carbohydrate Composition of Nectar, Honey and Sugar Candy of Indian Butter Tree. *Mellifera*, 57-59.
- Maikhuri, R. K., Rao, K. S. and Saxena, K. G. (2004). Bioprospecting of wild edibles for rural development in the central Himalayan mountain of India. *Mt Res Dev*, 24, 110–113.
- Majumder, K., Datta, B. and Shanlar, U. (2012). Establishing continuity in distribution of *Diploknema butyracea* (Roxb.) H. J. Lam in Indian subcontinent. *Journal of Research in Biology*, 2(7), 660-666.
- Pandey, J., Khanal, B., Bhandari, J., Bashyal, R., Pandey, A., Mikrani, A. A., Aryal, P. and Bhandari, R. (2021). Physicochemical evaluation of *Diploknema butyracea* seed extract and formulation of ketoconazole ointment by using the fat as a base. *Journal of Food Quality*, 1-11.
- Rijal, A. (2011). Surviving on Knowledge: Ethnobotany of Chepang community from mid-hills of Nepal. *Ethnobotany Research and Applications*, 9, 181-215.
- Sundriyal, M. and Sundriyal, R. C. (2003). Underutilized edible plants of the Sikkim Himalaya: need for domestication. *Current Science*, 85(6), 731-736.
- Tag, H. and Tsering, J. (2012). Ethnobotanical Study and Nutritional Analysis on Middle and High Altitude Wild Edible Flora of West Kameng and Tawang

- Sector of Arunachal Pradesh for Defence Food Security. Technical Report, Defence Research Laboratory, DRDO, Ministry of Defence, Government of India.
- Tamta, K. K. and Tewari, A. (2018). Assessing the resource potential of Cheura (*Diploknema butyracea* Roxb.) in Kumaun region of Uttarakhand. *International Journal of Advanced Research and Development*, 3(2), 1214-1217.
- Tewari, A., Shah, S., Singh, N. and Kumar T. K. (2015). *Diploknema butyracea* (Roxb.) Lamb: A viable livelihood option for hill communities of central Himalayan region. *International Journal of Recent Scientific Research*, 6, 3937-3940.
- Uprety, Y. and Asselin, H. (2023). Biocultural Importance of the Chiuri Tree [*Diploknema butyracea* (Roxb.) H. J. Lam] for the Chepang Communities of Central Nepal. *Forests*, 14(3), 479.

**How to cite this article:** L.R. Lakshmikanta Panda, Neelu Singh, Arun Uniyal, Jyoti Kukreti and Ritu (2024). *Diploknema butyracea* (Roxb.) H. J. Lam (Chyura): A Viable Livelihood Option for Hill Communities of Uttarakhand. *Biological Forum – An International Journal*, 16(2): 144-148.