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Trends and innovative strategies in honey marketing: Bibliometric and systematic review

Tendencias y estrategias innovadoras en la comercialización de la miel: Revisión bibliométrica y sistemática

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ABSTRACT

Honey is the most recognized and widely marketed beekeeping product worldwide. This article aimed to perform a bibliometric analysis and a systematic review of the available literature on scientific works related to honey marketing. The database consulted was Scopus. The terms "bee AND honey AND marketing" were used, and only documents in English were included. The tools used for data analysis were Bibliometrix and VOSviewer. A total of 89 articles published between 1999 to 2024 were identified, originating from more than 20 countries, including Ethiopia, Indonesia, and India. The year 2021 was particularly significant, with the highest scientific output recorded, with 15 publications. These reviewed studies had clear objectives, including constructing a honey marketing mix, defining consumer profiles, and analyzing the reasons for purchasing and consuming this product; as well as topics related to production processes, quality control, labeling, and sustainability. Nonetheless, the relatively small number of articles found in systematic scrutiny revealed a concerning gap in the scientific literature on honey consumption, particularly regarding its marketing. This gap represents an opportunity, especially in Peru, where no prior research on this topic was identified. Furthermore, the limited internationalization of scientific work and the limited cooperation between authors from different countries underscore the need to promote joint initiatives. Overall, this study highlights research gaps while expanding scientific understanding of honey marketing, offering insights that support sustainable commercialization strategies and guide future research at both the local and global levels.

RESUMEN

Palabras clave:
Enfoques
Comportamiento del consumidor
Consumo
Promoción

La miel es el producto apícola más reconocido y comercializado a nivel mundial. Este artículo tuvo como objetivo realizar un análisis bibliométrico y una revisión sistemática de la literatura disponible sobre trabajos científicos relacionados con la comercialización de la miel. La base de datos consultada fue Scopus. Se utilizaron los términos "bee AND honey AND marketing" y se incluyeron únicamente documentos en inglés. Las herramientas utilizadas para el análisis de los datos fueron Bibliometrix y VOSviewer. Se identificaron un total de 89 artículos publicados entre 1999 y 2024, provenientes de más de 20 países, entre ellos Etiopía, Indonesia e India. El año 2021 resultó particularmente relevante al registrar la mayor producción científica, con 15 publicaciones. Estos estudios revisados tuvieron objetivos claros, entre los que se encontraban la construcción del marketing mix para la miel, la definición de perfiles de consumidores y el análisis de las razones de compra y consumo de este producto; así como, temas relacionados con los procesos de producción, el control de calidad, el etiquetado y la sostenibilidad. No obstante, el número relativamente reducido de artículos encontrados en el escrutinio sistemático evidenció una brecha preocupante en la literatura científica sobre el consumo de miel, especialmente en lo referido a su comercialización. Esta brecha representa una oportunidad, especialmente en Perú, donde no se identificaron investigaciones previas sobre este tema. Asimismo, la limitada internacionalización de los trabajos científicos y la escasa cooperación entre autores de distintos países subrayan la necesidad de fomentar iniciativas conjuntas. En conjunto, este estudio resalta vacíos de investigación al tiempo que amplía la comprensión científica sobre la comercialización de la miel, aportando elementos que respaldan estrategias de comercialización sostenible y orientan futuras investigaciones tanto a nivel local como global.

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Honey is viewed as a product of considerable monetary worth and is managed as a natural resource within socio-ecological frameworks because it employs the participation of multitudes of people who support a green economy (Harianja et al. 2023). As a natural food, it is highly valued for its nutritional, medicinal, and culinary uses, particularly by consumers of organic products. This growing demand, fueled by globalization and market expansion, creates opportunities but also significant challenges for honey producers and marketers (Kuma et al. 2023).

Despite its recognized importance, a clear research gap persists regarding marketing strategies. Previous studies have mainly emphasized composition, bioactive compounds, and nutritional properties of honey. In relation to its composition and benefits, it is important to highlight that there are currently about 300 different kinds of honey known, and their variety is closely related to the distinctive flora of each area, giving them special qualities and health benefits (Korošec and Bertoncelj 2020). Carbs make up 95 to 97% of honey's dry weight, with fructose and glucose making up most of these carbs (Ghosh and Jung 2024). According to Adaškevičiūtė et al. (2019), honey also includes traces of proteins (0.5%), over 20 amino acids, vitamins, minerals (0.04–0.2%), organic acids (0.57%), and a variety of enzymes, including glucose oxidase, sucrase, diastase, and invertase. Additionally, it includes solid particles derived from its collection process. Among its most notable bioactive compounds are flavonoids and polyphenols, recognized for their potent antioxidant, anti-inflammatory, and antibacterial properties (Wu et al. 2025). This evidence has established honey as a functional food with diverse health benefits, but its commercial dimensions remain relatively unexplored.

From a global trade perspective, honey has also gained increasing importance. Honey exports, especially monofloral honey, have grown rapidly worldwide in recent years because of its medical qualities, which include strong anticancer effects (Mărgăoan et al. 2021). Nonetheless, the ability of many countries to compete internationally is still constrained by quality. Iran is one of the main exporters, although it is not listed as a supplier to the European Union, since 85% of its monofloral honey is adulterated, harming its reputation in the market. The taste profile of these honeys is adversely affected by feeding hives sugar syrup along with the strong flavors of plants like Eryngium and Taraxacum. This limits their worldwide adoption and commercialization (Khansaritoreh et al. 2021). Consequently, quality assurance and compliance with international standards have become central challenges for producers seeking access to global markets.

In response, recent innovations have emerged in post-harvest handling, processing, and product development. Improving the post-harvest management and processing of honey is essential to maintain its quality and promote innovation in derivative products through emerging technologies, processing, obtaining derived products, or their combination with traditional methods (Piedrahíta-Márquez et al. 2025). In Ethiopia, a study that implemented hive improvements to enhance honey production and marketing showed remarkable results: the use of movable-frame hives tripled annual production, and consumers began to prefer honey based on colony color and the agroecological zone of origin (Yue et al. 2024). Such evidence highlights the need to integrate production, innovation, and consumer perspectives into marketing strategies.

This approach not only enhances production but also generates opportunities for diversifying beekeeping products. For example, honey holds significant potential as a healthy sugar alternative. Furthermore, propolis's antibacterial and antioxidant qualities can be enhanced by methods such as microencapsulation, and pollen proves to be a multipurpose food (Piedrahíta-Márquez et al. 2025). However, beeswax has been shown to greatly improve the quality and preservation of sustainable foods, extending their shelf life in an environmentally responsible manner when used as a coating and in the production of oleogels (Korošec and Bertoncelj 2020; Maicelo-Quintana et al. 2024). These product innovations reflect the growing interest in developing functional and sustainable apicultural products.

Moreover, understanding consumer behavior is essential to align production and marketing strategies with demand trends. To ensure greater profitability and long-term competitiveness, promoting local consumption and diversifying export destinations is essential. This can

be achieved through agricultural producer organizations that efficiently connect with consumer markets, facilitating expansion and increasing the global competitiveness of apiculture products (Dharni and Rathore 2023). Furthermore, the success of these strategies depends on producers' individual characteristics, such as agricultural motivation, entrepreneurial skills, and entrepreneurial mindset, which influence innovation and profitability (Imelda et al. 2022).

Regarding consumption, a 2022 study in Slovakia showed that the silver generation (over 60 years old) typically consumes honey for its nutritional benefits and prefers dark-colored monofloral honey. In contrast, Generation X primarily uses honey in cosmetics, while Generation Z has low consumption and limited knowledge of honey and its derivatives, showing a preference for multifloral honey (Šedík et al. 2023). Other factors influencing honey consumption included trust in retail locations and producers, as well as consumers' educational level, and human health (Bannor et al. 2024; Fluck et al. 2024). This complexity underscores the need to address honey marketing through a comprehensive research approach.

Previous bibliometric studies have analyzed scientific production related to apiculture and bee products, focusing mainly on honey composition, bee health, and pollination (da Silva et al. 2025). Other analyses have explored marketing and consumer trends in agri-food sectors, such as coffee, olive oil, and organic products (Koner et al. 2024). However, no bibliometric research has specifically addressed honey marketing, representing a critical gap in understanding how this product is positioned within global agri-food markets.

To address this gap, the present study integrates bibliometric mapping and systematic analysis to identify research trends, collaboration networks, and emerging themes related to honey marketing. Unlike previous bibliometric or narrative reviews, it employs a combination of Biblioshiny of Bibliometrix, VOSviewer, and Orange Data Mining to provide a comprehensive visualization of global scientific dynamics. This approach enables a more nuanced understanding of how sustainability, quality, and consumer behavior intersect in honey commercialization, offering insights into sustainable marketing strategies not previously addressed in the literature (Pérez and Lutsak 2017).

Therefore, this study conducted a bibliometric analysis and systematic review of scientific literature on honey marketing available in the Scopus database to identify global trends, innovative strategies, and knowledge gaps to guide future research and support sustainable commercialization.

MATERIALS AND METHODS

The search was conducted between May and July 2024 in the Scopus database, using the terms "Bee AND honey AND marketing". A total of 98 relevant documents were retrieved (Figure 1). Scopus was chosen for its experience and reputation, as it follows strict indexing policies that safeguard the quality of its data. Furthermore, its detailed bibliometric metrics were indispensable for this study, allowing for a more comprehensive analysis (Remolina-Medina 2023). Hence, Scopus was considered the most appropriate database for conducting bibliometric analysis because of its reputation in such studies (Saravia et al. 2022).

The study included publications from 1999 to 2024 but excluded documents deemed less than scholarly, such as conference papers, letters, or descriptive snapshots. Consequently, 89 original research articles, section documents, book chapters, and books written in English were selected.

The articles were downloaded along with all their citation data and stored as CSV files. For a preliminary analysis, various aspects of the dataset were explored, including distribution by discipline, authorship, journal sources, affiliated institutions, countries of origin, and annual publication rates. The analysis included several metrics such as frequency, trends, rankings, proportions, network analysis, citations, co-authorship, and co-occurrence of keywords.

For a more advanced analysis, the Biblioshiny application from the Bibliometrix package in R and VOSviewer 1.6.19 were used. These tools facilitated the mapping of keyword co-occurrence, allowing the identification of major research directions and the detection of evolving critical points. Additionally, Orange Data Mining 2024 v. 3.37.0 was employed to create graphical representations of the most frequently used terms, effectively visualizing the findings.

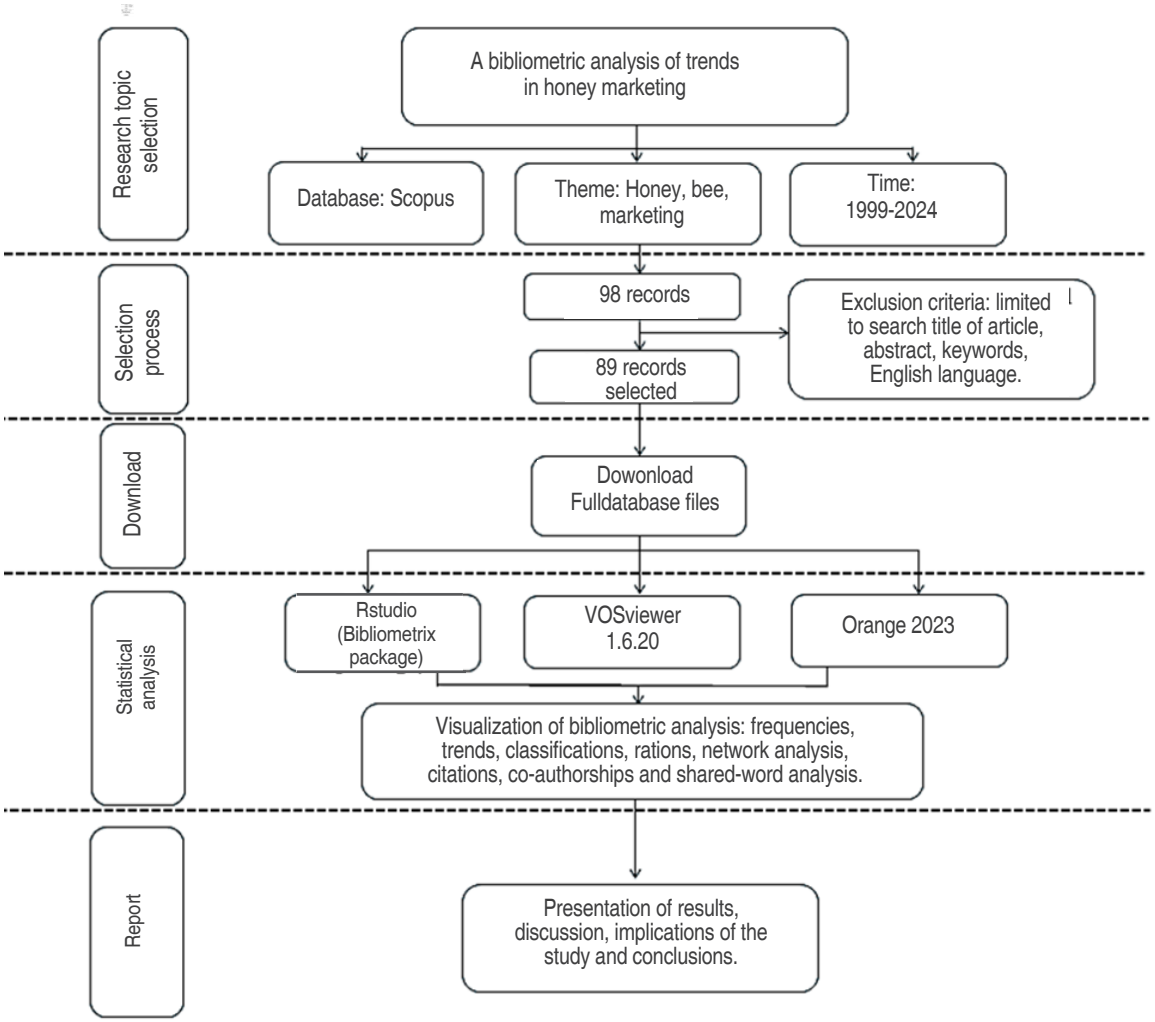

Figure 1. Flowchart of the bibliometric analysis.

RESULTS AND DISCUSSION

Notable Information Sources

Among the 89 manuscripts reviewed on honey marketing, 64 research articles and 10 section documents were identified as the most predominant types of publications in this thematic area (Table 1). Additionally, 8 journals, 6 book chapters, and 1 book were recorded, reflecting a significant diversity in the formats of scientific dissemination related to the study of honey marketing. This variety of publication types contributes to the accessibility of knowledge for both academic and non-academic stakeholders, including policymakers and producers. Moreover, it indicates that the research field is expanding, encompassing a wide range of approaches that integrate both theoretical foundations and practical insights.

The main documents supporting this study were primarily obtained from the following sources: Earth and Environmental Science, (six articles), Livestock Research for Rural Development (four articles), followed by Bee World and Pot-Honey: A Legacy of Stingless Bees, with three articles each. The remaining journals contributed two documents each (Table 1). The inclusion of specialized journals such as Bee World and Pot-honey: A Legacy Of Stingless Bees underscores the technical relevance of apicultural knowledge, whereas broader journals like IOP Conference series: Earth and Environmental Science and Livestock Research for Rural Development reflect the sector's intersection with sustainability and agroecology.

Table 1. Descriptive characteristics of manuscripts indexed in the Scopus database.

Characteristics of manuscripts indexed	Number of documents
Documents by type	
Article	64
Section documents	10
Journals	8
Book chapters	6
Book	1
Top 10 sources	
IOP Conference series: earth and environmental science	6
Livestock research for rural development	4
Bee world	3
Pot-honey: a legacy of stingless bees	3
American bee journal	2
Cogent food and agriculture	2
Encyclopedia of insects	2
Foods	2
Journal of apicultural research	2
Journal of food science	2
Top 10 most productive Authors	
Dharni K	3
Sher H	2
De Graaf DC.	2
Kakati LN.	2
Mozhui L.	2
Hailu TG.	2
Ismail MM.	2
Njurumana GN.	2
Wakjira K.	2

It can be observed that research on honey marketing exhibits an interdisciplinary scope, which includes studies from agricultural, environmental, and food sciences. Although honey marketing research remains a narrow research area, it is increasingly evolving towards a more integrated approach that combines multiple disciplines. This trend aligns with the global movement toward transdisciplinary solutions to food system challenges — blending agricultural sciences with marketing and sustainability frameworks (Bannor et al. 2024; Maicelo-Quintana et al. 2024; Oktavia et al. 2025).

Regarding author productivity, the top 10 contributors were: Dharni K, who published three articles, while the remaining authors published two articles each (Table 1). This relatively balanced distribution of authorship indicates a collaborative yet still emerging research community. The diversity of authors and published works reflect a wide range of research interests and perspective on honey marketing. Nevertheless, the absence of established research networks or leading institutions consistently working in this field may limit long-term research continuity and funding opportunities.

The author with the highest number of publications (Dharni K) clarifies that apiculture aids in both improving rural income and enhancing ecological health (Dharni and Rathore 2023). Strategies to improve local marketing

and develop agricultural producer cooperatives were also critical in addressing issues and capturing opportunities in Beekeeping (Dharni and Goel 2013). These findings support the notion that honey marketing is not only an economic strategy but also a tool for environmental stewardship, a view echoed by other scholars such as Gallai et al. (2009), who highlight the ecosystem services linked to pollination activities.

A general analysis of the global honey market found that it has maintained a consistent flow, but it faces severe challenges due to competition from other sweeteners and instances of product adulteration, which undermines consumer trust (OECD/FAO 2022; Prathibani et al. 2025). The increasing presence of high-fructose corn syrup and synthetic sweeteners in international markets intensifies this competition, reducing the market share of natural honey products (FAOSTAT 2025). This issue is particularly relevant, as several studies suggest that adulteration drastically alters consumers' perception and their willingness to pay for premium honey, especially organic or pure (Guerin et al. 2025; Ramírez-Mijangos et al. 2025).

Consumer studies conducted in European markets have demonstrated that traceability and certification labels can recover consumer confidence after adulteration scandals (Klein et al. 2007). Countries with strict traceability and certification systems, like New Zealand with its Manuka honey, have been able to deal with these issues and maintained a competitive edge (Thrasyvoulou et al. 2018). This emphasizes the value of integrating food authenticity protocols as a critical component of honey marketing strategies.

In countries like Peru, where integration into the global market remains limited, a combination of domestic and export opportunities has resulted in a surge of honey production over the last two decades (MINAGRI 2021; Ramírez-Mijangos et al. 2025). However, production in Peru remains limited due to low technological adoption and price competition from leading producers such as Argentina and China (MINAGRI 2021; FAOSTAT 2025). This reflects a structural weakness in the Peruvian honey value chain, where production continues to be small-scale, often informal, and reliant on traditional methods (Moreno-Quispe et al. 2022). As other agricultural markets have demonstrated, the adoption of digital marketing and e-commerce strategies can significantly reduce dependence on intermediaries and strengthen direct engagement with consumers (Oktavia et al. 2025).

In recent years, consumer preferences for natural products with designation of origin, especially in high-income markets such as the United States and the European Union, have created opportunities for Peruvian honey (Olshanskyi 2025). According to OECD/FAO (2022), marketing strategies emphasizing the purity and organic origin of Peruvian honey have boosted its competitiveness, particularly through certifications guarantee product traceability and authenticity. The successful implementation of these strategies may represent a pathway for inclusive rural development, particularly when combined with support programs for smallholders and collective brands (Imelda et al. 2022). Thus, understanding consumer perception is not merely a marketing exercise but a crucial factor in building competitive and sustainable value chains.

Evolution of Publications

The analysis of scientific production on honey marketing reveals a noteworthy and sustained increase over the past two decades, with a significant rise in publications since 2020 (Figure 2). The annual production of documents provided an acceptable evaluation of trends within a specific research field.

Publications were categorized by year, revealing that the first manuscript was published in 1999 (Boot et al. 1999). This study examined the effects of the *Varroa destructor* mite on honey production in Europe, with an emphasis on Hungary. It analyzed the impact of treatments used to control this pest on the quality of the final product. Although the control agents effectively contained mite's spread, the researchers found that these substances left residual traces in the honey. Consequently, both food safety and the product's commercial viability in European markets were compromised (Medina and Martin 1999). These findings highlighted the need to develop safer management strategies that would not affect the organoleptic properties or safety standards of honey, which remains an ongoing concern, as noted by Thrasyvoulou et al. (2018), Oliveira et al. (2023), and Ramírez-Mijangos et al. (2025). These early studies reflect how apicultural health and environmental safety issues initially dominated the academic focus.

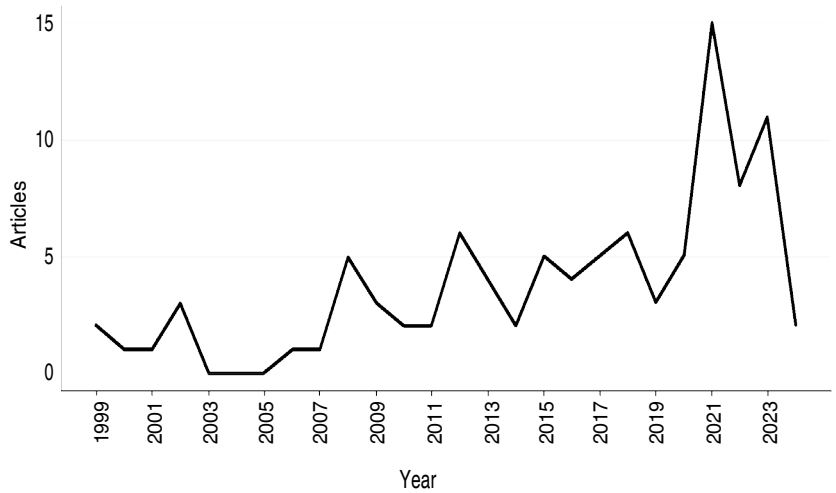

Figure 2. Number of scientific documents per year on honey marketing (Source: Own elaboration based on data extracted from Biblioshiny (Bibliometrix package, R)).

Beginning in 2012, research topics gradually diversified, shifting from biological threats and food safety concerns to encompass consumer perceptions and health-related properties. The number of publications per year remained limited until 2019, never exceeding seven. However, from 2021 onward, there was a marked and exponential increase in publication output, peaking at 15 manuscripts that year. This surge indicates a growing interest in the multidisciplinary potential of honey research. Furthermore, according to the annual publication graph, researchers began focusing on honey's antibacterial and antioxidant properties in 2019. This shift likely aligns with the rise in consumer demand for natural functional foods and growing interest in sustainable and health-promoting alternatives. Honey's position as a high-value commodity in the global market (Prathibani et al. 2025; Dharni and Rathore 2023) stems from increased interest in its functional benefits, particularly its antibacterial and antioxidant effects (Al-Kafaween et al. 2023; Mărgăoan et al. 2021).

In addition to being an energy-rich substance, honey contains a variety of bioactive compounds that are believed to positively influence rigorous activity and resistance to fatigue (Al-Kafaween et al. 2023; Ilia et al. 2021). Other studies suggest that honey is composed of natural sugars that provide rapid energy availability, and antioxidants to reduce oxidative stress that help enhance athletic performance (Ali et al. 2021; Khalil et al. 2010). Besides, honey is reported to have positive effects on exercise performance and even improve the quality of life among elderly patients suffering from certain conditions (Bogdanov et al. 2007). Its effects are attributed to its anti-inflammatory and restorative properties, which contribute to muscle endurance and strength maintenance. Taken together, these health findings have elevated the commercial perception of honey from a sweetener to a nutraceutical product.

Notably, the COVID-19 pandemic further catalyzed this trend. Metabolites in honey, like 3-phenyllactic acid, have been studied for their potential therapeutic use in COVID-19-related mucormycosis, highlighting honey's consideration as an alternative treatment (Lunavath et al. 2023). This growing body of evidence has contributed to positioning honey as a potential therapeutic and preventive agent, especially within natural medicine markets. During the pandemic, the benefits of honey became more prominent in the market, increasing both demand and marketing, especially among beekeepers operating in short food supply chains (Ramírez-Mijangos et al. 2025; Oktavia et al. 2025). This increase was most evident among large-scale beekeepers, those who added value to honey, and those who increased their production to include additional apiculture products (Guerin et al. 2025).

However, the development of this sector faced a major limitation: a lack of digital marketing skills. This challenge particularly affected older beekeepers, who consequently

experienced fewer benefits (Paraušić et al. 2024). According to the same authors, this generational digital divide created an asymmetry in benefits within the apicultural community, reinforcing the need for training and capacity-building strategies. It is also important to note that the apparent decline in scientific production observed between 2023 and 2024 does not reflect a true reduction in research activity but rather results from the timing of the database search, which included only publications indexed in Scopus up to the first half of 2024. Consequently, many papers published later in 2024 may not have yet been indexed at the time of data collection.

Leading countries in publications

Figure 3 presents the scientific output of the top 10 countries regarding honey commercialization research. Countries shaded in dark blue concentrated the highest number of publications, while light blue tones correspond to countries with fewer publications, and grey indicates the absence of records in the Scopus database. This geographical distribution reveals not only regional disparities but also potential areas for knowledge expansion.

The countries with the highest scientific output on honey commercialization coincided with the world's main honey producers. In Asia, for instance, production reached ($8.7x10^5$ ton), equivalent to 53% of global honey production (FAOSTAT 2025). The region also concentrated 54% of the scientific output, led by Indonesia with 59 articles (followed by other Asian countries such as India, Turkey, Malaysia, and Saudi Arabia). This strong presence underscores a relationship between production scale and academic interest in commercialization. Ethiopia ranked second with 33 articles, followed by Brazil with 26 articles, representing South America. However, no scientific research related to this topic was recorded in Peru, highlighting an opportunity to initiate studies in this field.

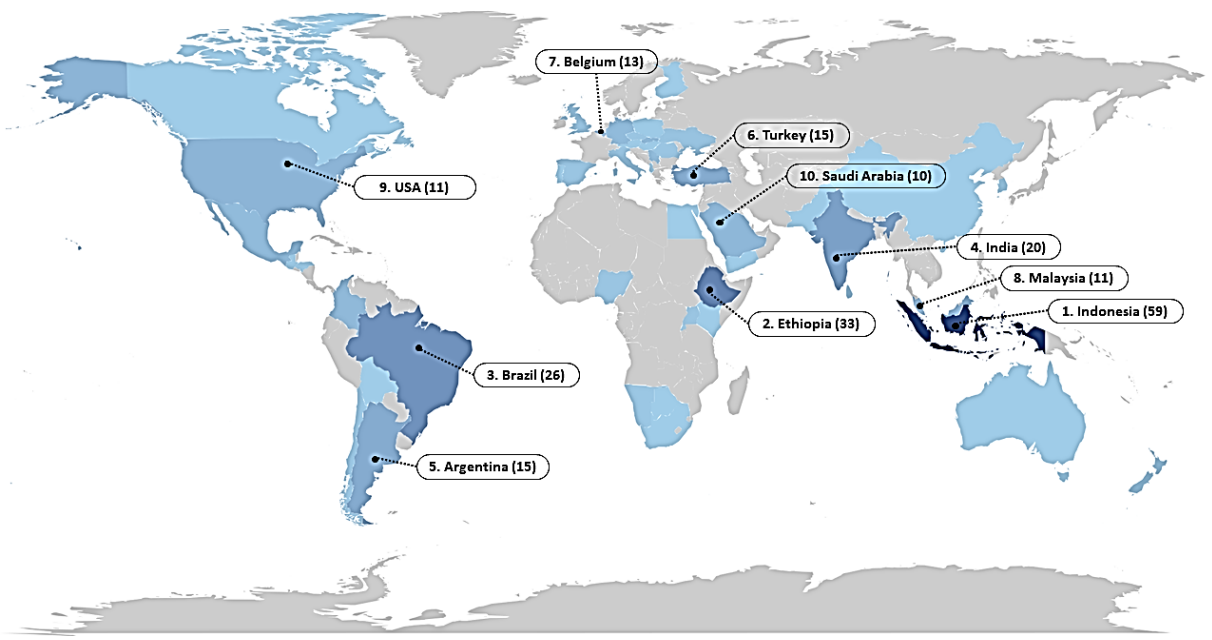

Figure 3. The 10 countries with the highest scientific output in honey marketing according to the number of documents (Source: Map generated using Biblioshiny (Bibliometrix package, R); country labels and graphic annotations were edited by the authors).

In this bibliometric analysis, countries such as Indonesia, Ethiopia, and Brazil demonstrated high research output and diversification of research topics. These included studies on the antioxidant and antimicrobial properties of honey, medical applications, bee-derived products, product standardization and commercialization, and the botanical and geographical origin of honey (Almuhayawi 2020; Adaškevičiūtė et al. 2019; Dharni and Goel 2013; Harianja et al. 2023). This thematic variety reflects the complex and interdisciplinary nature

of honey commercialization, which integrates scientific, economic, and sociocultural dimensions.

Moreover, beekeeping plays a crucial role in improving livelihoods in several countries. For instance, a study conducted in southwestern Ethiopia identified major limitations, such as bee diseases, lack of equipment, and limited access to credit (Mengistu 2023; Tulu et al. 2020). These findings highlight the need for stronger health controls, resource availability, and training to support the beekeeping sector.

It is noteworthy that China, the world's largest honey producer with 28% of global production (FAOSTAT 2025), is not among the top 10 contributors to honey commercialization research. This apparent paradox may be explained by the prioritization of production volume over scientific investment in marketing strategies. This suggests that in some countries, honey production is more oriented toward commercial exploitation than toward the generation of scientific knowledge on market strategies. Consequently, encouraging research in these high-production countries could bridge the gap between production capacity and market innovation.

Network of collaborations between countries

Figure 4 presents the collaboration networks among countries, revealing three distinct clusters that represent scientific cooperation groups in honey commercialization. The largest cluster, shown in red, involves most countries, with Indonesia, India, Brazil, and Saudi Arabia as the main nodes of interaction. The green cluster includes Ethiopia and Germany, while the light blue cluster consists solely of Turkey. The size of the nodes corresponds to the volume of scientific output from each country; in this sense, Indonesia and Ethiopia stand out as the nations with the highest publications, playing central roles within their respective clusters.

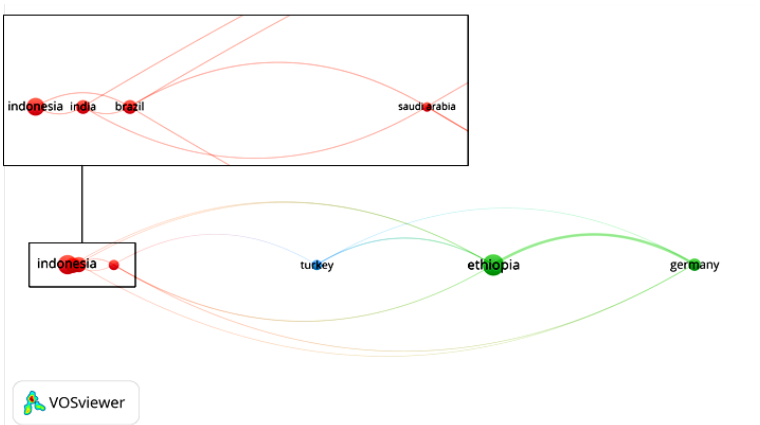

Figure 4. Network of bibliographic coupling and country relationships in scientific research on honey marketing strategies.

This visualization not only highlights scientific productivity but also reveals gaps in international cooperation. It suggests a structural disconnection in which resources and information do not flow effectively between countries and their cited components, such as collaborations for writing or through academic institutions (Mas-Tur et al. 2021). For example, the clustering pattern suggests that while intra-cluster collaboration is relatively strong, inter-cluster communication remains weak, potentially hindering the exchange of innovation and policy strategies.

Such fragmentation within collaborative networks, excluding other countries conducting honey research—such as the United States, Argentina, and Belgium—reveals a limited level of scientific coordination and knowledge exchange. This lack of integration may not only delay the standardization of research protocols but also restrict countries from participating in shared initiatives on traceability, sustainability, and technological innovation. Therefore, fostering broader and more dynamic international collaborations is crucial to enhance information sharing and diversification (Oliveira et al. 2023).

Research progress and the development of important support functions such as Standardization, Certification,

and Product Marketing within the beekeeping sector are stifled due to insufficient collaboration (Kopytko et al. 2023; Mas-Tur et al. 2021; Remolina-Medina 2023). In constrast, effective research-marketing collaboration networks have enabled countries with traceability and certification system, such as New Zealand, to mantain their global competitiveness (Thrasyvoulou et al. 2018; Oliveira et al. 2023). This highlights the potential benefits of replicating such models in emerging honey-producing nations with less-developed institutional frameworks.

The expansion of networks that provide access to researchers from other countries is vital for the advancement of honey research at an international level. The effective circulation of resources and knowledge relies on international cooperation collaborative research frameworks (Mas-Tur et al. 2021; Oliveira et al. 2023). Promotinginternational collaboration also facilitates the adoption of emerging technologies, such as Artificial Intelligence, and other global concerns like Climate Change that impact honey production (Dharni and Rathore 2023; Elshekh et al. 2025; Kopytko et al. 2023; Oktavia et al. 2025). For instance, AI applications are being explored to predict hive productivity and optimize harvest schedules, while climate models can help forecast regional risks for pollinator health (Astuti et al. 2024). Such changes might create new opportunities for honey research and commercialization. Therefore, strategic efforts to foster cross-border alliances are essential for tackling future challenges and capitalizing on innovation.

Keyword analysis

Figure 5 depicts word clouds with the most prevalent terms identified in: A) titles, B) keywords, and C) abstracts. A comparative analysis of these elements reveals thematic consistency and research focus across apicultural literature. Significant commonalities is observed among the three subfigures, with terms such as “honey”, “marketing”, “production”, “bee”, and “beekeeping” appearing frequently. “Bee”, “honey”, “marketing”, and “production” are among the most frequently occurring terms in scientific publications on apiculture. Their prevalence reflects a research focus that spans both the biological aspects of bees and honey production, as well as the economic and commercial dimensions of beekeeping. This suggests a growing interest in understanding not only how honey is produced, but also how it is positioned in the market with emphasis on traceability, branding, and strategies to enhance its value along the supply chain.

Figure 5. Word Clouds of: **A**. Titles; B. Keywords; and **C**. Abstracts, in scientific research on honey marketing strategies (Source: Orange Data Mining).

Research on honey began in the late 1990s, driven by its health benefits and applications in medicine (Kopytko et al. 2023). This initial interest is reflected in the prevalence of terms related to raw material, emphasizing its functional properties and potential applications in the health and wellness markets, as

noted by Al-Kafaween et al. (2023) and Prathibani et al. (2025). In recent years; however, the scope of research has broadened to include production efficiency, marketing dynamics, and sustainability within the beekeeping sector, as evidenced by the frequent occurrence of terms such as “bee,” “honey,” “production,” and “marketing” in the scientific literature. This evolution reflects a growing recognition of honey not only as a functional food, but also as a socio-economic product embedded in global value chains.

From a bibliometric perspective, this research provides insight into how the scientific approach to beekeeping and marketing strategies has evolved over recent decades, highlighting emerging topics and areas of greatest dynamism. These findings are useful for guiding future research toward more integrated approaches that consider not only the functional properties of honey but also the productive, commercial, and environmental challenges faced by the sector. The practical value of this study lies in its potential to serve as a resource for researchers, institutions, and policymakers aiming to strengthen the honey value chain through science, traceability, differentiated certifications, and sustainability. Moreover, the analysis of frequently occurring terms helps identify innovation opportunities, such as the development of predictive production models or territorial marketing strategies.

Future research should focus on deepening the understanding of consumer behavior, the adoption of digital marketing among small-scale beekeepers, and the economic implications of sustainability certifications, as well as on establishing comparative bibliometric studies between regions and over time. Additionally, based on these results, it is recommended to promote multidisciplinary research that integrates health, environment, economics, and technology to enhance beekeeping as a resilient and high-value-added production system.

CONCLUSION

This study identified key trends and innovative strategies in honey marketing through a bibliometric analysis of Scopus-indexed literature, directly addressing the study’s objective of mapping global research output and highlighting knowledge gaps. The analysis revealed a growing emphasis on integrated approaches that consider quality attributes, geographic origin, and sustainability as market differentiators.

The findings showed a limited but growing body of research, with a notable increase in publications between 2019 and 2021, possibly associated with the heightened interest in honey’s health benefits during the COVID-19 pandemic. The predominance of qualitative methodologies, particularly surveys and interviews, indicates a strong focus on understanding consumer behavior and market perceptions.

Countries such as Ethiopia, Indonesia, and India led research output demonstrating not only academic productivity but also practical efforts to improve honey quality, increase production, and promote sustainable rural development. However, the analysis also revealed a low level of international collaboration, revealing a gap in global research networks related to honey marketing.

Future research should aim to deepen understanding of consumer price perception, trust in product quality, and preferences for certified or artisanal honey. The adoption of mixed-methods approaches and advanced bibliometric techniques is recommended to strengthen the rigor of evidence. Moreover, experimental and longitudinal designs could provide new insights into consumer decision-making and long-term market dynamics. Studies are also encouraged to explore differentiated marketing strategies for niche markets and to develop predictive models of honey demand and production. Strengthening multidisciplinary approaches and fostering international cooperation will be essential for positioning beekeeping as a competitive, sustainable, and value-added sector.

In summary, this study contributes to the advancement of scientific knowledge on honey marketing by providing a systematic bibliometric overview that clarifies global research trends and gaps. The findings inform practical strategies for sustainable commercialization and also reinforce the potential of honey marketing to support the long-term development of the apicultural sector within a global sustainability framework.

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CONFLICT OF INTERESTS

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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