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Research Article

ETHNOECOLOGY OF WILD HONEY COLLECTION BY KADAR ETHNIC COMMUNITY ENDEMIC TO WESTERN GHATS

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ABSTRACT

Ethnoecology is the interrelationship between man and its surrounding including every element in nature. The study aims to give the ethnoecological knowledge of the wild honey collection of the Kadar ethnic community to the mainstream people. Kadars are a food gathering semi-nomadic community in the Anamalai part of Western Ghats of India. The stratified sampling and qualitative research methodology were applied in this study for the knowledge gathering from this community. The study revealed that the Kadar community identified four main species of wild honey bees and each one of them had a specific terminology. The colour, taste, smell, and properties of the wild honey depend upon their surrounding vegetation. The study contends that ethnoecology should be considered as a reliable scientific methodology for studying endemic species of biodiversity and must be used especially in ecological studies in indigenous communities where ethnoecological knowledge system abounds.

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INTRODUCTION

Indigenous communities or aboriginals are distinct ethnic groups who are usually confined to definite territory, using common dialect, and are socially and culturally homogenous, as well as endogamous (Srinivas, 1977; Dalton, 1978; Jain, 1986; Jaganath, 1984; Gosart, 2012). According to the Imperial Gazetteer of India (1965), "A tribe is a collection of families bearing a common name, speaking a common dialect, occupying or professing to occupy a common territory and is not usually endogamous, though originally it might have been so." The first people or native people since time immemorial have lived in harmony with nature. They hold rich traditional or indigenous knowledge, sprouting from their livelihood practices and observations (Adom, 2016). Rocheleau (1991) defines this knowledge system as the science of survival where indigenous knowledge combines social, economic, and ecological strategies. Indigenous knowledge operates based on the understanding that there is an interconnection and individual functions in a system. All these components are observed in traditional cultural instruments such as cosmological belief systems, myths, folklore, and taboos duly

observed in societies (Woodley, 1991; Rocheleau, 1991; Bharara & Seeland, 1994; Adom, 2019). Dei (1993) avers that indigenous knowledge is the common sense knowledge and ideas of local peoples about the everyday realities of living. The ecological dimension of traditional knowledge is known as traditional ecological knowledge (TEK) (Adom, 2016). It is a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmissions, about the relationship of a living being (including humans) with one another and with their environment (Berkes et al, 2000). It alludes to a people's medicinal, technical, and ritual uses of plants, animals, and rock; to place names and occupancy of a territory or to the spiritual, cosmological, and relational aspects to the various presences (animate, inanimate, present, or past) in an environment (Studley, 1998; Adom, 2019).

Continuous interaction of humans with their surroundings develops a holistic understanding of nature and its functions. The ecological aspect of indigenous Knowledge including ecological processes (Alcorn, 1989) and the relationship between human, animal, plants, and physical elements of the local environment is referred to as Ethnoecology (Posey, 1984;

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Toledo, 1992; Martin, 1995; Nazarea, 1999; Davison-Hunt, 2000; Henfrey, 2002; Hunn, 2007). The TEK is the vital element in the field of ethnoecology (Gragson and Blount, 1999; Nazarea, 1999; Alves *et al.*, 2010). According to Hardesty (1977), ethnoecology is a study of the system of knowledge developed by a given culture to classify objects, activities, and events in its universe. Thus, Casagrande (2017) concurs that ethnoecology is the cross-cultural study of how people perceive and manipulate their environments. Research on ethnoecology gives a platform for understanding the dynamic relations between biodiversity and the social, cultural system (Hunn, 1999). Earlier studies on ethnoecology were undertaken by Hugh Popenoe and Conklin. The dissertation of Conklin, titled 'The Relation of the Hanunoo Culture to the Plant World' (Conklin, 1954) gave birth to the term 'Ethnoecology'. He contributed to ethnoecological studies in southeast Asia. In the field of botany, ethnoecology is interdisciplinary, some examples are, from the Department of Botany, Hazara University, Pakistan, where Shujaul Mulk Khan conducted a study on ethnoecology in 2013. Also, a fungal ethnoecological study was recently conducted by Kotowski *et al.* (2021) in Poland under the Institute of Ecology and Botany. In India, anthropological aspects of ethnoecological studies have been conducted by Anindita Ghosh from the Indian Institute of Technology, Mandi, India in 2012. His work was themed 'An ethnoecological approach to the study of a village- Himachal Pradesh. In the aspect of environmental studies, Singh and Sourabh (2012) researched the ethnoecology of Indian Ephedras under the school of Environment Management, GGS Indraprastha University, Dwaraka, India. This study focused on the ethnoecology of wild honey collection by the Kadar ethnic community endemic to the Anamalai part of western Ghat, India. These studies conducted over the years, show the relevance of ethnoecology as a giant field in understanding ecological, environmental, and biodiversity-related issues in indigenous communities. This is particularly true in the Indian context where 28% of the population are aboriginals, including 75 tribes listed among the Particularly Vulnerable Tribal Groups (PVTGs). The Kadar is one of the PVTGs in India.

Most of the aboriginals depending on Minor Forest Produce (MFP) for livelihood. Honey is the most important economic resource for them and it contributes the lion's share of their income. Racially, the Kadar appear related to the Proto - Australoid and Negrito groups of Souths- east Asia. They were food-gathering and collectors, without either stable house and agricultural food production (Ehrenfels, 1952). The Kadar are termed as the king of Anamalais (Thurston, 1909) and they inhabited the Tropical Rainforest Habitat in the Western Ghats. Kadar has been considered as a human strain of considerable antiquity. The Kadar community and its residents may be considered integrated food gatherers. Both men and women have dark wavy hair, some exhibiting curly hair. Their arms are proportionately long; they have a deep chest (which adapts them to mountaineering) and they have great powers of endurance and can carry heavy loads on their back. These indigenous people form an integral part of the reserve and their population also has fluctuated over a while due to the various forestry operations. The forest plays a significant role in the life and economy of the indigenous people. They depend mostly

upon the forest's flora and fauna for their livelihood (Bachan *et al.*, 2011; Mohapatra & Sahu, 2012).

Honey collection from the 30-45 m tall trees of the forest and rocky cliffs of the mountains forms an important part of their traditional skill and livelihood. The constant practices of the wild honey collection developed a knowledge system, that may be gathered from their ancestors and their observations. It is this ethnoecological knowledge that this study focuses on. It sought to contribute significantly in filling the knowledge gaps in the identification of the different wild honey bees, their collection method, and their uses. Also, the study aimed at highlighting the ethnoecological perceptions of wild honey collection by the Kadar community. This study is novel in that it would help in preserving the ethnoecological knowledge related to wild honey bee collection in the Kadar community. This would assist greatly in conserving the rich hives of wild honey bees and their associated flora and fauna species from possible exploitation.

Description of the Study Area

Different indigenous communities are living in the Anamalais of South India. Anamalais a hotspot of rare and endemic biological diversities. The area includes an elephant reserve, water reserve, floral reserve, and anthropological reserve which are inhabited by six indigenous people viz. Kadars, Muduvars, Malasars, Malaimalasars, Eravalars and Pulayars (Ramachandran, 2007). The nature of the Kadar community is nomadic or seminomadic (Ehrenfels, 1952; Thurston, 1909; Bachan *et al.*, 2011). Now they are settled in colonies and seasonally visit their resource areas. According to the available data, the present distribution of Kadar is around the Anamalai hills of southern Western Ghats. The Kadar were distributed in twenty-two settlements both in Kerala and Tamil Nadu. Among the 16 settlements within Kerala state, nine are confined to Thrissur, and seven colonies are within Palakkad districts. The six settlements are in the Coimbatore district of Tamil Nadu. The total population of Kadars 2395 with 711 families in the 22 settlements (Gouthami, 2017). The distribution area includes Vazhachal, Chalakudy, Nemmara Forest Divisions, Pambikulam Tiger Reserve, and Anamalai Tiger Reserve.

The Vazhachal Forest Division

The Vazhachal forest division falls in Mukundapuram Taluk of Trissur district and Aluva Thaluk of Ernakulum district and the tribal areas are within the Athirappilly Grama Panchayath of the Trissur District. The Division has five administrative ranges i.e. Sholayar, Kollathirumedu, Vazhachal, Charpa, and Athirappilly. The area falls between 10° 14'' and 10° 23'' north latitudes and 76° 25'' and 76° 54'' east longitudes. The working plan of Vazhachal Forest Division (2003-04 to 2012-13) by B.P.Vergheese, Deputy Conservator of Forests (Non-Cadre), Forest Resource Survey Cell, Thrissur also reports that the tribes found in the forests of Vazhachal Division are Malayars and Kadars. They live in separate colonies and do not mingle with each other. There are eight tribal colonies in the division. Traditionally, Kadars do not engage themselves in agriculture or any other activity except the collection of honey, wax, tubers, etc. from the forest. The forest department has been engaging them for management works like planting, weeding, thinning, etc. They are also engaged as firewatchers during the fire season. (KFRI research report, no: 377, 2010).

Parambikulam Tiger Reserve

The Parambikulam Tiger Reserve is divided into core area, buffer zone, and adjoining areas or corridors. The Tiger reserve was declared in 2009 including some portions of Vazhachal, Chalakudy, Nemmara forest divisions with the existed Parambikulam Wildlife Sanctuary. The total area is 643.66 Km² which includes a core area of 390.89Km and a 252.77Km buffer zone. The area lies between longitude 76° 35'- 76° 50'E and latitude 10° 20'-10° 26'N. The socio-cultural importance of the area is signified by the presence of four indigenous communities – Kadar, Muthuvar, Malasar, and Malamalar distributed in six tribal colonies-Sungam, Kadas, Kuriarkutty, Pooppara, Fifth colony, and Earth Dam colony. There are 399 households in the six tribal colonies located in the buffer zone of the Tiger Reserve with no habitation in the core zone of the Reserve (Divya, 2020).

Anamalai Tiger Reserve

Anamalai Tiger Reserve was earlier known as Indira Gandhi Wildlife Sanctuary and National Park (IGWLS&NP) is located (10° 12' N to 10° 35' N and 76° 49' E to 77° 24' E) in the Valparai plateau. In Tamil language, Anai = Elephant, Malai = mountains hence, the name 'Anamalai'. Various documents in the late 1800s have referred to them as 'Anamallays' or 'Annamullay' (Beddome, 1878; Hamilton, 1892). The recent name 'Anamalais' will be used in this thesis (Congreve, 1942; Wilson, 1973; Sekar and Ganesan, 2003). This region is known for its anthropogenic diversity; indigenous people living in the Anamalais include Kadars, Malasar, Malaimalar, Pulaiyar, Muduvar, and Eravalar (Sekar and Ganesan, 2001; Chandi, 2008 and references therein). Though most of these communities were hunter-gatherers in the past, they now live in sedentary units within the Anamalai Tiger Reserve largely along its fringes (Chandi, 2008) and few in the interiors of Parambikulam Tiger Reserve. Livelihood activities for some of the communities documented in the past range from natural resource gathering, cultivation of subsistence and cash crops, and limited employment with forest departments and private plantations (Chandi, 2008).

METHODOLOGY

Many methods were involved in this study. Secondary information on the required topic was collected from various literature. We visited the hamlets inhabited by Kadar, for household interviews from June 2019 to March 2021. During the field visits, the researchers gathered extensive ethnoecological knowledge related to wild honey bee and their production procedures from the indigenes in the Kadar community. The qualitative research approach with phenomenology, guided the extensive engagements with the indigenous people to gather rich and extensive data on their ethnoecological wild honey collection and production procedures (Bogdan & Ksander, 1980; Taylor & Bogdan, 1984; Marshall *et al.*, 1998; Murphy & Dinwall, 2003; Baden & Major, 2013; Rosenthal & Gabriele, 2018). A well-prepared interview guide based on the research questions for the study as well as the theoretical underpinnings in the study of Singh and Sourabh (2012). The developed interview guide was pre-tested on seven wild honey bee collectors in the Kadar community. Few corrections were made after the pre-test and also after receiving inputs from two skilled qualitative researchers.

200 recruited study participants were interviewed out of 2395 people from the Kadar settlements. They were selected using stratified sampling (Ackoff, 1953, Cochra, 1977; Pizadcg, 2011; Taherdoost, 2016; Saunders *et al.*, 2012). However, due to the Covid-19 pandemic period within which the study's timelines falls, we again used the convenience sampling technique to identify the 200 study participants (Henry and Gary, 1990; Christensen *et al.*, 2012; Sauders *et al.*, 2012; Palinkas *et al.*, 2013; Bornstein *et al.*, 2017). The researchers explained the rationale of the study to them orally and they voluntarily partook in the study. As a result, various personal interviews and focus group discussions were conducted by the researchers. The Participatory research appraisal (PRA) methodology (Chambers and Robert, 1981, 1983, 1984; Flower *et al.*, 2000) aided in the understanding and validation of the ethnoecological knowledge garnered and recorded. Finally, the data collected were analysed using qualitative thematic analysis.

RESULTS AND DISCUSSION

World health organization calculated that almost 80% of the world's population is still dependent upon the traditional usage of natural resources for health care (Upadhaya *et al.*, 2016). In India alone, it is estimated that more than 100 million people are dependent on forest gathering as a source of livelihood (Kabra, 2010). And about 50 million forest dwellers in India harvest large quantities of Non-Timper Forest Produces (NTFPs) for trade. And also their main income source (Dattagupta *et al.*, 2014). One of the forest resources of the indigenous community is honey. Honey has high medicinal value; thus, it has a great demand throughout the year especially for its Ayurvedic medical utilities (Demps *et al.*, 2012). In India honey is obtained from *Apis dorsata*, *A. florea*, *A. cerana*, and *A. millifera*. Among these, *A. cerana*, and *A. millifera* are cultivated by the people for honey production. The *Apis dorsata* is a wild rock bee and has still not been domesticated. The collection of honey from forest landscapes is common in tribal communities and forest dwellers (Demps *et al.*, 2012). The method of honey hunting varies according to

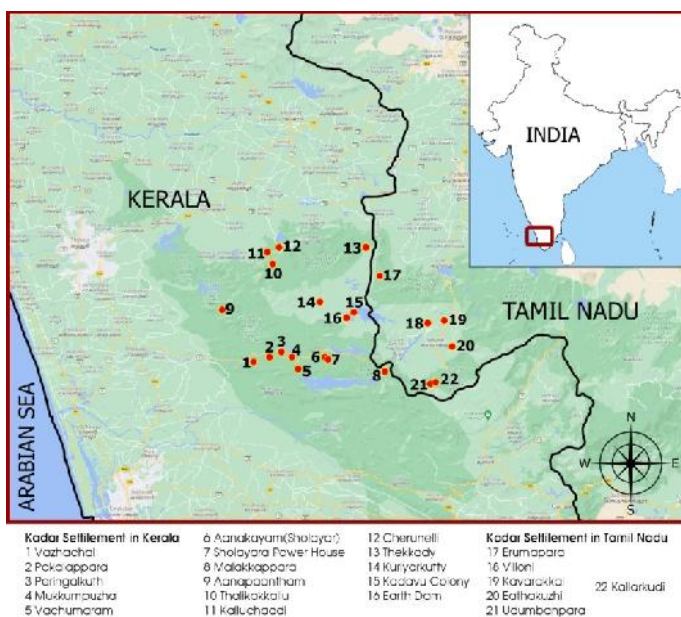


Fig 1 Distribution of Kadar Ethnic Community.

the nature of the support, the number of colonies in aggregation, or singly. Many traditional methods are followed in different regions for honey harvesting. Honey hunters have to climb cliffs or ascend tall “bee trees” by hand-made ladders during the darkness of the night then kept away with smoke and cut away the comb completely for collecting honey. This technique is a very strenuous, laborious, and demanding job (Mardan, 1989).

The Kadar dwelling community depending on their natural resource for their livelihood, and honey has given the major part of the source of income. According to the first objective of the study, The Kadar ethnic community identified four types of honey bees from their habitat. And seasonality and processing method of honey are described below.

Different kinds of honey, season, and processing method

There are mainly four types of honey were collected by Kadars from the rain forest. 1. 'Vanthen' (*Apis dorsata dorsata*), 2. 'Kurunnan' (*Apis cerana indica*), 3. 'Kottaan' (*Apis florea*) and 4. 'Karinthan' (*Trigona iridipennis*). The honey flow season is depending on the rainfall, flora, and topography of the region. The season can be broadly divided into two periods; April – June, and September – November (Roy et al, 1997). Mainly the Kadar collect honey during March, April to June seasons. The study of Wapishana ethnoecology (Henfrey, 2002), described the specific terminologies for wild honey bees used by the Wapishana community. The honey gatherers of the Baka community also have ethnobiological knowledge on wild honey bees and they also collected during February and May months (Dounias, 2015).

Different kinds of honey

'Vanthen' (*Apis dorsata dorsata*)

'Vanthen' is the honey getting from *Apis dorsata dorsata* hive. It is shown in the branches of big trees in the forest and the cliff ('Varathen'). The honey hive is comparatively larger than the others. Honey hive has three layers; 'Pookkatti' (pollen) in the top close to the branch, 'Theli' (honey storing area) in the middle, and 'Ratt' (eggs laying place) in the bottom of the honey hive. The 'Vanthen' is collecting for marketing only. Kadar never uses 'Vanthen' in their daily life.

'Kurunnan' (*Apis cerana indica*)

'Kurunnan' honeycomb is making by the *Apis cerana indica*. The honeycombs are shown in the tree holes and hills. The 'Vanthen' and 'Kurunnan' are large in amount and their value is the same in the market value is the same too. Sometimes they mix both of them to sell.

'Kottaan' (*Apis florea*)

'Kottaan' is shown in the small branches in the trees and shrubs by *Apis florea* bees. The honey hive is a miniature of the 'Vanthen' hive. The top of the honey hive is fully covering the situated area of the branch. This honey is used for domestic purposes and will not sell.

'Karinthan' (*Trigona iridipennis*)

'Karinthan' is produced by *Trigona iridipennis* in the gap of rocks or walls and the narrow space in the switchboards in

houses. 'Karinthan' has a high medicinal and economic value rather than other kinds of honey.

Honey Hives Marking

This is a very simple but strong system existing within the Kadar even today. Honey excavation is a much-appreciated job of Kadar. When the honey season starts, they will go to the forest for finding out the trees where honey bees have started making combs, then they will differentiate (Mark) the tree with green leaves or put a mark on the bark of the tree with a knife. So that is already set aside.

Preparation & method of honey collection

'Vanthen' collection

Hive in Trees

Kadars reduce their body weight for ease to climb trees. At the beginning of the honey season, they prepare 'Thattaan' (stopples), 'Kottaapudi' (hammer), 'Choodu' flambeau, etc... for honey collection. Bamboo (*Oxytenanthera bourdillonii* and *Bambusa bambos*) is used to make 'thattaan' and desiccate it in the sunshine to become stronger. 'kottaapudi' is making from a tree that is named 'Kottaapudimaram' (*Lepisanthes tetraphylla* (Vahl) Radlk., *Mallotus aureopunctatus* (Dalz.) Muell.) by the Kadars. The making of 'choodu' by reeds and dried bamboo. When the preparations are getting ready, they entering to the forest for searching honey hive. If Kadars discover any hive in trees they put down 'Thattaan', 'choodu', etc... at the bottom of the tree and continue this on other sites. The best time for honey collection is moonless nights. They will come back at night and pray to their deity for getting a lot of honey without any harmful incidents at their risky job. After the prayer, one person tacks the 'thattaan' with the 'kottaapudi' like a step for climbing on the large tree. When he reaches near to the branch of the hive; he hangs his tools and properties in stopple tacked on the tree trunk and move through the branch like a monitor lizard to reach near to the honey hive. Then they will fire the flambeau to fumigate the bees to drive away. After that, they will cut down the 'rat' (Lower portion of the hive) to remove eggs and larva from the comb. Then incise the 'theli' (part of hive filled with honey) and put it to the can. At last, they will cut down the 'pookkatti' (Pollen) and clean the branch for the next season.

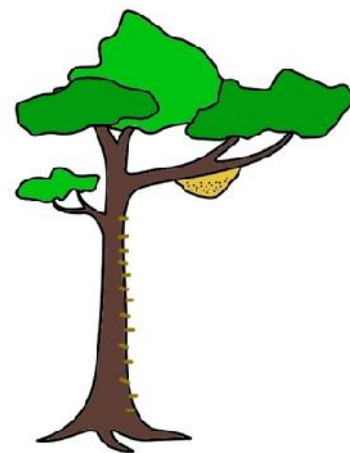


Fig 2 Hive in Trees

Hive in the cliff

They make ladder with sturdy rope by 'Vakkanaaru' (*Sterculia villosa*) or by 'Vallichooral' (*Calamus travancoricus*). They will climb down the cliff via the ladder and will do the same as the honey collection method in the trees.

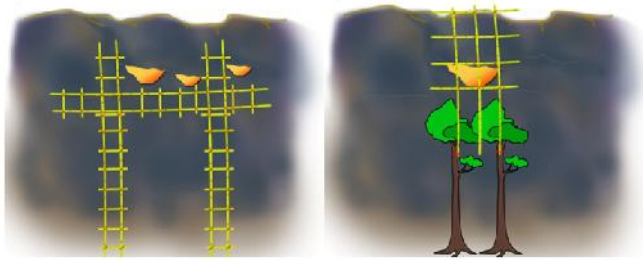


Fig 3 Hive in the cliff

'Kurunnan', 'Kottan' and 'Karinthan' collection

The 'Kurunnan' honeycombs are shown in the tree holes and anthills. 'Kottaan' are shown in the small branches in the trees and shrubs and 'Karinthan' nests are built in wall crevices, trunks of trees, logs, or under the roofs of dwellings. After the fumigation process, they will collect the honey.

Honey extraction method

After the collection of 'Vanthen', 'Kottan' and 'Karinthan' filtered and stored in clean cans for selling. The 'Kurunnan' filtration is done after heating the pieces of the comb.

The focus of the study was to find out the ethnoecological perception of the Kadar community on wild honey collection.

Ethnoecological knowledge on wild honey collection

Withered flowers are a good sign to finish honey collection by bees. April and May are the honey season and sometimes it varies to June month. The 'Elavan' (*Bombax ceiba*), 'Thaani' (*Terminalia bellirica*), 'Churuli' (*Mesua ferrea*), 'Vellapain' (*Vateria indica*), 'Paali' (*Palaquiummellipticum*), 'Punnapain' (*Calophyllumpolyanthum*), 'Cheeni' (*Tetramelesnudiflora*), 'Maraavu' (*Ficus* spp.) and 'Vezhaavu' (*Lagerstroemia lanceolata*) are the most commonly chooses trees by giant honey bees for making colonies.

The colour, smell, and taste of honey is depending upon flowering trees. The honey has an aromatic smell and taste at the time of flowering of *Vateria indica* and the honey is clear transparent as freshwater but bees are very aggressive at the time offlowering. The flowering season of 'Kuntikodi' (*Gnetumedule*) and 'Kaattukadukka' (*Terminalia chebula*) make honey bitterness. The honey will be clot like rock sugar at the time of bamboo and 'Kareetta' (*Ochlandratravancorica*) flower. The 'Eeti' (*Dalbergia latifolia* Roxb.) flower makes honey dark like black. The 'Mulanthapoo' (a climber) gives red colour and makes honey thick. The best honey in sense of taste is at the time of 'Elavan' (*Bombax ceiba*) flower.

Some animals and birds (Leopard, Tiger, Oriental dollarbird, and Honey-buzzard)eat the 'ratt' region of the hive. The Sloth bear and Brown mongoose eat the honeycomb as a whole.

The Kadar never gather honey during moonlight because that time bees are very aggressive. They improve the medicinal value of wild honey by mixing all collected honey from all hives during the season.

Table 1 Major plants used by *Apis dorsata*for making colonies.

Sl. No	Name of the plant	Family	IUCN status / Endemism	Terminology of Kadar	Forest type
1	<i>Bombax ceiba</i> L.	Malvaceae	LC	Elavan	Moist deciduous and semi-evergreen forests, also in the plains
2	<i>Calophyllumpolyanthum</i> L.	Calophyllaceae	NE	Punnapain	Evergreen forests
3	<i>Ficus benghalensis</i> L.	Moraceae	NE	Kallich	Evergreen to deciduous forests; and cultivated around villages.
4	<i>Ficus callosa</i> Willd.	Moraceae	NE	Velmaravu	Semi-evergreen and moist deciduous forests, also in the plains
5	<i>Ficus microcarpa</i> L. f.	Moraceae	LC	Kannayanimaraavu	Evergreen and semi-evergreen forests, also in the plains
6	<i>Ficus nervosa</i>	Moraceae	LC	Chola maraavu	Semi-evergreen and evergreen forests
7	<i>Ficus racemosa</i> L.	Moraceae	LC	Athi / Maraavu	Evergreen to moist deciduous forests; and cultivated.
8	<i>Lagerstroemia lanceolata</i> Wall.	Lythraceae	Endemic to the Western Ghats	Vezhaavu	Deciduous and dry evergreen forests
9	<i>Mesua ferrea</i> var. <i>ferrea</i>	Calophyllaceae	NE	Churuli	Evergreen forests
10	<i>Palaquiummellipticum</i> (Dalzell) Baill.	Sapotaceae	LC	Paali	Evergreen forests
11	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	NE	Thaani	Mixed forest, deciduous forest, primary forests, sal forest
12	<i>Tetramelesnudiflora</i> R. Br	Tetramelaceae	LC	Cheeni	Evergreen, semi-evergreen and moist deciduous forests, also in the plains
13	<i>Vateria indica</i> L.	Dipterocarpaceae	VU	Vellapain	Near streams and moist places of evergreen forests of the Western Ghats

Table 2 The major plants' list that is influencing colour, taste, smell, and character of the wild honey

Sl. No	Name of the plant	Family	IUCN status / Endemism	Terminology of Kadar	Colour, taste, smell, and character of the wild honey
1	<i>Bambusabambos</i> (L.)	Poaceae	NE	Mula	Honey clots like rock sugar
2	<i>Bombax ceiba</i> L.	Malvaceae	LC	Elavan	Best in taste
3	<i>Dalbergia latifolia</i> Roxb.	Fabaceae	VU	Eeti	Black
4	<i>Dendrocalamusstrictus</i> (Roxb.)	Poaceae	NE	Mula	Honey clots like rock sugar
5	<i>Gnetumedule</i> (Willd.) Blume	Gnetaceae	NE	Kuntikodi	Bitterness
6	<i>Ochlandrasetigiera</i> Gamble	Poaceae	NE	Velleetta	Honey clots like rock sugar
7	<i>Ochlandratravancorica</i>	Poaceae	NE	Kareetta	Honey clots like rock sugar
8	<i>Pseudoxytenantherabourdillonii</i>	Poaceae	NE	Arayambu	Honey clots like rock sugar
9	<i>Terminalia chebula</i>	Combretaceae	LC	Kaattukadukka	Bitterness
10	<i>Vateria indica</i> L.	Dipterocarpaceae	VU	Vellapain	Transparent, aromatic smell and taste
11	Unidentified climber			Mulanthapoo	Red, thick honey

They use 'Karinthan' for babies to quick starting of verbal communication 'Kottaan' is used for glaucoma. They will eat the eggs and larvae in the 'rat' from the first harvested hive for resisting the pain and swelling in the body by bee bite.

Beewax is one of the by-products of the honey hive. It is also an economic source. When they temporarily stay in the forest for collecting MFPs, they use wax as a candle. The nodal region of the reed and its sleeve is used to make the candle.

Kadar cleans the branches of the nesting tree for helping the honeybee to build the hive for next time. The face of the hole becomes bigger while collecting 'Karinthan' honey from the gaps of rocks and tree holes, they close the face of the hole partially with small rocks for helping bees nesting.

Kadars know bees are the pollinating agent, and bees taking a vital role in vegetation growth. They believe the deity gives responsibility to bees for distributing the pollen grains for next-generation and making honey to them.

Generally, the Kadar dwelling community collects only necessary products from the forest. It looks that they abide by their fellow people's efforts by not attending to gather honey from the same tree. The methods are really important for any kind of forest produces for its sustainability. Marking a honey hive gives authority to the community members. Kadar has not even heard of the dispute between individuals or between hamlets on a resource issue. The wide area of resource dependency is also an important element to be considered for the minimum chance of a dispute. And they give information about the relationship between flora and wild honey that affects the properties of honey in the sense of taste, colour, and quality. In Ethiopia white colour and good quality, honey is produced when flowering *Becium grandiflorum*, *Vernonia amygdalia*, *Eucaluptusglobulus*(Amabye and Mekonen, 2016).

CONCLUSION

There are four types of honey were identified in the Kadar community. There are nine major trees are chosen by Giant honey bees('Vanthen') for making colonies where they observed. The flowering in the forest will influence the quantity of honey and the flowering in the forest is directly depends upon the availability of rain in the season. Kadar people know that how flora and fauna are connected with climate and nature. They identified that the hives are decreasing yearly due to the presents of irregular rains and climate changes.

The smell, colour, taste, and thickness are depending upon the flowering tree's surroundings of the hive. 'Kurunnan', 'Karinthan' and 'Kottaan' were used as medicine. When they collecting honey hive from the trees, there some animals also depending they for eating rat. Here, they observed the nature connects them with all elements in the forest. The dynamism of nature is identified by them so that they know their surrounding changes influence biodiversity. The continuous interaction with the forest gives insight into the wisdom of the forest. So that they have rich ethnoecological knowledge of their habitat. Limitations of the knowledge is depending on the habitat of the particular community. This is different from other dwelling communities and it gives a unique system of knowledge of the Kadar community.

The ethnic knowledge about the honeybee depending flora can use in the working plan(ten-year working plan) of the forest departments and planting such plants like *Vateria indica*, *Bombax ceiba*, *Dalbergia latifolia* Roxb.,etc.. accordance with the characteristics of ecology. This also helps to enrich the flora and fauna of the vegetation and depending community. The wild bees in India were three species of Apidae: *Apis dorsata*, *Apis cerana*, and *Apis florea* and stingless bees of the family Meliponinae occur in the National Bureau of Asian Research (NBR), (Thomas et.al, 2009). The Kadar community identified four species of the wild honey bee and also they have terminologies for the bees. It expressed their intelligence in the classification of the fauna around them. They are also conserving their diety places that including dense forest and rich resource areas. Some of the diety places, they are not allowed to enter. So simultaneously conserved the natural resources and forest including wild honey bees.

The study helps to Conservation of wild honey bees take place through Kadar communities. And monitoring projects may establish within the community. Harvested honey can be marketed through the Local bodies (Gramasabha) of the community. That may give authority to them. Commercial honey farmers can plantsome plant species like *Bombax ceiba*, and *Vateria indica*, which helps to acquire the aroma and improve the quality of the honey. More scientific studies are needed in this area to prove the truth in the medical use of honey by them.

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