

Full Length Research Paper

Survey on the level of knowledge, production and consumption of honey-based craft beer produced in northern Côte d'Ivoire

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This study focused on artisanal honey-based beer, a traditional beverage that is disappearing in northern Côte d'Ivoire, particularly in the villages of Touro, Nangakaha and Lassologo. The surveys carried out reveal that this drink, once consumed at social events and reputed for its therapeutic virtues, is today little-known by the younger generations. Its production, carried out exclusively by women who are often illiterate and economically precarious, is in decline due to competition from tchapalo and palm wine, as well as a lack of intergenerational transmission. The results highlight a generational divide in knowledge of this beverage, predominantly male consumption, and unfavorable socio-economic conditions for female producers, compromising the sustainability of this tradition. These findings underscore the importance of strategies aimed at preserving this cultural heritage, promoting the economic empowerment of women producers, and integrating this beverage into more sustainable local food systems.

Key words: Craft beer, honey, survey, Côte d'Ivoire, female producers, consumers.

INTRODUCTION

Honey-based craft beer, a traditional drink emblematic of northern Côte d'Ivoire, is now on the verge of disappearing, joining the long list of food-related skills threatened by globalization and sociocultural changes (Food and Agriculture Organisation [FAO], 2019a). Once produced and consumed in northern Côte d'Ivoire, this fermented beverage, whose ancestral recipe is based on

a close interaction between beekeeping, which provides honey whose floral origin and harvesting practices directly influence its quality and taste, and traditional brewing, which adapts fermentation techniques to the characteristics of the honey (RTBF, 2021). This symbiosis between beekeeping and traditional brewing, which combines the transmission of beekeeping knowledge and

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brewing expertise, remains largely unknown to younger generations, with only the elders preserving the memory (Solange et al., 2017). This phenomenon of gradual disaffection with traditional culinary knowledge in favor of industrialized beverages has been observed in several African countries (Chauveau, 2018). Despite the cultural and economic importance of honey in Côte d'Ivoire, research has been limited mainly to the study of beekeeping sectors or traditional cereal beverages such as tchapalo (Chauveau, 2018; FAO, 2019b). No research has yet comprehensively documented the level of knowledge, production practices, and consumption habits of artisanal honey beer, nor linked these dimensions to the sociodemographic and economic profiles of producers. Faced with this worrying observation, it seems urgent to document and enhance this cultural and gastronomic heritage before it falls into oblivion.

This study stands out for its combined approach, which aims to assess the level of awareness of this craft beer within local communities and identify female producers who are still active. It also seeks to analyze the sociodemographic and economic profile of these craftswomen, as well as to understand the reasons for the low distribution of this beverage compared to other traditional alcoholic drinks such as tchapalo or palm wine.

By conducting surveys in localities such as Katiola (Touro), Korhogo (Nangakaha) and Ferkessédougou (Lassologo), in northern Côte d'Ivoire, this research will not only help preserve the memory of this tradition, but also suggest ways of revitalizing it. The results could then serve as a basis for safeguarding and promotion initiatives, so that this honey beer regains its place in local cultural and economic practices.

METHODOLOGY

Surveys

Two surveys were carried out to collect data on the basis of survey forms (survey form in Appendix 1). Nine villages (Fronan, Touro, Kolokaha, Tuoro, Karakoro, Nangakaha, Lassologo, Fangakaha and Kakikaha) from three towns (Katiola, Korhogo and Ferkessédougou), including three villages per town (Katiola : Fronan, Touro and Kolokaha; Korhogo : Tuoro, Karakoro and Nangakaha ; Ferkessédougou : Lassologo, Fangakaha and Kakikaha) from the northern region were selected for this study. The survey took place from July 18 to October 25, 2022, that is, a week and a half in each village. One hundred people were interviewed per village, and all responded without hesitation. Respondents included men and women aged 18 and over. Villages were selected using a reasoned sampling method based on the proven presence of honey and, in the past, the presence of producers of artisanal honey beer in these localities. All participants, men and women aged 18 and over, were informed of the objectives of the study, the conditions of participation, and the scientific use of the data collected. Their free and voluntary agreement was obtained in the form of verbal informed consent. The anonymity and confidentiality of the information provided were respected, in accordance with the ethical principles of social science research.

An initial survey made it possible to assess the level of knowledge

of artisanal honey beer, and to identify all the women producing this beer among the population. The questionnaires covered, among other things, consumers' socio-demographic status (identity, gender, age) as well as their socio-economic situation, the specific characteristics of artisanal honey beer as perceived by consumers, consumption habits, reasons for consumption, frequency and times of consumption. The second survey was dedicated to women producers. This provided information on the socio-demographic status (identity, gender, age) of women producers, their socio-economic situation, and the reasons why this artisanal honey-based beverage is not as widespread as other artisanal beverages such as Tchapalo and Bandji palm wine, and to identify all the production diagrams for artisanal honey beer.

Analysis of survey data

The various items of information collected on the survey forms were entered using Epi data 3.0 softwares, and then transferred to SPSS version 20.0 to form the database. Qualitative variables were described in terms of numbers and percentages, while quantitative variables were summarized by mean and standard deviation. Statistical analyses were performed using STATISTICA software (version 14, TIBCO Software Inc., Palo Alto, CA, USA). Differences were considered statistically significant for a p-value < 0.05. Calculations and figures were performed using EXCEL.

RESULTS

Villages selected and disappearance of women producers

After surveys in the nine villages (Fronan, Touro, Kolokaha, Tuoro, Karakoro, Nangakaha, Lassologo, Fangakaha and Kakikaha) of the three towns (Katiola, Korhogo and Ferkessédougou), three villages were selected, one from each town (Katiola : Touro; Korhogo: Nangakaha and Ferkessédougou: Lassologo): Touro; Korhogo: Nangakaha and Ferkessédougou: Lassologo) for further work, as these were the villages in which we were able to find only one artisanal honey beer producer in Figure 1. The other villages were not included in the study because craft honey beer production had disappeared there due to a lack of producers.

Knowledge of beer

The survey showed that those who are familiar with craft beer made from honey are over 50 years old, and among them, 10 ± 0.03 , 21 ± 0.01 and $13\% \pm 0.03\%$ of respondents are in Touro, Nangakaha, and Lassologo, respectively. Those aged 30 to 45 have heard of it, with $27\% \pm 0.01\%$ in Touro, $43\% \pm 0.00\%$ in Nangakaha and $30\% \pm 0.02\%$ in Lassologo, while those under 30 are completely unfamiliar with artisanal honey beer, with 90 ± 0.01 , 71 ± 0.02 and $87\% \pm 0.02\%$ of those surveyed in Touro, Nangakaha, and Lassologo, respectively. There are significant differences ($P < 0.05$) in the levels of awareness in the different localities (Figure 2).

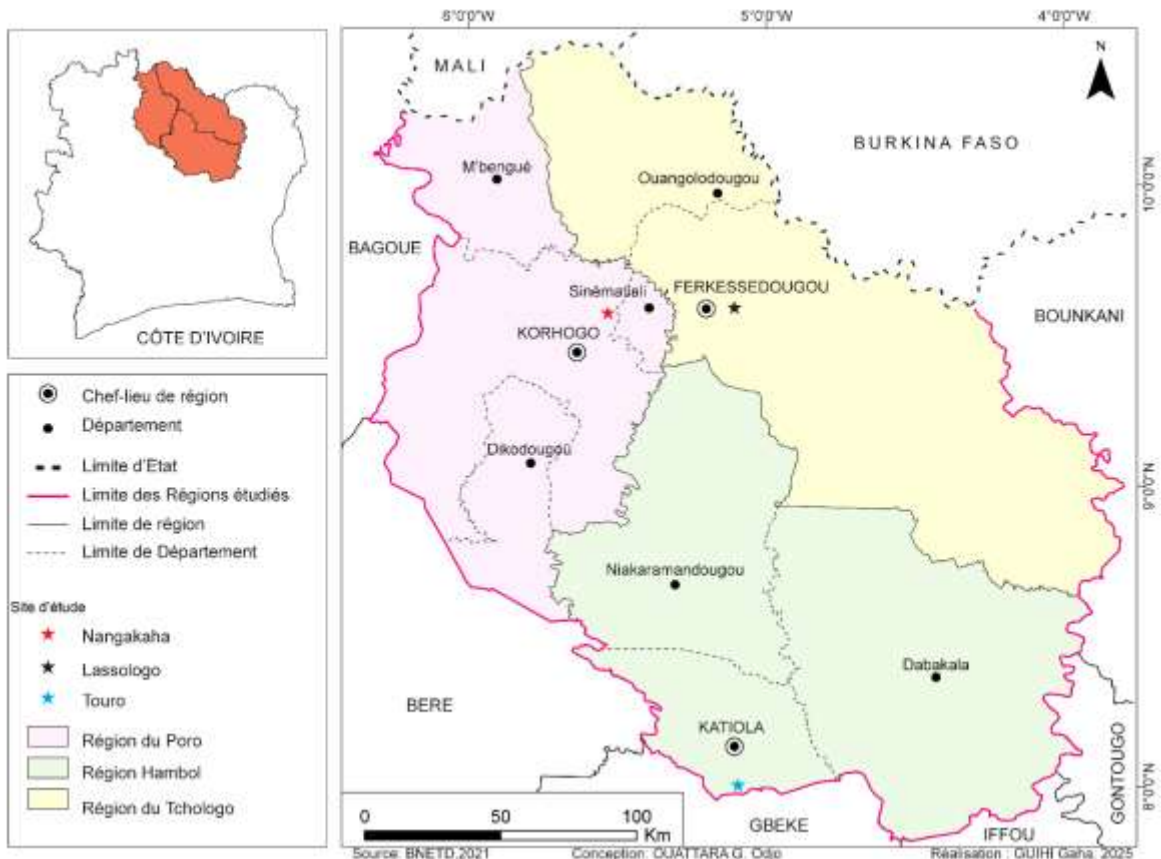


Figure 1. Map showing selected survey locations (Touro, Nangakaha and Lassologo) in the northern region of Côte d'Ivoire.

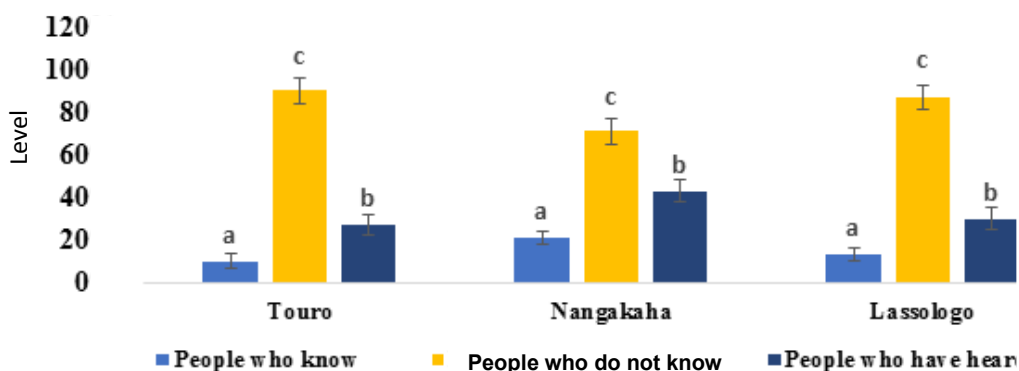


Figure 2. Respondents' level of knowledge of honey-based craft beer. Letters a, b and c represent significant differences (P<0.05).

Drinking habits, times and frequencies

According to those who know and those who have heard about it, this drink was once consumed by people aged 18 and over. Honey beer was most often consumed at ceremonies or very special events such as weddings, baptisms, birthdays, funerals, but also after farmers/planters had made a good profit when the harvests were good. This

beer was frequently consumed by middle-class people, usually on festive occasions. In Touro, men accounted for 94.9% ± 0.04%, compared to 5.1% ± 0.02% for women. In Nangakaha, 90% ± 0.01% of consumers were men, compared to 10% ± 0.04% women. In Lassologo, the proportion was 93.7% ± 0.01% for men and 6.3% ± 0.02% for women. Statistical analysis of the data revealed a significant difference (P< 0.05) between male and female

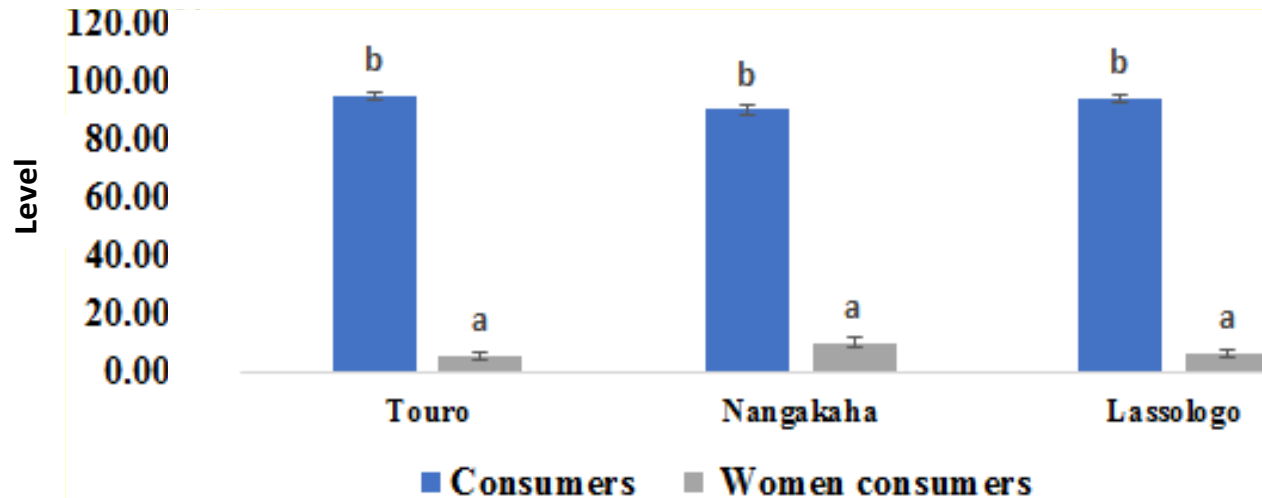


Figure 3. Gender of honey-based craft beer drinkers surveyed. Letters a and b represent significant differences ($P < 0.05$).

consumers in each village (Figure 3).

Reasons for consumption

Some respondents began drinking artisanal honey-based beer on the strength of recommendations that it had therapeutic virtues, helping to prevent malaria and promote defecation. For some men, beer consumption is associated with notions of virility, strength or authenticity, and some women drink beer for its honey-like taste and aroma.

Sociodemographic status, socio-economic situation of female producers and production process the survey on honey beer conducted among the populations of these three towns (Touro, Nangakaha, and Lassologo) showed that this drink was produced exclusively by women. The majority of these producers were part of the working population (aged 20 to 50) in these villages. Mostly illiterate, their socio-economic conditions were very unfavorable, hence their decision to engage in this activity to meet their needs. However, there are almost no producers left. Only three producers, one in each locality, were identified, and these producers share the same production pattern (Figure 4).

The production diagram is described as follows: The production of craft honey beer begins by mixing 1 L of raw honey (MB) with 10 L of water. The mixture is then heated to 100°C for 15 min to obtain a homogeneous liquid. 5 g of chili powder is added, and the mixture is stirred for 5 min. After filtering, the pre-fermented honey beer (BMavf) is obtained.

This liquid is then stored in a closed container and left to ferment naturally for 24 h at room temperature. The final product obtained is the post-fermented honey beer (BMafp), ready for consumption.

Preserving food and cultural heritage

The gradual disappearance of artisanal honey beer means the loss of ancestral knowledge linked to beekeeping and local brewing practices. This intangible heritage, which combines honey production with its transformation into a fermented beverage, is part of the cultural identity of rural communities. Preserving it would not only help to safeguard a tradition, but also promote food and cultural diversity in the face of the standardization of industrial beverages.

Gender equality and women's empowerment

This beverage is produced almost exclusively by women, who are often in vulnerable economic situations. The decline of this activity exacerbates their precarious situation, as they lose not only a source of income but also a space for social recognition. Revitalizing this beverage could therefore contribute to women's economic empowerment, recognition of their role in passing on food knowledge, and the reduction of gender inequalities in production and consumption systems.

Local economies and sustainability

Craft honey beer could represent an economic opportunity in a context where rural communities are seeking to diversify their sources of income. Promoting it (through formalization, modernization of processes, or integration into local tourist and commercial circuits) would strengthen village economies, create new sustainable agri-food sectors, and limit dependence on imported industrial beverages.

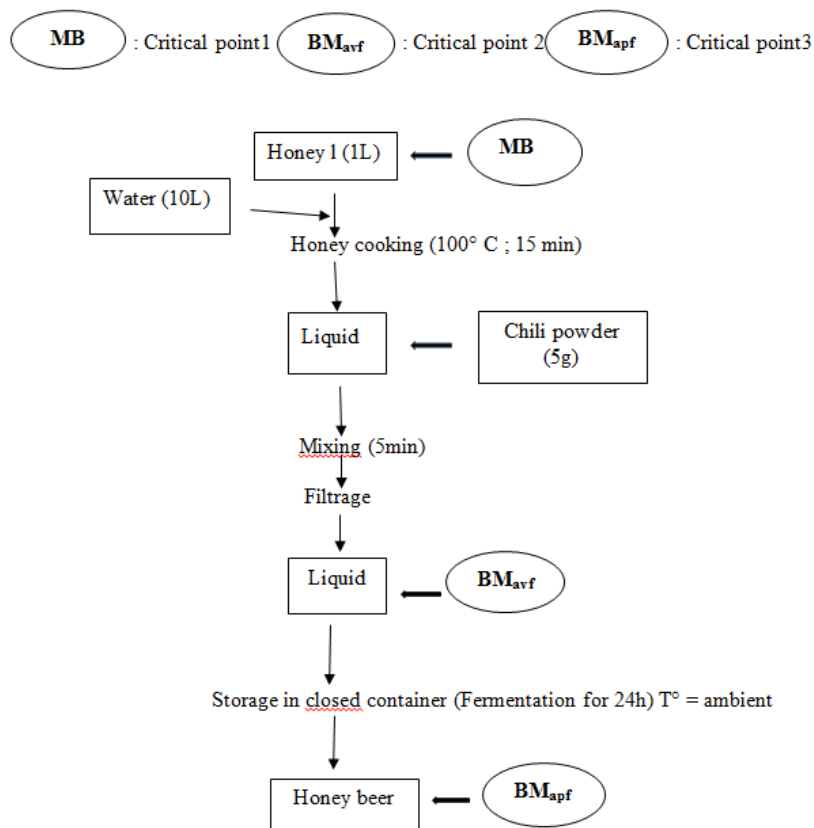


Figure 4. Diagram of artisanal honey beer production. MB: raw honey; BM_{avf}: honey beer before fermentation; BM_{apf}: honey beer after fermentation.

DISCUSSION

Selected villages and the disappearance of female producers

The survey shows that artisanal honey beer is only produced in three villages (Katiola: Touro, Korhogo; Nangakaha, and Ferkessédougou: Lassologo), where there was only one female producer per village. This situation corresponds to the observations of Coulibaly et al. (2014) on the disappearance of artisanal know-how in Côte d'Ivoire, where urbanization and economic changes are marginalizing local practices. The fact that only a few producers remain highlights a lack of intergenerational transmission.

Level of knowledge about beer

The data reveals that people who are familiar with craft honey beer are aged 50 and over, while young people fewer than 30 are virtually unaware of this drink. These data reveal a growing lack of knowledge about honey beer among young people, while older people still remember it. This generational gap is typical of disappearing food

heritage, as documented by Coulibaly et al. (2020) for traditional Ivorian beverages. This situation is also part of a process of gradual loss of traditional knowledge passed down orally between generations (Demarest, 2014).

Consumption habits, occasions, and frequency

According to those interviewed, craft honey beer was once consumed by people aged 18 and over because of its high alcohol content, so very young people did not drink it. This drink was consumed during important ceremonies such as weddings, funerals, and harvest festivals. These contexts highlight the social and ritual role of the drink, which is consistent with the research of Coulibaly et al. (2020). This trend is similar to that observed for other artisanal beverages such as tchapalo or palm wine, whose production and consumption are also rooted in oral traditions passed down from generation to generation (Demuyakor et al., 2019). The dominant male consumption observed for artisanal honey beer is consistent with the findings for tchapalo, where consumption is also dominated by men, mainly due to cultural and social norms that assign men the primary role of consumers in festive and social settings, while women

are responsible for production (Tuo et al., 2020).

Reasons for consumption

Some respondents began drinking craft honey beer because it was recommended as a way to relax after a day's work or unwind at the weekend. The feeling of relaxation associated with drinking beer can be an attractive factor. For others, it is believed to have therapeutic properties, helping to prevent malaria and promote bowel movements. These therapeutic properties attributed to this beer could be used as a lever for its reevaluation, as in the work of Coulibaly et al. (2020), who mention that tchapalo has digestive and relaxing properties.

Socio-demographic status, socio-economic situation of female producers and production processes

The survey on honey beer conducted among the populations of these three towns (Touro, Nangakaha, and Lassologo) showed that this drink was produced exclusively by women. This may be explained by the fact that in Africa, everything related to cooking and food is done by women (Tuo et al., 2020). The majority of these women producers were part of the working population (aged 20 to 50) in these villages. This dynamic reflects the central economic role played by the processing of agricultural and beekeeping products in the empowerment of rural women (Ferré et al., 2018). Most often illiterate, their socio-economic conditions were very unfavorable, hence their choice to engage in this activity to support themselves. However, there are almost no women producers left. These results illustrate the structural inequalities affecting rural women in Côte d'Ivoire (Bidou and Droy, 2017).

The artisanal process for producing honey beer described earlier is based on a series of simple but essential steps. The first step is to mix raw honey with water, which reduces the viscosity of the honey and provides a favorable environment for fermentation. This principle is similar to that observed in the preparation of mead, where the dilution of honey facilitates the fermentation activity of yeasts (Pereira et al., 2015). Cooking the wort at 100°C for 15 min plays a dual role. On the one hand, it promotes homogenization of the mixture and extraction of soluble compounds. On the other hand, it allows for a partial reduction of the initial microbial load, thus limiting the risk of contamination and promoting the selection of specific fermentative microorganisms (Obi., 2017). The addition of chili powder is a distinctive feature of this traditional process. Chili is known not only for its aromatic properties, which contribute to the sensory profile of the beverage, but also for its antimicrobial effects linked to capsaicin and phenolic compounds (Oliveira et al.,

2022). This practice can thus contribute to the microbiological stabilization of the product while reinforcing its cultural originality. Natural fermentation, carried out at room temperature for 24 h, relies on the indigenous microbial flora from honey, processing equipment, and the environment. This type of spontaneous fermentation is characteristic of many traditional African beverages, such as tchapalo (sorghum beer) and pito (millet beer) (Djeni et al., 2008). Thus, the artisanal process described illustrates the ingenuity of local communities in adding value to honey by transforming it into a fermented beverage. However, standardizing certain steps, such as fermentation control, could help improve the product's hygienic and organoleptic quality, while promoting its commercial and scientific value.

Preserving food and cultural heritage

The gradual disappearance of artisanal honey beer represents a loss of ancestral knowledge linked to beekeeping practices and local brewing techniques, which contribute to the intergenerational transmission of knowledge and strengthen the resilience of rural food systems (Ouattara et al., 2023). This intangible heritage, which combines honey production with its transformation into a fermented beverage, contributes to cultural identity and social cohesion.

Furthermore, traditional fermented beverages play a documented nutritional and health role in many regions, which reinforces their heritage and social value (Cuamatzin-García et al., 2022). Preserving this tradition would not only safeguard it in the face of the standardization of industrial beverages, but also open up opportunities for local development (increased household income, short supply chains, culinary tourism), an approach supported by international analyses linking food heritage, biodiversity for food, and food security (FAO, 2019a).

Gender equality and women's empowerment

This beverage is produced almost exclusively by women, who are often in vulnerable economic situations. The decline of this activity exacerbates their precarious situation, as they lose not only a source of income but also a space for social recognition. Revitalizing this beverage could therefore contribute to women's economic empowerment, recognition of their role in transmitting food knowledge, and the reduction of gender inequalities in production and consumption systems. Recent studies confirm these dynamics. For example, in Benin, the empowerment of women in agriculture is correlated with a significant improvement in household food security (Tossou and Igue, 2023). Furthermore, in Sierra Leone, a

participatory “Gender Model Family” approach reveals that strengthening women's capacities in food chains has a positive impact on nutrition and family well-being (Ayamga et al., 2023).

Local economies and sustainability

Honey beer could represent an economic opportunity in a context where rural communities are seeking to diversify their sources of income. Promoting it through formalization, modernization of processes, or integration into local tourist and commercial circuits would strengthen village economies, create new sustainable agri-food sectors, and limit dependence on imported industrial beverages. This context promotes economic diversification and reduces dependence on imported industrial beverages, according to Brasseur (2024).

Conclusion

These surveys show that artisanal honey beer represents a threatened cultural and gastronomic heritage, the disappearance of which highlights major issues linked to modernization, socio-economic inequalities and the breakdown in the transmission of traditional knowledge. While some people consume honey beer for the first time on the occasion of festive or ceremonial events, others consume it on recommendation and develop a lasting attachment to it. Regular consumers also attribute therapeutic virtues to honey beer, such as preventing malaria and improving intestinal transit, thus reaffirming the importance of preserving these practices rooted in the local social and cultural fabric.

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CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Appendix 1

Survey form

1. Knowledge of craft honey beer:

- a. Have you ever heard of craft honey beer? Yes / No
- b. If yes, how did you hear about it? _____
- c. Do you know the steps involved in its production? Yes / No
- d. Have you ever tried this beer? Yes / No

2. Producers of craft honey beer:

- a. Do you know any women or men who produce this beer? Yes / No
- b. If yes, please provide their names, locations, and contact details (if possible):

3. Consumer identity:

- a. Gender: Male / Female _____
- b. Age: _____ years old

4. Socio-economic status:

- a. Occupation: _____
- b. Level of education: None / Primary / Secondary / Higher:

- c. Approximate monthly income: _____ CFA

5. Specific characteristics of the beer:

- a. Taste: _____
- b. Smell: _____
- c. Color: _____
- d. Estimated alcohol content: _____

6. Consumption habits:

- a. How often do you consume this beer? Daily / Weekly / Occasionally:

- b. On what occasions do you consume it? Weddings / Parties / Gatherings / Other:

- c. Why do you consume this beer? Taste / Price / Effects / Support for local production / Other:
