

 RESEARCH PAPER

An assessment of *Diploknema butyracea* (Roxb.) H. J. Lam (Chiuri) utilization in Chepang community Chitwan district, Nepal

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Abstract

Chiuri (*Diploknema butyracea*) is a medium-sized tree indigenous to Nepal and integral to the Chepang ethnic group. The utilization of Chiuri has experienced a decline, leading to a perceptible gap between agricultural practitioners and entrepreneurial endeavors within the Chepang community. This study, conducted from January to July 2023 in the Rapti municipality of the Chitwan district, Nepal, aims to document both traditional and contemporary applications of Chiuri in the Chepang community, evaluating its market presence, economic contributions, and cultural practices. The research involved household surveys and six key informant interviews, employing structured and semi-structured questionnaires for primary data collection. The collected data underwent meticulous analysis using MS-Excel and statistical tools. Traditionally, the Chepang community employed Chiuri for diverse purposes, including the extraction of Chiuri butter, utilization of flower juice, leaf plate fabrication, liso production, and oilcake processing. However, contemporary practices have witnessed a transition towards packaged oil, various juice derivatives, and fertilizer. Historically, Chiuri butter held paramount importance as the primary source of income for the Chepang community, supplemented by revenue generated from honey, oilcake, leaf plate crafting, alcohol juice production, and liso manufacturing. Over the past two decades, a marked decline is evident, with only 36% of the population currently engaged in processing and selling Chiuri products, compared to 85% in the past. Market transactions predominantly occur in Lothar Bazaar, trailed by Bhandara and local markets, where Chiuri butter, honey, and seeds are the primary commodities. Beekeeping, honey production and butter have emerged as the predominant sources of income. Historically vital for the economic and social well-being of the Chepang community, Chiuri has seen a decline in traditional practices such as Chepuwa (Khalang) oil extraction and a diminishing prevalence of the dowry system. Adopting cost-effective treatment technology is crucial to replace traditional methods and ensure sustainable Chiuri product production.

Keywords

Butter, chiura, chepang, income, khalang, traditional practices

Introduction

Chiuri, scientifically known as *Diploknema butyracea* (Roxb.), is a deciduous tree that graces the sub-Himalayan mountains, thriving at elevations ranging from 300 to 1500 meters (Chikanbanjar et al. 2021a). This medium-sized tree, belonging to the Sapotaceae family, plays

a pivotal role in the biodiversity of the region (Manandhar 2002). Commonly referred to as the Indian butter tree, it boasts various synonyms such as *Bassia butyracea* (Roxb.), *Madhuca butyracea* (Roxb.), and *Aesandra butyracea* (Roxb). The Chiuri tree is characterized by its robust growth, reaching heights of about 20 meters. The distribution of Chiuri extends beyond the borders of

Nepal, encompassing regions in India, Bhutan, and the Philippines (Subedi et al. 2022). In Nepal alone, Chiuri is widespread, with approximately 50 districts hosting the presence of Chiuri plants. According to a Resource analysis conducted by MEDEP (2020), there were over 5 million Chiuri fruiting trees documented across the country. The tree's geographical range spans from the western to the eastern regions of Nepal, covering districts such as Acham, Baitadi, Darchula, Kailali, Gorkha, Chitwan, Lamjung, Syangja, and many others (GoN-MoI/UNDP 2014).

The Chiuri tree is a valuable natural resource with diverse uses. Its timber serves various purposes, including construction and firewood. The leaves are utilized as fodder for animals, while the resin extracted from the tree finds applications in glue production. However, the most economically significant aspect lies in the extraction of oil from Chiuri seeds, yielding a rich and valuable butter. The butter produced from Chiuri seeds has immense economic potential (Devkota et al. 2019). It is a source of income for communities engaging in its extraction, and the derived products are manifold. Chiuri butter is used in the production of chocolate, illuminants, candles, candy, margarine, and holds medicinal purposes (Chhetri et al. 2020). Additionally, the flowers of the Chiuri tree contribute to the culinary landscape, being used in the manufacture of confectionery, baked goods, sauces, and purees (Thapa 2019). The honey derived from Chiuri flower nectar adds to the array of products generated from this versatile tree. The commercial utilization of Chiuri butter extends into various sectors such as confectionery, cooking oil, candle manufacturing, and soap production. Furthermore, the medicinal properties of Chiuri have been recognized, with its effectiveness against rheumatism documented by Practical Action (The Schumacher Centre for Technology and Development 1926).

The Chepang community (Fig. 1), also known as Che-wang, forms a Tibeto-Burman ethnic group residing in the rugged ridges of the Mahabharat mountain range in central Nepal (Chepang people 2019). Historically, the Chepang people have maintained a close and symbiotic



Figure 1. Traditional Chepang community of Chitwan, Nepal.

relationship with nature, relying on forests, water, and wildlife for their livelihoods (Aacharya and Syantant 2023). Over the years, they have practiced shifting cultivation and are recognized as one of the most disadvantaged ethnic communities in Nepal (Sharma and Kerkhoff 2006). Culturally diverse, the Chepang people have evolved in their beliefs, transitioning from an amalgamation of nature, Hinduism, and Buddhism to a more recent incorporation of Christianity. Six different sources of livelihood were identified in the Chepang community, namely agriculture, wage labour, forestry, crafts, skilled non-agricultural employment, and remittances (Piya et al. 2011). Despite their physical strength and large stature, the Chepang community faces economic, social, and political challenges, rendering them economically backward but resilient and broad-minded (Aacharya and Syantant 2023).

The Chepang community's connection with Chiuri goes beyond mere utilization (Acharya 2015; Community 2017); it is deeply embedded in their cultural fabric (Aacharya and Syantant 2023). Chiuri holds significant religious and cultural value in Nepalese ethnic communities, especially within the Chepang culture. Notably, Chiuri has been presented as a dowry to Chepang daughters, highlighting its cultural significance (Community 2017). Chepangs, known for their adeptness in utilizing forest resources, engage extensively in the preservation and utilization of Chiuri (Joshi 2010). Traditionally, the Chepang community refrains from cutting or felling Chiuri trees due to their multifunctional importance. The tree serves not only as a source of economic sustenance but also as a symbol of cultural identity.

There is a growing concern about the declining utilization of *Diploknema butyracea* in the Chepang community despite its economic and cultural significance (Bhattarai 1995, Chhetri et al. 1997). With increasing populations, changing land use patterns, and potential shifts in cultural practices, the Chepang community faces challenges in preserving the traditional utilization of Chiuri. The objective of this study is to delve into the intricate dynamics of this relationship, exploring the traditional and contemporary uses of Chiuri within the Chepang community, assessing market dynamics, and understanding the socio-economic implications of its changing utilization patterns. In doing so, it aims to contribute valuable insights for the preservation of cultural heritage, sustainable economic development, and ecological conservation. The study's novelty lies in its comprehensive exploration of the multifaceted role of *Diploknema butyracea* within the Chepang community. By documenting traditional practices, market dynamics, and cultural significance, the study contributes valuable insights into the intricate interplay between indigenous communities and natural resources. The study hypothesizes that utilization of *Diploknema butyracea* in the Chepang community has undergone changes over time, impacting traditional practices, economic aspects, and cultural significance. The research holds practical implications for various stakeholders, including entrepreneurs, researchers, and policymakers. Understanding the

current scenario of Chiuri utilization can provide a basis for developing sustainable economic ventures, preserving cultural practices, and informing policies that ensure the conservation of *Diploknema butyracea*.

Materials and methods

Study area and sampling technique

The study area was Rapti Municipality, Chitwan, Nepal, situated in the eastern region of Chitwan at 27.603947°N, 84.646058°E (Fig. 2). The research was conducted from January 2023 to July 2023. The site was purposefully selected due to the predominant Chepang community presence, heavily reliant on non-timber forest products (NTFPs). Out of a total of 1,158 households in this area, 10% (116 households) were surveyed with a confidence level of 95% and a 5% error limit. A simple random system was employed to select households for interviews.

For household surveys, a structured and semi-structured questionnaire was prepared. Following formula in Equation (1) for determining sample size as;

$$n = \frac{[Nz^2P(1-P)]}{[(Nd^2) + z^2P(1-P)]} \quad (1)$$

Where, n is the sample size, N is the total number of households (1158), z is the confidence level (at 95%, $z = 1.96$), P is the estimated population proportion (0.5, maximizing the sample size), and d is the error limit of 5%. Using this formula, a sample size of 227 was derived, representing 19% of the total households. Approximately 10%, or 116 households, were selected for the research.

Secondary data collection involved consulting relevant journals, papers, books, and both published and unpublished reports.

Data analysis

Both qualitative and quantitative data were analyzed using standard techniques and applicable tools, with MS-Excel 2010 serving as the primary tool. Quantitative data were presented through tables, charts, and diagrams, while qualitative data were described in a narrative manner. The outcomes were interpreted within the text, ensuring a comprehensive understanding of the collected data.

Results

Socio-demographic condition

The inhabitants of the study area exhibit varying socio-economic conditions concerning education level, income sources, food sufficiency, family size, age, and occupation. The demographic distribution in the study included 26% women and 74% men (Fig. 3). Among them, 11% of respondents belong to the 20–30 age group, 35% to the 31–40 age group, 30% to the 41–50 age group, 14% to the 51–60 age group, and 10% are above 61 years old (Fig. 4). The gender distribution of 26% women and 74%

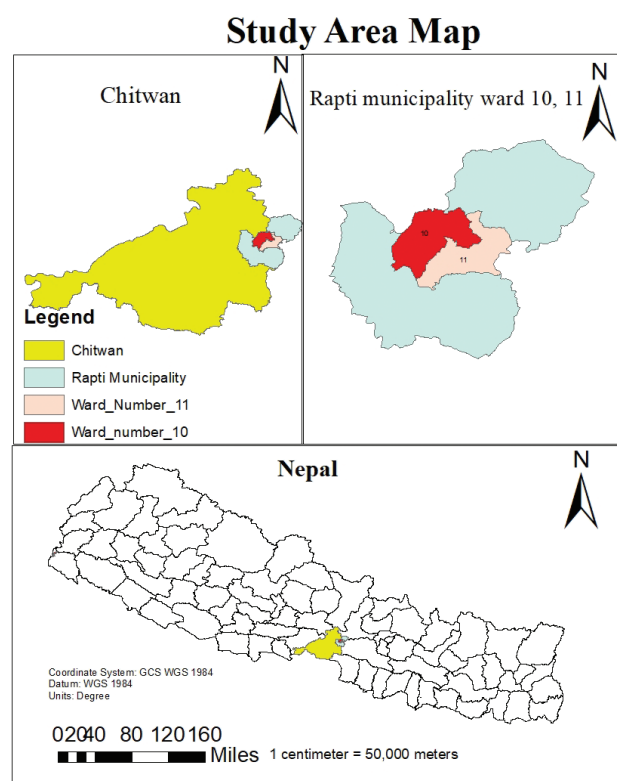


Figure 2. Study area showing Rapti municipality, Nepal.

Research design and method of data collection

Primary data collection involved household surveys and key informant interviews, utilizing both quantitative and qualitative survey designs. The study primarily adopted a social survey approach. Six key informant surveys were conducted, consulting individuals such as the Division Forest Officer, Assistant Forest Officer, President of Community Forest User Group, local leaders, and traders to ascertain the actual conditions related to Chiuri.

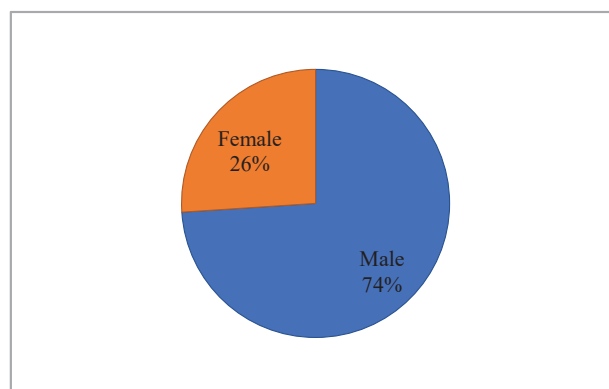


Figure 3. Gender ratio of the respondents.

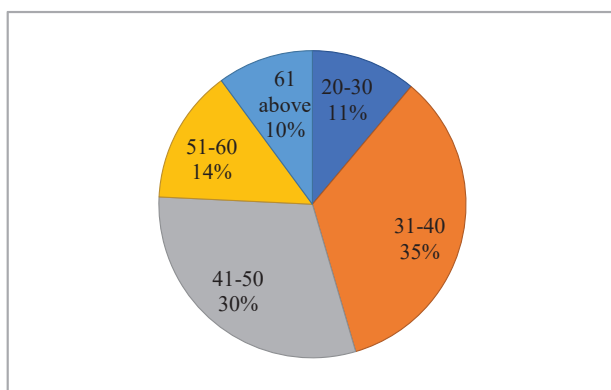


Figure 4. Age of the respondents.

men indicates a notable imbalance. In a scientific context, this distribution may have implications for understanding gender-specific roles and dynamics within the community (Poudel Chhetri and Ghimire 2023).



Figure 5. Collection of Chiuri seeds by local people.

Traditional and contemporary uses of Chiuri within Chepang community

Chiuri, being a versatile and beneficial plant, is referred to as “Kalpavriksha” due to the utility of its leaves, fruit, flowers, and plants. However, the usage varies across locations, customs, and cultures. The traditional and contemporary uses of Chiuri products are summarized in Table 1.

The utilization of *D. butyracea* products within the Chepang community is presented based on market price and quantity preferences. The majority of respondents identified Chiuri butter as their primary source of income, followed by honey, oilcake, leaf plate, alcohol juice, and liso (Fig. 6).

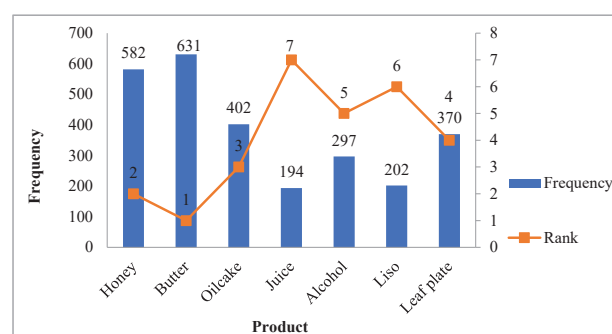


Figure 6. Pareto chart of preference-wise ranking of products.

People's involvement in selling Chiuri products

People's involvement to sell a product in the past (20 years ago)

Chiuri, being a multipurpose tree species, could be sold in various raw product forms. Around 20 years ago, 85% of people were involved in processing and selling Chiuri

Table 1. Comparative study of traditional and contemporary use.

Product	Traditional uses	Contemporary uses	Replaced by
Chiuri ghee	- Used in vegetable and for making bread throughout the year - Used for light a lamp - Used as a face cream to soften the cracked areas of the hands and feet - Used on burn part of body - Used on religious purpose	- Sometime used in vegetable - Used on making chocolate, candle and body lotion etc., but not practice in Chepang community	- Plastic package oil - Candle - Different type of soap found in market
Oilcake	- Used as a fertilizer in agriculture field - Suitable for killing earthworms, ants, butterflies, and protecting crops from cowpeas - Used to stick fish when fishing in rivers, ponds and lakes - Exchanged oilcake with rice in equal amount	- Rarely found but has a same utilization with past - Nowadays it is not used in fishing	- NPK Fertilizer - Fishing net is available in market
Juice of flower	- Used for energy drink - Used for making “khudo” - Used for washing cloth - Useful for making honey	Nowadays it has limited uses. People only used flower for cultivating bee	- Different juice item - Sugarcane product
Leaf plate	- Used for religious purpose as well as used for lunch at a time of agriculture field work - Used in making compost manure - Used in fodder for animal.	- Used for making compost manure - Used as fodder grass	Leaf plate is gradually replaced by plastic plate
Liso	Used for catching bats, killing insects, mice, etc.	Nowadays it is not used	Replaced by different poison item found in market

products. Most respondents (27%) expressed a preference for selling Chiuri as butter in the past, while the least preferred option (15%) was selling Chiuri products in the form of seeds (Fig. 7).

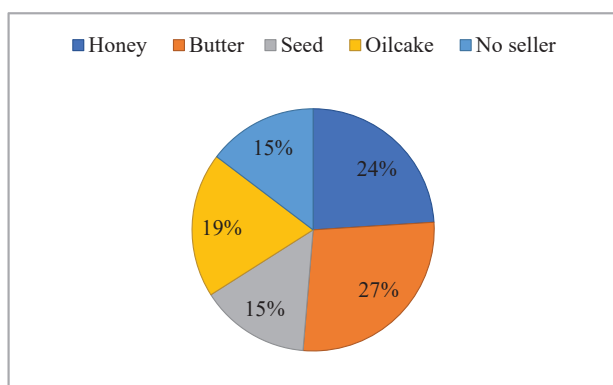


Figure 7. People's involvement to sell a product in the past.

People's involvement to sell a product at present

In the present day, 64% of respondents stated that they do not sell Chiuri products. Among those who are involved, 15% sell seeds, 10% sell butter (ghee), 7% sell oilcake, and 4% sell honey (Fig. 8).

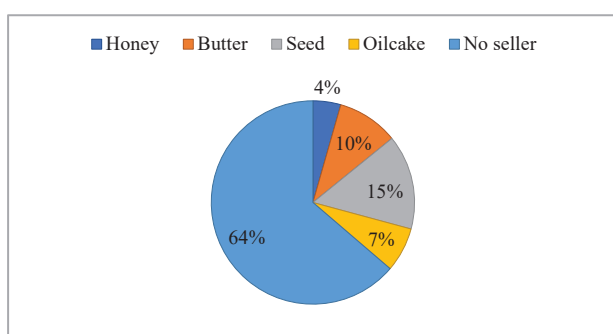


Figure 8. People's involvement to sell a product at present.

Market place of Chiuri products

Most respondents indicated that butter (Chiuri ghee), honey, seeds, and oil cake were consumed mostly in Lothar Bazaar (17, 19, 13, and 10, respectively), followed by Bhandara (13, 11, 8, and 8, respectively) and local places (11, 6, 1, and 10, respectively). However, oilcake (also a Chiuri product) is consumed mostly in villages, followed by Lothar and Bhandara (Fig. 9). Respondents reported a practice of exchanging oilcake for rice in a one-to-one ratio.

Comparative study of average income of respondents in the past and present

Average income of respondents product-wise in the past

In the past, the majority of respondents were involved in selling butter (41), followed by honey (36), oilcake

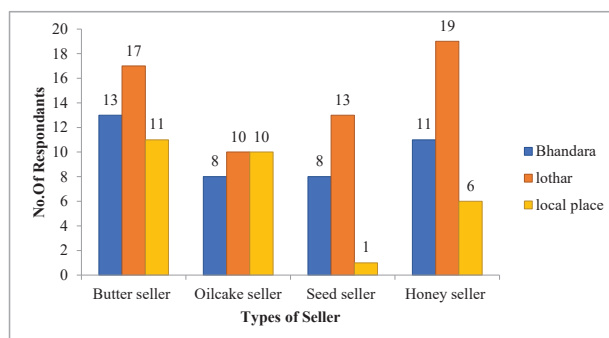


Figure 9. Market place of Chiuri products.

(29), and seeds (22). The major income source was seed selling due to higher prices and quantities, followed by butter, honey, and oilcake. Selling seeds was the primary source of income before 2003 AD, with seed income at NRs. 1800, followed by butter, honey, and oilcake at NRs. 735, 560, and 402, respectively (Table 2 and Fig. 10).

Table 2. Product-wise average income in the past.

Products	No. of respondents	Average quantity	Unit price NRs	Average income	% of product wise income
Honey	36	4.67 kg	120	560.4	15.98
Butter	41	7.359 Dharni	100	735.9	21.02
Seed	22	25.73 Pathi	70	1801.1	51.49
Oilcake	29	10.069 Pathi	40	402.76	11.50
Total				3500.16	100

Note: 1 Dharni equals 2.33 kg and 1 Pathi equals 3.2 kg.

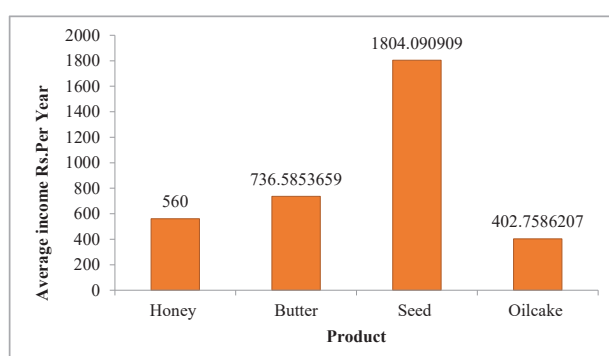


Figure 10. Average income product-wise in the past.

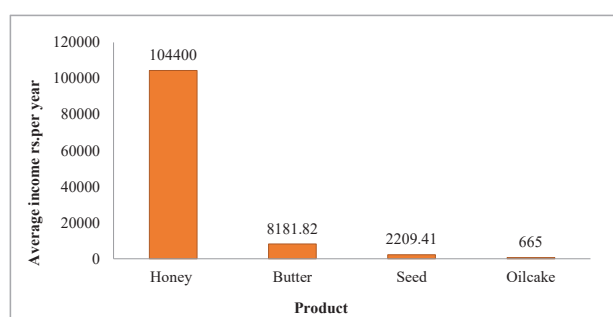
Average income of respondents product-wise at present

In the present day, due to modern beekeeping practices, honey has become the major source of income, followed by butter. Seeds and oilcake contribute less to income. Beekeeping and producing honey are major income sources nowadays, with honey leading. From honey, the average income is NRs. 104,400, followed by butter, seed, and oilcake at NRs. 8,180, 2,200, and 665, respectively (Table 3 and Fig. 11).

Table 3. Average income of respondents product-wise at present.

Products	No. of respondent	Average quantity	Unit price NRs.	Average income	% of product wise income
Honey	5	208.8 kg	500	104400	91.15
Butter	11	8.18 Dharni	1000	8180	7.14
Seed	17	18.15 Pathi	120	2178	1.13
Oilcake	8	9.5 Pathi	70	665	0.58
Total				115423	100

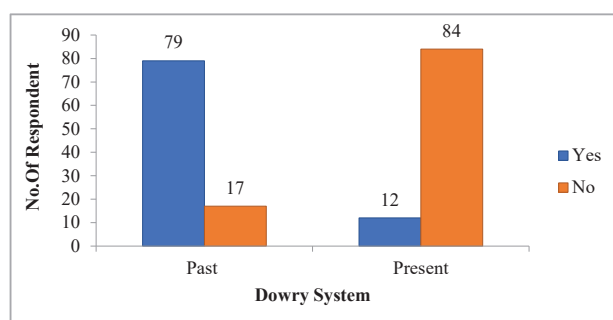
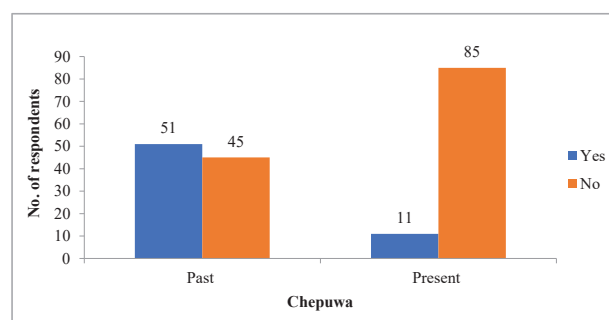
Note: 1 Dharni equals 2.33 kg and 1 Pathi equals 3.2 kg.

**Figure 11.** Average income product-wise at present.

Cultural practices of *D. butyracea* utilization and status of Khalang in Chepang community

The relationship between Chiuri and the Chepang community extends beyond financial aspects; it encompasses social, cultural, and intimate dimensions. In the past, the Chepang community used to give Chiuri plants as dowry in their daughters' marriages, considering Chiuri (*Diploknema butyracea*) as multipurpose and reliable. Traditionally, the mother-in-law would provide dowry to her married daughter with honey, oil, and butter. Out of 96 respondents, 79 households acknowledged the presence of the dowry system in the past, while 17 households reported its absence. In the present day, out of 96 respondents, 84 respondents stated the loss of the dowry system, and only 12 households reported its continued presence (Fig. 12).

The traditional tool "Chepuwa," used to extract oil from Chiuri (*Diploknema butyracea*) seeds, has become extinct in the Chepang community. In the past, 51 out of 96 respondents reported the presence of "Chepuwa," while 45 respondents reported its absence. In the present day, out of 96 re-

**Figure 12.** Status of Chiuri in dowry system.**Figure 13.** Status of Chepuwa.

spondents, 85 respondents stated the loss of "Chepuwa," and only 11 households reported having a "Chepuwa" (Fig. 13).

Discussion

The utilization of Chiuri in the study area has undergone changes from the past to the present. The trend indicates a decreasing utilization of Chiuri oil and a decline in honey production through traditional methods. The collection of Chiuri fruits in the forest poses dangers, leading to the wastage of many fruits left to rot on the trees. Over the years, Chiuri's productivity has gradually decreased, with the obtained fruit not being efficiently utilized due to the lack of robust processing techniques and storage facilities. The propagation of Chiuri trees by seeds, coupled with the time required for them to yield, discourages the cultivation of Chiuri as the main business activity due to the reasonable pricing (Dahal et al. 2021). A comprehensive evaluation reveals the uneconomic and risky nature of Chiuri production and extraction (Shakya 2000).

In the past, Chiuri served various purposes, such as using its leaves as plates and making compost manure. Chiuri leaves were also utilized to make disposable plates, potentially replacing paper plates in the market. Additionally, Chiuri could be developed into a small business for local and distant markets (Joshi 2010). Chiuri holds the potential to replace palm oil imported from Malaysia and Indonesia. Several Chepang individuals engaged in Chiuri collection earn an average of \$41.43 per year from selling Chiuri seeds. This income is notably low when compared to the current market value (Chikanbanjar et al. 2021a). Despite the numerous uses in the past, the present scenario indicates a decline in Chiuri planting, attributed to a militarized conservation model limiting access to protected areas, agricultural lands, and resources. Communities are in dire need of additional livelihoods, particularly in the modern economy, to generate extra cash flow. Chiuri oil, a byproduct of seeds, was used for lighting lamps as an alternative to electricity, and oilcake was extensively utilized as fertilizer in rice and other grain crop fields. In terms of preference-wise ranking, Chiuri butter is considered more advantageous for income, followed by honey and other products. The total production potential of Chiuri butter, identified as the most significant commercial product of Chiuri, is estimated at 37,245 tons, contributing to an economic value exceeding 5 billion Nepalese rupees. Similarly, the honey production

potential of the Chiuri tree in the country is estimated to be approximately 17,285 metric tons (Shakya 2000).

Today, the utilization of Chiuri leaves, flowers, fruit, latex, and bark is limited to a few uses. For the Chepang community in Shaktikhor VDC, Chiuri is considered their property, consumed, and sold in the market. While Chiuri oil seeds were once harvested for cooking purposes and sold in the market (Marketing 1984), modernization and globalization have led to an increased utilization of mustard oil and the initiation of new businesses in honey production through modern methods (Requier et al. 2019). As a result, the status of *Apis cerana* is expected to decrease (Requier et al. 2019), indicating that the introduction of many exotic bees can pose problems for both native and wild pollinators. The profitability of *A. mellifera* notwithstanding, its introduction into the natural habitat of *A. cerana* has often been problematic. The market structure of Chiuri, when comparing the past to the present, reveals a significant shift. In the past, a majority of people were actively involved in harvesting, processing, and selling Chiuri products. However, in the present day, a considerable number of people are unfamiliar with these practices. The market structure of Chiuri has shifted, with Lothar being the primary marketplace followed by Bhandara and the village. While selling Chiuri seeds was a major income source in the past, honey has become the primary source of income today. The primary challenge facing the Chiuri market is its discriminatory pricing policy. Currently, there is no equitable policy in place for collectors and farmers concerning the sale of Chiuri seeds and flowers. Additionally, the limited consumption of Chiuri for domestic purposes further complicates pricing and marketing efforts. Low productivity and the use of traditional oil extractors are significant limitations affecting Chiuri's market value (Thapa 2019).

Flowers were utilized for extracting juice and sugar, as well as for washing clothes, serving as an alternative to soap. People sustained their livelihoods by maintaining beehives, with each household keeping a range of 5–15 bees in the past. Chiuri stands out as one of the very rare plants capable of collecting nectar without the assistance of bees, as noted by Crane. Particularly in the Far-west regions, such as Darchula, Baitadi, and Dadeldhura districts, individuals shake the flowers to gather nectar (Joshi 2010). This nectar, after prolonged steam cooking, transforms into candied sugar, locally known as “guṛ” (Joshi and Pechacker 2002). The latex of the Chiuri tree was used to make liso, which serves the purpose of controlling houseflies and eliminating harmful insects, mice, and bats. Additionally, people claim that the extraction of latex is beneficial for increasing chiuri fruit production. The juice from its bark can be used as a home remedy for cattle dealing with stomach worms, water worms, etc (Aacharya and Syantal 2023).

Chiuri seeds are extensively used for producing butter or essential oil, sufficient for use in culinary purpose throughout the year (Aacharya and Syantal 2023). Despite the significant role of chiuri trees in their culture, Chiuri planting has become less common, and communities have experienced a militarized conservation model that restricts access to protected areas, agricultural lands, and resources.

Communities are in desperate need of additional livelihoods beyond reserves and subsistence agriculture, especially in the modern economy where additional cash flow is crucial. Chiuri oil is used to light lamps as an alternative to electricity. The oilcake, a byproduct of seeds, is extensively used as fertilizer in rice and other grain crop fields.

The Chepang community's traditional production of Chiuri butter is mainly for self-consumption, with excess butter sold to generate meager incomes for some families (Chikanbanjar et al. 2021b). Despite the increasing recognition of herbal products in the international market, traders have not fully tapped into the Chiuri market due to a lack of awareness among producers, processors, and traders about Chiuri's potential (Moktan 2021). Chiuri butter, with its potential use in German cosmetics, faces challenges in reaching the German market, including issues of volume and consistency in quality and quantity. However, there are opportunities for niche marketing and value-added propositions (GIZ 2024).

Chiuri butter serves as the main source of cooking oil for over one hundred thousand people. This butter is used for cooking vegetables and bread. Chiuri juice is also used to quench thirst. The potential applications of Chiuri products extend to various fields such as confectionery, pharmaceuticals, margarine production, candle making, soap making, and as an effective remedy against rheumatism. It is also used as an additive in animal ghee (The Schumacher Centre for Technology and Development 1926). Despite its benefits, the production and utilization of Chiuri products are declining due to the decreasing status of “Chepuwa,” cultural utilization of Chiuri, and the utilization of flower, fruit, seeds, and other components (Joshi 2023). The growing influence of Christianity has also impacted the cultural identity of the Chepang people, driving them away from nature and traditional activities that preserve Chepang customs, which are not recognized by the government (Chepang 2008). The increasing trend of Chepang youth leaving their communities in search of better economic opportunities further threatens their connection with the land and forests, as they desire a modern lifestyle and settlement in urban areas (Chepang 2008).

Survey responses indicate a growing trend towards beekeeping at the household level, with honey sales being a significant income source for people (Golay et al. 2021). Honey is another wallet for the household economy (Golay et al. 2021). Despite the potential income from Chiuri, many Chepang households earn only about NPR. 5,000 (USD 42) annually from Chiuri, emphasizing the importance of honey as an additional income source. The Chepang community prioritizes the preservation of the Chiuri tree for future generations. Existing cooperatives can play a vital role in supporting local agribusiness, such as beekeeping, improving honey quality, securing better prices, and supporting livelihoods (Chikanbanjar et al. 2021b). However, the lack of sufficient economic resources and education hinders some individuals from starting such businesses. Out of 100% respondents, only 5% are involved in honey production, while 75% have no knowledge about production and selling in the market.

Despite its many benefits to local livelihoods, the Chepang people do not fully optimize the advantages of the Chiuri tree. Many Chepang households in the rural municipality of Raksirang are below the poverty line despite ongoing livelihood support programs (Chikanbanjar et al. 2021a). Specifically, in Thakaltar and Araulitar, Rapti municipality 10 and 11, Chitwan, the average annual income from Chiuri ghee is around NRs. 8000. Honey remains a valuable asset for the Chepang community, motivating them to conserve the Chiuri tree in their area. Some individuals also grow Chiuri on their private land.

Conclusion and recommendations

The findings of the study revealed a notable shift in the utilization of Chiuri (*D. butyracea*) products, with respondents opting for alternatives available in the market. Notably, the majority of participants expressed a preference for Chiuri butter over other products. While historical engagement in butter production was prevalent among respondents, the present scenario reveals a decline in production activities, with some respondents transitioning to seed selling followed by butter, oilcake and honey. Notably, beekeeping has emerged as a burgeoning source of income, constituting an average of 90% of total earnings. However, a significant portion of respondents remains inactive in capitalizing on the economic potential of Chiuri, contributing to a reduction in overall utilization. Lother and Bhandara continue to stand out as major marketplaces for Chiuri products, emphasizing the need for targeted interventions to sustain these markets. The Chepang community, once deeply rooted in the cultural and economic significance of Chiuri, is experiencing a shift towards foreign cultural influences, leading to a decline in traditional utilization practices. The historic extraction of oil by the Chepuwa (Khalang) community has become obsolete, resulting in a diminishing number of households engaged in this practice. The traditional role of the “Chepuwa” is gradually diminishing, raising concerns about the potential loss of cultural heritage associated with Chiuri. Implementing an effective and economically viable treatment technology is imperative to replace traditional methods, ensuring the sustainable production of Chiuri products. Furthermore, to promote sustainable utilization of Chiuri, implement

cost-effective treatment technology, provide entrepreneurship and marketing training, explore export opportunities, and enhance urban promotion. Future research endeavors should delve into the ecological dimensions to ascertain the root causes of the declining utilization status of Chiuri.

CRedit authorship contribution statement

Bhojraj Poudel: Conceptualization, Data curation, Software, Visualization, Formal analysis, Methodology, Writing – Original draft, Writing – review & editing. **Sudip Ghimire:** Conceptualization, Data curation, Formal analysis, Methodology, Supervision, Writing – review & editing. **Nabin Gautam:** Software, Formal analysis, Visualization, Writing – review & editing.

Data availability statement

Data will be made available on request.

Declaration of competing interest

The authors declare no conflict of interest.

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