

Beekeeping practices in Central-Northern Côte d'Ivoire: The case of Tafiré

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Abstract

Understanding the conditions under which honey is produced in rural areas is essential for the development of beekeeping and for improving beekeepers' incomes. The objective of this study was to describe beekeeping practices in the town of Tafiré (Côte d'Ivoire). To this end, we conducted an ethno-apicultural survey of 59 honey producers in Tafiré for a descriptive analysis. The ages of the producers interviewed ranged from 21 to 86 years, with a mean of 43.69 ± 13.57 years, and their years of experience ranged from 2 to 50 years, with a mean of 12.62 ± 10.99 years. The survey identified three types of beekeeping practices: Honey hunting, traditional, and modern. Virtually all of the honey produced comes from traditional hives. A traditional beekeeper produces an average of 234 liters of honey per year with approximately 50 ± 51.26 hives, for a gross annual income of 481,956 CFA francs. In contrast, a modern beekeeper, with an average of 12 hives, produces approximately 240 liters of honey per year, generating an annual gross income of 660,000 CFA francs. A gradual transition from traditional hives to modern hives could increase honey production and beekeepers' incomes.

Keywords: Beekeeping; Beehives; Honey Production; Tafiré (Côte d'Ivoire)

1. Introduction

Agriculture is the main economic activity in most rural areas of West Africa [1]. However, many farmers continue to struggle with persistent poverty. To improve the living conditions of rural populations, diversifying sources of income appears to be an essential strategy. In this context, beekeeping presents itself as a promising complementary activity. Indeed, beekeeping is an activity that can be easily integrated with agricultural activities and generate significant additional income for farmers, thereby making them less vulnerable to poverty [2]. This activity involves raising honeybees for the sustainable harvest of hive products: honey, beeswax, pollen, brood, bee venom, and royal jelly [3]. As in many West African countries, beekeeping is an ancestral tradition in Côte d'Ivoire [4]. It is becoming increasingly widespread today and is practiced in various regions of the country using a wide range of production systems, ranging from the oldest methods such as honey hunting to the use of traditional artisanal hives, as well as modern beekeeping.

This approach, which helps improve honey production while reducing environmental impact, remains underdeveloped, however. To help optimize the beekeeping sector, several studies have been conducted on existing beekeeping practices, notably in Yamoussoukro [4], [5] and in Cetchi, in the south of the country [6].

The northern regions are the main honey-producing areas. However, knowledge of beekeeping practices in these regions remains limited and focuses mainly on the cities of Korhogo [7] and Katiola [8]. Furthermore, honey marketing flows indicate that several localities contribute to the supply of regional markets. For example, a significant portion of

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the honey sold at the Katiola market comes from Tafiré and Niakaramadougou [8]. Despite their contribution to honey production, beekeeping practices in these areas remain poorly studied. This lack of information limits our understanding of production systems, the identification of constraints faced by beekeepers, and the implementation of strategies adapted to the sustainable development of the beekeeping sector.

In light of this observation, it seems necessary to conduct research to better understand beekeeping practices in the village of Tafiré. The objective of this study is therefore to describe the beekeeping practices currently in use in this village

2. Methodology

2.1. Study Area

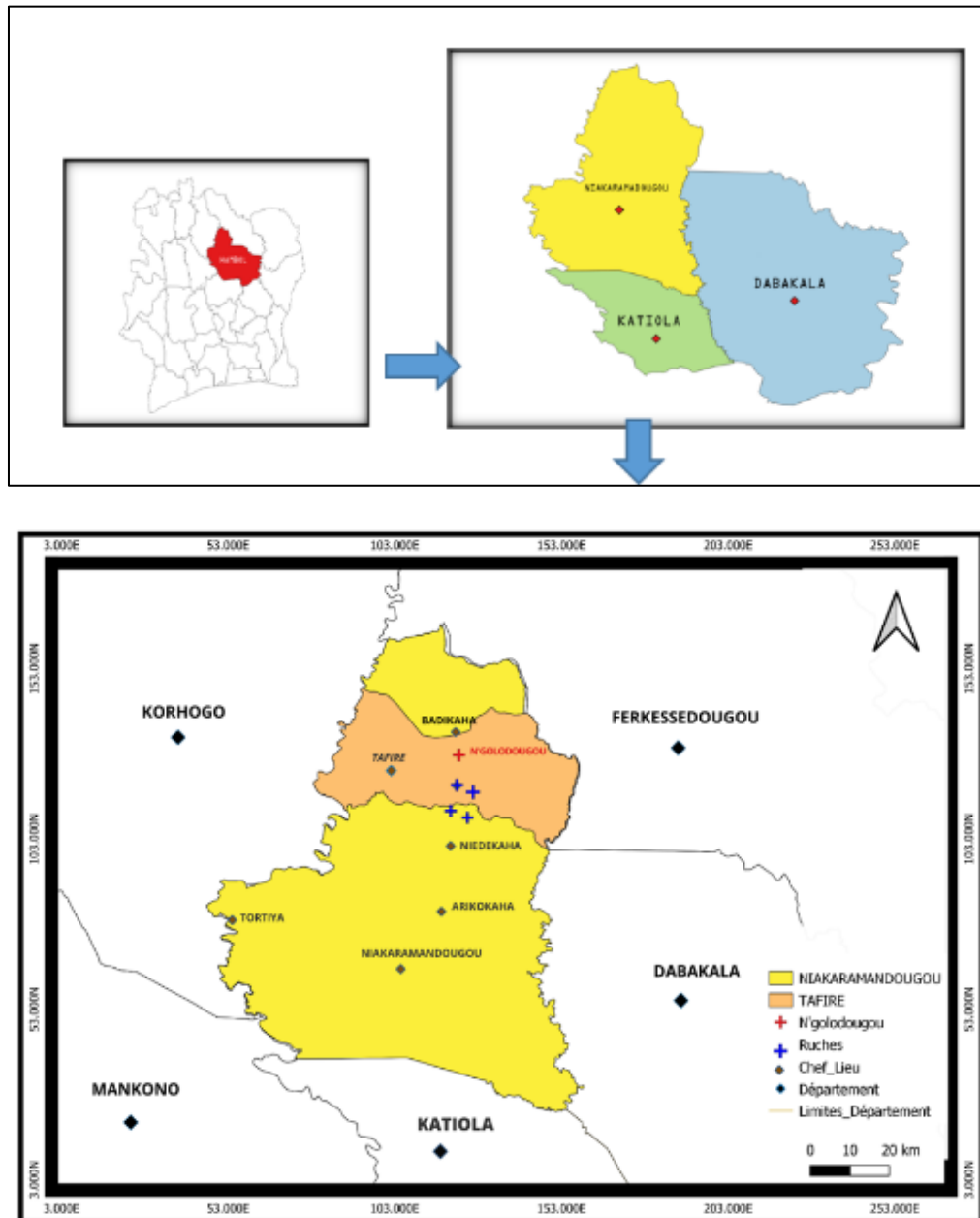


Figure 1 Location of the study area

The study was conducted in the Tafiré subprefecture and in the village of N'Golodougou. These whereabouts are located in the Niakaramadougou department, in the Hambol region, in north-central Côte d'Ivoire (Figure 1). The climate of this

region is of the South Sudanese type, characterized by a rainy season and a dry season [9]. The average annual temperature is 26.4 °C, and annual precipitation reaches 1,155 mm. The predominant soil type is ferralitic [10]. The vegetation is characterized by a wooded savanna belonging to the subsudanese sector of the Sudanese domain [11]. It is distinguished by the presence of woody flora comprising morphologically diverse plant species such as: *Adansonia digitata* (Malvaceae), or baobab; *Daniellia oliveri* (Fabaceae), or faro; *Parkia biglobosa* (Mimosaceae), or néré; *Isobertinia doka* (Fabaceae), or sau; *Phoenix dactylifera* (Arecaceae), or date palm; *Nauclea latifolia* (Rubiaceae), or African peach; etc.

2.2. Data Collection

The study took place from January to June 2023. Data were collected as part of an ethno-apicultural survey conducted among beekeepers who harvested honey in 2022 and who operate in Tafiré and N'Golodougou. These beekeepers, who met the survey criteria, were identified using the non-probabilistic snowball sampling technique described in [12] and interviewed individually using semi-structured interviews, as described in [13].

The questionnaire covered:

- beekeepers' profiles: gender, age, ethnic background, years of experience in beekeeping, primary occupation, and level of education;
- beekeeping techniques: the type of beekeeping practiced (whether in a cooperative or as an individual operation), beekeeping training, the type and number of hives, the location of apiary sites, the materials used to build traditional hives, harvesting techniques, as well as methods for extracting and storing honey;
- honey production: the number of harvests per year, the annual quantity of honey harvested, the selling price per liter of honey, and operational constraints.

Following the questionnaire, four beekeepers were selected based on their availability to participate in a field study. This study involved examining the location of the hives, the process of building traditional hives, and honey harvesting techniques.

Anyone who did not own hives was considered as a honey gatherer-hunter who harvests honey from habitats naturally colonized by bees.

2.3. Data Processing

The collected data were entered and coded in Excel, then exported to Sphinx Lexica. A descriptive analysis was conducted using Excel's analytical tools to calculate means, standard deviations, maximum and minimum values, and to create graphs and tables. Sphinx was used to calculate the frequencies of the various parameters.

The frequency of mention, expressed as a percentage, corresponds to the ratio of the number of beekeepers who reported a given parameter to the total number of beekeepers surveyed, calculated using the following formula.

$$\text{Citation Frequency(\%)} = \frac{\text{Number of beekeepers who identify a parameter}}{\text{Total number of beekeepers surveyed}}$$

The average gross revenue from honey production (RBM) per modern or traditional beekeeper was estimated by calculating the ratio of total honey production (PT) to the total number of traditional (NT) or modern (NM) beekeepers.

$$\text{RBM} = \frac{\text{PT modern or traditional beekeeping}}{\text{NT modern or traditional beekeeping}}$$

3. Results

3.1. Profile of Respondents

A total of 59 beekeepers were surveyed in the region. The survey results indicate that beekeeping in this area is practiced exclusively by men. Of these, 92% are indigenous people, 5% are Mossi, and only 3% are Senoufo.

The beekeepers' ages range from 21 to 86, with an average of 43.69 ± 13.57 years. The most represented age group is 41–50 years old, accounting for 39% of the beekeepers. The 20–30 and 31–40 age groups account for 20.30% and

16.90%, respectively. The 51–60, 61–70, and 80–90 age groups are the least represented, accounting for 11.90%, 8.50%, and 3.40% of beekeepers, respectively (Figure 2).

As for the beekeepers' experience in beekeeping, it ranges from 2 to 50 years, with an average of 12.62 ± 10.99 years. Beekeepers with between 2 and 10 years of experience (64.40%) constitute the largest group among the respondents (Figure 3).

Among the 59 beekeepers surveyed, 61% had no formal education, while 25.40% had completed elementary school and 13.60% had completed high school.

Agriculture was cited as the primary occupation by more than 86% of the surveyed beekeepers. The remaining 11 beekeepers, or 13.33%, are engaged in activities other than agriculture.

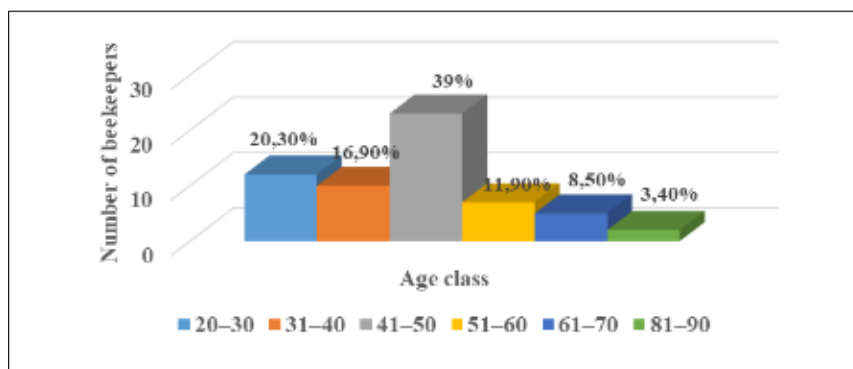


Figure 2 Distribution of Beekeepers by Age Group

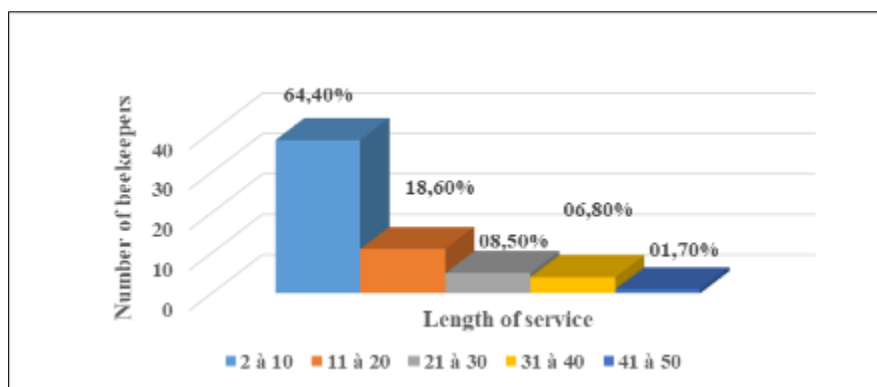


Figure 3 Distribution of Beekeepers by Years of Experience

3.2. Types, Number, and Placement of Beehives

Table 1 shows the type and number of hives used by local beekeepers. The hives most commonly used by beekeepers (93.21%) are traditional (made of straw and planks), while a minority (5.1%) are modern Langstroth- and Kenyan-style hives.

Straw hives (49 mentions, or 83.05%) predominate, followed by wooden hives and mixed hives (beekeepers who own both types of hives: straw and wooden), each accounting for 5.08%; Kenyan-style hives (3.4%); and finally, Langstroth-style hives (1.70%).

Straw hives are constructed from the bark of the *Isobertina doka* and *Daniellia oliveri* trees, covered with straw (Figure 4). Plank hives, on the other hand, are modeled after Kenyan hives and are made from the trunk of *Tectona grandis* (Lamiaceae).

A total of 2,849 hives were recorded in the Tafiré region, of which 2,800 are traditional. The number of hives used by these beekeepers ranges from 5 to 300, with an average of 50 ± 51.26 hives per beekeeper. In contrast, the modern beekeepers surveyed own an average of 12 hives.

Regarding hive locations, traditional beekeepers place their hives in fallow fields, plains, farmland, and the savanna, while modern beekeepers place them in cashew and mango plantations.

Table 1 Types and Number of Beehives Used by Beekeepers

Types of beehives	Number of beehives	Citation Frequency (%)	Beehives /apiculteur
Straw Beehives	2574	83.05	50 ± 51.26
Wooden beehives	63	5.08	
Mixed beehives	163	5.08	
Nothing	0	1.70	-----
Kenyanee beehives	39	3.4	12
Langstroth beehives	10	1.70	
Total	2849	100%	-----



A: stripped trunk of *Isoberlina doka*; B: Stripped trunk of *Daniellia oliveri*; C: Set of tree barks; D: Straw beehives

Figure 4 The Process of Making a Straw Beehive

3.3. Honey Harvest and Swarming Season

The process of capturing bee swarms takes place throughout the year, depending on the availability of hives and beekeepers in the study area. The baits used to attract swarms vary from beekeeper to beekeeper. For example, 12.28% of beekeepers use wax, while others rely on traditional beekeeping practices passed down from their ancestors, goat fat, and incense. As for the harvesting period, beekeepers in the region generally harvest honey only once during the first five months of the year, from January to May, with a preference for March and April. However, a minority prefer to harvest honey from February to June, from April to September, and from March to June. Harvesting takes place at night.

3.4. Techniques for Harvesting, Extracting, and Storing Honey

Honey harvesting techniques in the study area vary depending on whether beekeepers use traditional or modern methods. Modern beekeepers prepare a smoker (modern smoker), in which they light a fire and add cow dung to weaken the bees and facilitate harvesting; they then remove the honey frames from the hives.

They harvest the honey while leaving three to four honey frames in the hive to ensure the bees' survival.

In contrast, traditional beekeepers climb the tree on which the hive is placed to harvest the honey. More than 66% of traditional beekeepers (37 out of 56) smoke out the hives using straw fires, and about 8.92% use boxes. These beekeepers extract the honey through an opening other than the bees' main entrance, without worrying about swarms.

As for hunter-gatherers, they harvest honey from natural habitats colonized by bees, such as termite mounds and tree hollows. Once the honey is harvested, 25.40% of the beekeepers surveyed deliver their product to the various cooperatives to which they belong. The honey is then extracted using the drip method with a manual extractor, after which it is stored in an airtight container that serves as a maturation tank for up to one month to allow it to clarify. Finally, they transfer the honey into 25-liter containers for wholesale, as well as into 1-liter plastic containers for retail sale. The 74.60% of beekeepers who do not work with cooperatives let the honey rest for 3 days to clear naturally after extraction using the drip method. They then store it in 20- and 25-liter containers, as well as in one-liter jars and plastic bottles.

3.5. Honey Production

In 2022, the average honey production per modern beekeeper was 240 liters. Traditional beekeepers, on the other hand, harvested a total of 13,140 liters, for an average of 234 liters per beekeeper (Table 2). With regard to foraging beekeeping, the only practitioner interviewed produced 80 liters after cutting down more than 20 trees.

The selling price per liter of honey charged by traditional beekeepers ranges from 1,500 to 2,500 FCFA, with an average price of 2,054 FCFA. Total gross income for the year 2022 amounts to 26,989,560 FCFA, representing an average annual income of 481,956 FCFA (Table 2). Sixty-two point five percent of traditional beekeepers sell their product at a fixed price of 2,000 FCFA.

Table 2 Breakdown of Honey Production in 2022

Type of beekeeping	Total Amount of Honey (Liter)	Average amount of honey (liter)	Average price (CFA francs)	Total Gross Revenue (CFA francs)	Average Revenue/ Beekeeper (CFA francs)
Traditional	13140	234	2054	26 989 560	481 956
Modern	480	240	2750	1 320 000	660 000
Honey hunting	80	80	2000	160 000	160 000

For 37.5% of beekeepers, this price varies depending on the type of customers they serve and the period of honey scarcity in the area. This honey is sold to different types of customers: 3.57% of beekeepers sell it exclusively to the COOPROMIT and AGRITAF cooperatives in Tafiré, 14.28% sell it to both the cooperatives and regular buyers, and 82.14% sell it to merchants, private individuals, and regular buyers (customers from Tafiré, Abidjan, and the interior of Côte d'Ivoire).

The selling price for modern beekeepers ranges from 2,000 to 3,000 CFA francs, with an average price of 2,750 CFA francs. Their annual gross revenue for 2022 is 1,320,000 CFA francs, with an average income of 660,000 CFA francs. Their honey is sold to the cooperative and to regular buyers.

3.6. Challenges Related to Honey Production

Both modern and traditional beekeepers in the region face common problems. 23.72% of beekeepers are affected by ant attacks on their hives, 45.76% by squirrels that take up residence in their hives, and 10.16% by bees that abandon their hives. More specifically, honey theft followed by the destruction of hives is the main problem faced by all traditional

beekeepers; modern beekeepers, on the other hand, complain about hive infestations by the false moth and the destruction of hives by livestock (Table 3). Conflicts of interest have been reported between modern beekeepers and livestock farmers in the region. Traditional beekeepers also have a conflict of interest with livestock farmers over the same natural resource: straw.

Table 3 problems faced by beekeepers

Practical constraints	Number of beekeepers affected by the constraint	Percentage
Lack of financial resources	59	100%
Squirrels	27	45,76%
Ants	14	23,72%
Deserted beehives	7	11,86%
Destruction of beehives	2	3, 38%
False moth	2	3, 38%
Termites	2	3, 38%

4. Discussion

Beekeeping is primarily practiced by the Tagbanan, the indigenous people of Tafiré. This predominance can be explained by the fact that beekeeping has long been viewed as a complementary activity to agriculture, a practice that depends largely on access to land, which is generally granted to indigenous peoples.

The majority of beekeepers are adults aged 31 to 50, of whom 39% are in the 41–50 age group and 16.9% in the 31–40 age group. A similar finding was reported by [14] in Burkina Faso. According to this author, adults must shoulder numerous family responsibilities that lead them to diversify their sources of income. Young people aged 20 to 30 are also engaged in this activity, contrary to the findings reported by [15] in the Manigri district of Benin, which indicate that young people under 30 did not practice beekeeping. Young people in Tafiré, for their part, are becoming increasingly interested in beekeeping, as this activity allows them to earn a substantial income with a relatively low initial investment. This helps them meet their financial needs. The interest shown by this younger generation in beekeeping could be an asset for the development of beekeeping in Tafiré. An average of 12.62 years of experience in beekeeping attests to the long-standing commitment of Tafiré's residents to this practice, driven by its economic benefits. Indeed, according to these beekeepers, even in the absence of other sources of income, beekeeping alone can provide enough income to support both family and personal needs through the sale of honey.

Traditional beekeeping, practiced using traditional hives, is the most widespread practice. Out of a total sample of 59 beekeepers, 56 are traditional beekeepers, while hunter-gatherers and modern beekeepers are underrepresented. This situation differs from that observed by [8] in the Katiola department, by [7] in the villages of Tiébila and Nafoun in northern Côte d'Ivoire, and by [6] in the Abbey region, where hunter-gatherers predominate. In fact, hunter-gatherers are rare in this region due to the physical exertion required and the risk of injury associated with felling trees during hunting and honey harvesting. Furthermore, [16] notes that these difficulties have prompted local populations to mimic nature by constructing traditional beehives. Furthermore, during the surveys, it was observed that hunter-gatherers generally live in camps, whereas our study took place in the town of Tafiré. Beekeepers in Tafiré opt for traditional beekeeping rather than modern methods because they cannot afford to buy modern hives, which are more expensive than traditional ones. Furthermore, in N'Golodougou, beekeepers attribute the failure of attempts to introduce modern beekeeping to the fact that the authorities did not take their local knowledge into account.

Traditional straw beehives are very common in Tafiré. They are made from the bark of the *Isoberlina doka* and *Daniellia oliveri* trees. Beekeepers prefer these species because of their strength and the durability they provide to the hives. They tend to increase the number of hives to harvest a larger quantity of honey. However, it has been observed that this practice degrades biodiversity. Indeed, according to [17], stripping the bark from a tree around its entire circumference causes internal stress, which can lead to the gradual or immediate death of the tree, depending on the extent of the stripping.

In Tafiré, beekeepers generally harvest honey only once a year, from January to May. This finding is consistent with that of [8] in Katiola, according to which the beekeeping calendar includes only one major flowering period. Indeed, according to [18], the main flowering season for woody plants in the savanna zone, which are the primary sources of nectar (an essential raw material for honey production), occurs from December through March. However, this finding contradicts those of [19] in Benin, as well as those of [20] and [14], who observed two distinct honey-harvesting periods. This discrepancy can be explained by geographical differences as well as by the flowering periods of the main nectar-producing plant species.

With regard to harvesting techniques and equipment, the use of fire during traditional harvesting practiced by 66.07% of beekeepers has a significant impact on the quality of the honey produced. Indeed, according to [7], this method contributes to the presence of debris and soot in the harvested honey, which increases the hydroxymethylfurfural (HMF) level. Consequently, the increase in HMF levels leads to a deterioration in the honey's organoleptic properties. Beekeepers in this area who use smoke for honey harvesting are unaware of the potential consequences of this practice, as they have not received training on proper honey harvesting techniques. Nevertheless, a minority of 8.77% devised a box to serve as a substitute for smokers during harvesting after receiving training on best practices for honey harvesting from the National Specialization Centers (CNS) and the National Association of Farmers of Côte d'Ivoire (ANACI). Regular training sessions focused on innovation and continuous improvement could promote a more widespread and effective adoption of best beekeeping practices, leading to high-quality honey production in the Tafiré area.

The average yield of 240 liters of honey harvested by a modern beekeeper in 2022 is higher than the 120 liters of honey harvested by modern beekeepers in Katiola in 2016 [8]. However, this figure is lower than the 480 liters and 840 liters harvested by small and large-scale producers, respectively, in the Central African Republic [21]. This disparity can be explained by the fact that beekeepers in Tafiré have made beekeeping a secondary activity, to which they do not devote enough time for the maintenance and monitoring of their hives.

The main obstacles to production, economic (ants, squirrels, wax moths), and sociological (theft followed by the destruction of hives) cited by beekeepers in Tafiré were also reported by [22] in the municipality of Cobly, in northwestern Benin. These obstacles are likely to have a negative impact on honey production and to hinder the development of beekeeping in the study area.

5. Conclusion

The honey produced in the Tafiré region comes mainly from traditional beehives. Unfortunately, this traditional practice has significant repercussions on the diversity of the plant species *Isoberlina doka* and *Daniellia oliveri*. Furthermore, the use of fire during harvesting damage the quality of the honey, which may limit its sale in domestic and international markets. Modern beekeeping, which remains underdeveloped in the study area, is distinguished, however, by the adoption of more environmentally friendly production methods. Generally speaking, beekeeping is an important source of income for beekeepers in Tafiré through the sale of honey. However, a lack of financial resources, the presence of biological pests, and certain sociological constraints are hindering increased production and the development of this activity. Thus, a gradual transition from traditional hives to modern or improved hives, combined with technical support and regular monitoring of beekeepers, could increase honey production while contributing to the conservation of biodiversity and the improvement of honey quality.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declared that they have no conflicts of interest.

References

- [1] FIDA, Évaluation de la pauvreté en Afrique, en Ouest et au Centre, IFAD, 2001. [Online] Available : <https://www.ifad.org/documents/3871470/39135645/french> (Accessed July 23, 2023).

- [2] Bradbear, Nicolas, Apiculture et moyens d'existence durables, FAO, 2005. [Online] Available : <https://openknowledge.fao.org/server/api/core/bitstreams/f6f89817-278f-4cc7-9dc7-aa8c99640e2b/content> (Accessed July 23, 2023).
- [3] G.A. Mensah, "Les abeilles : Importance écologique, économique et menaces", Atelier d'échanges et de réflexion sur la conservation des pollinisateurs et leur importance pour la biodiversité au Bénin –INFOSEC, Cotonou, Bénin, 07/04, 2010.
- [4] S. Savadogo, K.C. Assi et K. N'Guessan, « Note sur la place de l'apiculture dans la société Baoulé en Côte d'Ivoire : cas de deux villages du district de Yamoussoukro », *Géologie Écologie Tropicale*, vol. 42, n°1, pp. 199-206, 2018.
- [5] C. K. ASSI, G. E. K. Bollou, S. Savadogo and K. N'Guessan, "Traditional and modern beekeeping practices in the center of Côte d'Ivoire: the case of Western part of Yamoussokro", *International Journal of Scientific and Research Publications*, vol 10, no. 11, pp 347- 357, 2020.
- [6] K. C. Assi and K. F. Kouamé, "Caractéristiques socio-culturelles des apiculteurs et valeur économique du miel en zone forestière de la Côte d'Ivoire : cas de la région abbey", *Geologie Ecologie Tropicale*, vol 46, no. 3, pp 445-453, 2022.
- [7] D. Koné, E. J. B. Ohoueu, M. Sangare, B. M. Iritie and E. N. Wandan, "Pratiques apicoles et usages du miel dans deux villages riverains de la forêt classée de Badenou (Nord de la Côte d'Ivoire) : Tiébila et Nafoun", *International Journal of Innovation and Scientific Research*, vol 54, no.1, pp 1-9, 2021.
- [8] D. F. Kouassi, D. Ouattara, S. Coulibaly and K. E. N'guessan, "La cueillette, la production et la commercialisation du miel dans le Département de Katiola (Centre-Nord, Côte d'Ivoire)", *International Journal Biological and Chemical Science*, vol 12, no. 5, pp 2212-2225, 2018.
- [9] A. M. Kouassi, K. F. Kouamé, K.B. Yao, K. B. Dje, J.E. Paturel, and S. Oularé, Analyse de la variabilité climatique et de ses influences sur les régimes pluviométriques saisonniers en Afrique de l'Ouest : cas du bassin versant du N'zi (Bandama) en Côte d'Ivoire, *Cybergeo: European Journal of Geography*, Environnement, Nature, Paysage, 2010. [Online] Available : <http://journals.openedition.org/cybergeo/23388> . (Accessed April 26, 2023).
- [10] A. H. N'Da, L. Akanouvou, and K. C. Kouakou, "Gestion locale de la diversité variétale du maïs (*Zea mays* L.) violet par les Tagouana au Centre-Nord de la Côte d'Ivoire", *International Journal Biological and Chemical Science*, vol 7, no. 5, pp 2058-2068, 2013.
- [11] H. J. T. Coulibaly, Répartition spatiale, Gestion et Exploitation des eaux souterraines : Cas du département de Katiola, région des savanes de Côte d'Ivoire. Science de la Terre. Université Paris Est, France, 2009.
- [12] L. A. Goodman, "Snowball sampling", *Annals Mathematical Statistics*, vol 32, no. 1, pp 148-170, 1961.
- [13] [13] H. Tamboura, H. Kabore, and S. M. Yameogo, "Ethnomédecine vétérinaire et Pharmacopée Traditionnelle dans le plateau central du Burkina Faso : cas de la province du Passoré", *Biotechnologie, Agronomie, Société et Environnement*, vol 2, no. 3, pp 81-191, 1998.
- [14] B. A. Kaboré, L. D. Dahourou, W. Ossebi, N. S. Bakou, A. Traoré and A. M. G. Belem, "Caractérisation socio-économique et technique de l'apiculture au Burkina Faso : cas de la Région Centre-Ouest", *Elevage Médecine Vétérinaire Pays Tropicale*, vol, 75 no.1, pp 3-8. 2022.
- [15] H. Yédomonhan and A. Akoègninou, "La production du miel à Manigri (Commune de Bassila) au Bénin : enjeu et importance socio-économique", *International Journal of Biological and Chimical Science*, vol 3, no. 1, pp 125-134, 2009.
- [16] P. Kombo, Apiculture et miel dans la province de l'Adamaoua (Cameroun). Ecole inter états des sciences et médecine vétérinaires. Université cheikh antadiop de Dakar, 1989.
- [17] M. C. M Solefack, and K. G. Kinjouo, "Modification anatomiques après écorçage de trois espèces au sud-ouest Cameroun," *Journal of Applied Biosciences*, 115 : 11490 - 11501, 2017.
- [18] S. Coulibaly, Potentialités de production mellifère de la flore de transition forêt-savane, en zone Guinéenne et caractérisations pollinique et physico-chimique de quelques miels de la Côte d'Ivoire (Afrique de l'Ouest). Université Félix Houphouët-Boigny, Abidjan, Côte d'Ivoire, 2014.
- [19] H. Yédomonhan, G.M. Tossou, A. Akoègninou, B. B. Demènou and D. Traoré, "Diversité des plantes mellifères de la zone soudano-guinéenne : cas de l'arrondissement de Manigri (Centre- Ouest du Bénin)." *International Journal of Biological and Chimical Science*, vol 3, no. 2, pp 355-366, 2009.

- [20] K. C. Assi, H. C. Kaboré, K. Yao, “Diversité des plantes mellifères dans la zone soudanienne : le cas de la Ferme des Trois Lacs dans le département de Dabakala (Centre-Nord, Côte d'Ivoire)”, *International Journal of Agronomy and Agricultural Research*, vol 22, no. 1, pp 1-10, 2023.
- [21] E. Mbétid-Bessane, “Apiculture, source de diversification des revenus des petits agriculteurs : cas du bassin cotonnier en Centrafrique”. *Tropicultura*, vol 22, no. 3 pp156-158, 2004.
- [22] S. T. B. Ahouandjinou, G. H. Dassou, I. D. Y. Ahamidé, H. Yédomanhan, A. C. Adomou, M. G. Tossou and A. Akouègninou, “Potentialités floristiques mellifères de la zone nord-ouest du Bénin”, *International Journal of innovation and Applied Studies*, vol 32, no. 4, pp 552-565. 2021.