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"CHIURI CHRONICLES: INVESTIGATING THE INTERTWINED BOND BETWEEN DIPLOKNEMA BUTYRACEA AND CHEPANG COMMUNITIES IN NEPAL"

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Abstract
Diploknema butyracea (Chiuri) is a tree species native to the Himalayan region, belonging to the Sapotaceae family. Known by various names across different cultures, it holds cultural, religious, and economic significance. This study explores the cultural and ecological relevance of Chiuri within the marginalized Chepang community. The Chepangs, known for their reliance on natural resources, have intricate indigenous knowledge of plant use. The tree's cultivation on derelict lands ("khoriya") is a crucial part of their livelihood strategy. With approximately 68,399 Chepangs residing in specific districts, the Chepang-Chiuri relationship plays a substantial role in their socio-economic fabric. Chiuri's distribution spans Nepal's mid-hill districts within subtropical broadleaved forests. Its growth is facilitated by the nation's diverse geography and climate. This paper examines Chiuri's characteristics, such as its slow growth and broad leaves, offering insights into its biology. By delving into Chiuri's significance, cultivation, and role within the Chepang community, this study sheds light on the interplay between culture, ecology, and sustainable livelihoods in the Himalayan context.

Keywords: Diploknema butyracea, Chiuri, Chepang community, cultural significance, ecological diversity

Introduction

Diploknema butryracea (Chiuri) belongs to the order Ericales, the family of Sapotaceae of the plant kingdom (Chowdhury et al., 2020). There are different names for *Diploknema butyracea*, Chiuri in Nepali, Madhuspa in Sanskrit, Phulwara in Hindi; Yoshi, Chyumli, Isi, Imseva, Chihuli, Ibuchi Pu Ma in Chepang, Tamang, Rai, Limbu, Tharu, Newar communities respectively (Bhattarai et al., 2021; Kumar et al., 2012; Siddiqui et al., 2004). It is also known as the "Butter tree of Nepal." Chiuri is mostly found in those countries which lie in the lap of the Himalayas region, like Nepal (Joshi et al., 2018).
Chepangs are marginalized communities who are mostly known for the practice of shifting cultivations and depend upon natural resources for their livelihood strategy (Aryal et al., 2009; Piya & Maharjan, 2013). Chepang people have a primitive way of living and have indigenous knowledge regarding using different plants (Rijal, 2011). According to the census 2068, about 68,399 Chepangs are found mainly in Makwanpur, Chitwan, Kaski, Gorkha, Lamjung, and Tahanu districts. Chepangs are closely related

to the Chiuri and have cultural and religious importance within them. They cultivate those trees mainly in a derelict land called "khoriya" in Nepali (Sharma, 2011).

Chiuri is found in 50 mid-hill districts along the subtropical broadleaved forest with an altitude of 400 to 1400 m from the sea level in Nepal (Figure 1). Nepal has a diverse geographical and climatic variation which provides a favorable environment for growing *Diploknema butryracea*. It is a medium-sized, slow-growing plant that ranges 20-30 m in height. Leaves are broad and arranged alternately and with simple parallel venation, 6-12 inches in length and 3-6 inches in breadth (Joshi, 2010). Barks are 3 cm thick, dark grey in color, and light in weight. It gives a milky white fluid when cut freshly. Flowers are long, creamy white, axillary, clustered solitary, and ranges from 50 to 72 per fascicles. Light green fruits are seen in the early stage and appear yellowish or orange color when fully ripe. One fruit usually contains 1-2 seeds, and fruits look berry or pear-shaped. The wasteland, pastures, and inferior, rocky ridges of soil facing southwest-facing slopes are found in the southwest-facing slopes (Lead, 2007). Its product is mainly ghee or butter, which is obtained from the seed kernel. Hence it is known as the "Butter tree of Nepal." The life cycle of the insects like shoot borer and bark beetles is completed in these plants and affects the plant causing various diseases and reducing photosynthesis and fruits production in plants which ultimately causes the necrosis of the plant. Bats help in pollination and collects nectar from the flower.

Figure 1. *Diploknema butyracea* (Roxb.) H.J.Lam. (Chiuri) from Syangja District, Western Nepal.

Production of Chiuri in Nepal

Nepal has around 10.8 million mainly naturally growing trees of Chiuri and covers about 1900 hectares. Chepang earns USD 41.43 annually by selling Chiuri seeds which are low compared to the present market context. It has the possibility of producing 37,245 metric tons of Chiuri butter with a market value of about NPR five billion (USD 41.4) and 17,285 metric tons of honey potential (MEDEP, 2010). A fully grown tree can give 15 kg of seed and 1 quintal of fruits in 20 years. It was found that in the altitude up to 1000 m from the sea level, the growing of Chiuri trees acquires high height and gives high fruits and seeds (Tewari et al., 2015).

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Production of Honey from Chiuri in Nepal

In Sanskrit, "Madhu" means honey, and phuspa means flower; from its name also, we can say the flower of Chiuri helps produce honey (Table 1). Bees bear flowers of the Chiuri during Nov-Jan, and honey obtained from it, is of higher quality.

Table 1. Chemical composition in Nectar and Honey of Chiuri (Joshi & Pechhacker, 2002)

Parameters	**Nectar**	**Honey**
Fructose	9.57	36.27
Glucose	10.2	41.24
Sucrose	0.28	7.16
Dikojibiose	0.37	0.37
Maltose	0.25	0.97
Fructose/Glucose	0.98	0.88
Total Sugars	20.56	86.01

The average honey production from a single hive is 35 kg in the last two years, but in 2021 it may be up to 20 kg per hive due to the reduction of blossoming flowers. Bees feed on the flower of Chiuri and can get 80% of the total bee's food diets and can harvest honey four 4 times within a single season (Bista & Paudel, 2021). Nectar helps the bee survive, and the bee helps maintain the ecosystem (Teshome & Guta, 2020). Honey obtained from bees that feed on the nectar of Chiuri flowers has high demand in the international market as it is suitable for human health (Figure 2).

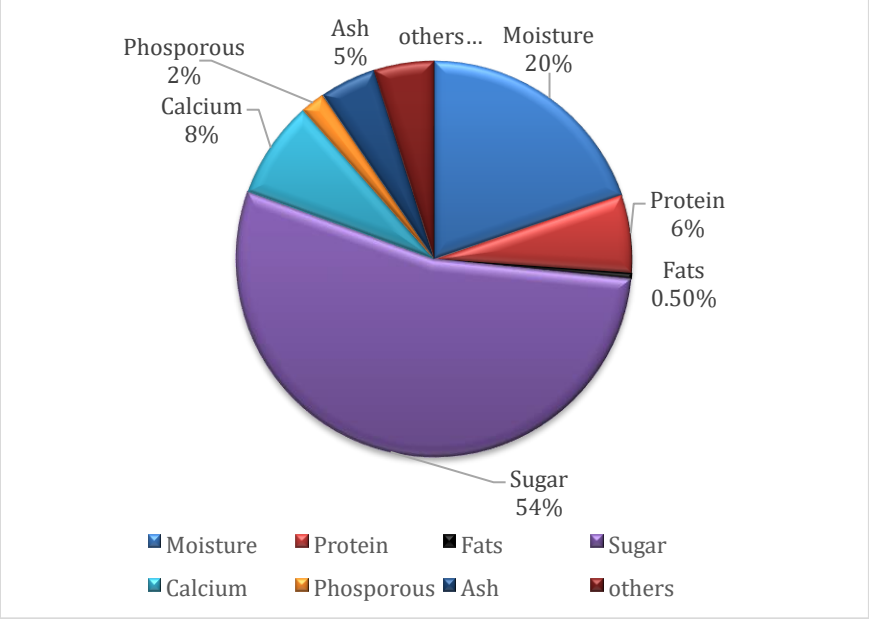

Figure 2. Composition of Chiuri flower (Kureel et al., 2009).

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1.1 Production of butter from Churi in Nepal

It is estimated that Nepal exports 20 tons of Chiuri butter to Europe annually. The yield of butter is 42-47% of the weight of seeds (Figure 3). Ghee is the solidification of butter and appears white with a pleasant odor.

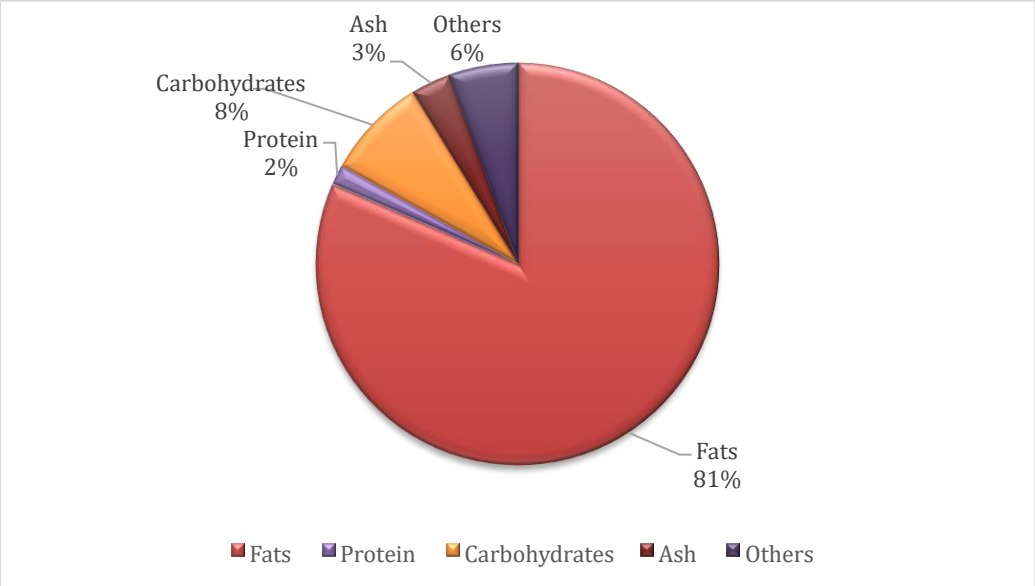

Figure 3. Composition of Butter (Sundriyal & Sundriyal, 2003).

Table 2. Chemical composition of butter obtained from Chiuri

Parameters	**Chiuri Butter**
Palmitic acid	(50-60)%
Oleic acid	(30-40)%
Linoleic acid	(2-10)%
Steric acid	(0-5)%

Processing of Butter

Butter is extracted from the seed, and the extraction process by the traditional method is laborious and time-consuming (Figure 5). It takes whole days to peel 100 kg seed of Chiuri (Devkota et al., 2013). For the processing of the butter traditionally, first, the fruits are harvested and collected in a basket. Then fruits are squeezed, and pulp is removed. After the removal of pulp, the seed is dried for 2-3 days and crushed down into powdered form with the help of a traditional instrument called "Dhiki," and obtained powdered form is placed on a plate above a boiling pan and streamed for some time. Then the butter is extracted by using "Khole " or "Chepuwa." While doing this process, 25-30% of the butter from the seed is obtained. In Modern techniques, seeds are dry in a fry fan and expel in expeller. This technique (40-45%) of butter is extracted from the seed (Singh et al., 2010). The oil thus obtained should be refined, unrefined Chiuri has a creamy, pale yellowish color, but a fully refined butter is pure white. Typically 18 kg of seeds are required to produce a liter of ghee, and one household generally consumes about 2-5 kg of ghee per year.

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Figure 5. *Diploknema butyracea* (Roxb.) H.J.Lam. (Chiuri) seeds and fruits from Chitwan District Central Nepal.

Other Products from Chiuri

Chocolates, soaps, candles, juice, fertilizers, cosmetics items, and medicines can be manufactured from the fruits, seeds, and bark of trees (Khanka et al., 2009).

Uses of Chiuri in Nepal

Medical perspective

The medicines obtained from the Chiuri are known as herbal medicines (Kumar et al., 2012). Every part of the Chiuri plant has some role in controlling different types of diseases in human beings. Butter made from Chiuri is rich in polyunsaturated fatty acids and vitamins (A, E) that helps to hydrates, nourishes our skin, repair hair, and shine. It is used to cure cracked feet, lips, and hands. It contains a high amount of palmitic acid (Table 2), which helps in softening the skin. The ghee extracted from the seed is used as body lotion and helps in therapy. It also works as antipyretic, anti-inflammatory, analgesic during headaches and rheumatism (Mishra, 2015; Shekhawat & Vijayvergia, 2010). Leaves are used as poultice to reduce pain, eczema in the body, Cushing's disease, and bronchitis (Yadav et al., 2012). Leaves extract helps in the death of Ehrlich Ascites carcinoma cells and control bleeding (Saluja et al., 2011). The barks treat diseases in humans like ulcers, itching, hemorrhages, inflammation of tonsils (Prashanth et al., 2010), leprosy, and diabetes (Tyagi, 2015; Thapa, 2019). Powder made from the bark of chiuri helps to maintain our blood sugar levels. Juices are applied against headaches, and seed powder is used for curing constipation (Kunwar & Bussman, 2009). The excellent form of bark mixed with ghee and honey increases sex vigor and vitality (Meena & Meena, 2016). Stem and barks contain the antibodies that work as an antidote for snakes and use them for snake bitter (Gaikwad et al., 2009). The fats obtained from the seed are used to cure pimples, burns, and emollients for cracked hands and legs (Manandhar, 2002).

Household perspective

From the harvested fruits, seeds are extracted and crushed with an expeller. The crushed seed is filtered and purified to obtain a light yellow-colored butter locally called "Makkhana." Then Makkhana proceeds to make ghee. Such extracted Ghee/Makkhana can be used for cooking, body lotion. The ghee is used as the primary fuel in "Diyo," which helps light the house during a power cut and unreached areas (Godiganur et al., 2009). Oilcake, the residue left after ghee production, can produce soaps and

detergents as it contains saponins. It is also used for the productions of candles (Majumdar et al., 2012). Leaves can be used to make paper plates and strong woods; branches are helpful to make furniture. Both fruits and seeds are the edible part of the plants and can be used by humans and animals after detoxification as foods and feeds. The fruits which look yellow supplies carbohydrates to the body or can be used for the purification of alcohol after certain industrial activities (Swain et al., 2007). Nectar is used for the manufacturing of sugar candy (Joshi, 2010). Generally, all the fruits of the tree mature simultaneously, and Nepal does not have any mechanism for the post longevity of the fruits, so the fruits can be used for making jams, squash, and juices.

Agricultural perspective

After extracting the ghee from the seed, the remaining part can be used as manures in banana and paddy cultivations due to its pesticide properties. It can also be used as homicide, nematicides, molluscicides, and rodenticides. The bark of trees contains tannins which are used to kill the fish. The thick and soft pulp, which is sweet present in the pericarp, is used to prepare the jaggary through crushing and boiling in the conventional method. The insects like honeybee suck nectar of flowers, hornets, wraps, and insects get their diets from (Chitale et al., 2018). Nectar is rich in sugar content, and honey bees visit such flowers mainly in the winter season and ultimately give Chiuri honey. The bees and bats also suck the nectars of flowers; they are rich in aromatic compounds and helps to maintain co-evolution in the environment. This plant has a well-developed tap root system, due to which it helps in soil conservation, preventing soil erosion, conserving the water resources, and maintain balance in the ecosystem by exchanging gases (Noss, 2001).

Management strategies

Chiuri flower is slightly yellow in color and blossoms from October to January; fruit sets start to develop and mature from February to July. Fruit is green in color in the early stage, and in the mature stage, they are yellow. Chiuri, which are propagated from seed, is good in quality, and such obtained saplings have good germination capacity. Seeds should be sowed in the soil within 7 days after taking out the ripened fruits; the soil should contain 1-part organic mulch, 1-part fine sand, and 1- part Fym. The seed should be soaked in cleaned water for 12 hrs before sowing. Sowing should be at 4 cm deep from the ground surface. Care should be given, especially in the early stage. After one year, we can get a 20-40 cm plant and be transplanted to a specific area. Training and pruning operations can be done to give the tree shape and obtain better fruit quality. Chiuri plant can give fruits from 12 years up to 70 years. Trees are tall, and harvesting should be done carefully so that harvester as well as fruits, branches do not get hurt.

Relation of Chiuri with Chepang communities

Chepang communities in Nepal are found in the upper slopes of the Mahabharat ranges, and they are the semi-nomadic people who mainly depend on the forest for their livelihood (Chhetri et al., 1997). It is a minority community that is involved in the conservation of *Diploknema butyracea*. In Chepang communities, it is found that the families having more trees are said to be rich. Moreover, during the marriage ceremony bride's family gives trees of *Diploknema butyracea* to the groom's family as a gift. The link between Chepang communities and Chiuri is so strong that when trees are sick, people will

treat them with the help of local healers instead of cutting them. Trees are divided equally among family members (Bhattarai et al., 2021). At midnight a hungry hoax ran away from her stable and went to the millet field for feeding. After being saturated, she began to return to the stable. On the way, she fell from the high cliff and get stuck halfway. None of them managed to rescue her, and after some time, she died. In the same place, the Chiuri tree was first grown with the help of fertilizers from the carcass. Some findings are compared to the plant's parts, such as fruit of Chiuri secrets white fluid compared with the milk of buffalo, oil obtained from seeds is compared with buffalo butter. Seeds are usually black and are compared with millets. Hence Chiuri is regarded as the milking buffalo for Chepang Communities (Bhattarai et al., 2021).

Conclusions

Chiuri plants are of great importance in human life and maintain the ecosystem, but only a few people work for the conservation of Chiuri. Plants are destroyed by the forest fire, which occurs during the summer months, and people often cut the branches during harvesting time. Strong winds and heavy rainfall also affect the plants. People are only concerned with benefits without making any attempt for its conservations. People do not know training and pruning operations, insects &pest affected plants part remains in the plant and ultimately necrosis occurs. The yield of Chiuri is decreasing year by year. The fruits obtained are also not well utilized; it gets rotten due to the lack of sound processing techniques and posts storage facilities. As the Chiuri plant propagates through seeds and takes a long time to obtain a yield, the correct price of Chiuri people's product hesitates to adopt Chiuri cultivation as their primary occupation. EIA (Environment Impact Analysis) should be done before conducting the development works in the hilly areas. Government, NGO, INGOs, following public participation, should work for the conservation of an indigenous variety of Nepal and try to obtain maximum benefit from the plant by applying modern tools and technology regarding harvesting, processing, and marketing of Chiuri products which ultimately contributes to eradicating the Chepangs from poverty line and increases the economic status of the country.

Conflicts of interest. There are no conflicts of interest.

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