Historical Development and Present Status of Beekeeping in Botswana: A Review

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Abstract

Beekeeping plays an important role in rural development, particularly in developing countries. It contributes to the achievement of the Sustainable Development Goals, particularly in no poverty, zero hunger, and ensuring environmental sustainability. This review presents the history of beekeeping in Botswana, its status, and discusses the subsector's challenges, opportunities and prospects. A literature survey of beekeeping in Botswana, Africa and other parts of the world was conducted. In many parts of the world, beekeeping is a source of food, income, medicine, employment and raw materials such as beeswax, cosmetics, and textile lubricants. Although beekeeping has been practised in Botswana for nearly half a century, it is still in its infancy. The annual demand for honey is estimated to be 40 tonnes, while production is 5 tonnes, representing about 13% of the national demand. This indicates that honey production is far lower than imports. The five major honey exporters to Botswana are South Africa, Zambia, India, China, and Tanzania. Some challenges that beekeepers in Botswana face include inadequate extension services, pests and diseases, harsh climatic conditions, drought and wildfires, lack of financial resources, and a lack of legal framework to guide the subsector's development. There are opportunities for further processing of beehive products and organic production. Prospects to increase production include expanding existing or developing new projects, value chain development, and intensifying extension outreach by involving the private sector and government extension services. It is concluded that increased technical support to beekeepers and improved market access could enhance the income of the rural populace and food and nutrition security.

Keywords: Apiculture, Botswana, honey, challenges, opportunities, poverty alleviation

Développement Historique Et Etat Actuel De L'apiculture Au Botswana : Une Revue

Résumé

L'apiculture joue un rôle important dans le développement rural, en particulier dans les pays en développement. Elle contribue à la réalisation des Objectifs de Développement Durable (ODD), notamment l'élimination de la pauvreté, la faim "zéro" et la durabilité environnementale. Cette revue présente l'histoire de l'apiculture au Botswana, son état actuel, ainsi que les défis, opportunités et perspectives de ce sous-secteur. Une analyse documentaire sur l'apiculture au Botswana, en Afrique et dans d'autres régions du monde a été réalisée. Dans de nombreuses régions du monde, l'apiculture est une source de nourriture, de revenus, de médicaments, d'emplois et de matières premières telles que la cire d'abeille, les cosmétiques et les lubrifiants textiles. Bien que l'apiculture soit pratiquée au Botswana depuis près d'un demi-siècle, elle en est encore à ses débuts. La demande annuelle de miel est estimée à 40 tonnes, tandis que la production locale n'atteint que 5 tonnes, soit environ 13 % de la demande nationale. Cela indique que la production locale est bien inférieure aux importations. Les cinq principaux exportateurs de miel vers le Botswana sont l'Afrique du Sud, la Zambie, l'Inde, la Chine et la Tanzanie. Parmi les défis auxquels sont confrontés les apiculteurs botswanais figurent : des services de vulgarisation insuffisants, les ravageurs et maladies, les conditions climatiques difficiles, les sécheresses et feux de brousse, le manque de ressources financières et l'absence de cadre juridique pour guider le développement du sous-secteur. Cependant, des opportunités existent pour la transformation des produits de la ruche et la production biologique. Les perspectives d'augmentation de la production incluent l'expansion des projets existants ou le développement de nouveaux projets, l'amélioration de la *chaîne de valeur et l'intensification des services de vulgarisation grâce à une collaboration entre le secteur privé et le gouvernement. Il est conclu qu'un soutien technique accru aux apiculteurs et un meilleur accès aux marchés pourraient améliorer les revenus des populations rurales ainsi que la sécurité alimentaire et nutritionnelle.*

Mots-clés : Apiculture, Botswana, miel, défis, opportunités, réduction de la pauvreté

Introduction

Worldwide, beekeeping has been practised for a long time. For instance, drawings related to beekeeping were found in cave paintings of 15000 BC (Ereğlu and Yüksel, 2020). Honey is mentioned 61 times in the bible, indicating that its consumption occurred before and during the time of Jesus Christ. According to Eardley (2004), honey is produced by stingless bees belonging to the tribe Meliponini and honeybees (*Apis mellifera* Linnaeus). FAO (2025) reported that global honey production reached 1894 thousand tonnes in 2023, with Africa having the highest growth rate. This indicates that beekeeping is one of the important agricultural activities globally. Wilson (2006) estimated honey production in Africa to be less than 10% of the world's production, and beeswax less than a quarter of world production. Global demand for honey and other hive products exceeds the marketed production. Agera (2011) observed that beekeeping can be practised as an additional source of income for farmers in rural areas and has been successfully implemented in poverty-alleviating projects.

Beekeeping contributes to rural development by supporting agricultural production, providing honey, wax, and other products and as a source of income for farmers and landless people (Ahmad *et al.*, 2007). Furthermore, beekeeping can diversify income sources, reduce dependence on single crops and enhance household resilience to economic shocks (Prodanović *et al.*, 2024). Beekeeping has the potential to contribute more significantly to poverty alleviation and achievement of the Sustainable Development Goals, especially in the eradication of extreme poverty and hunger, ensuring environmental sustainability (FAO, 2023a).

Although beekeeping is increasingly considered a promising agricultural activity with the potential to improve rural communities' livelihoods across Africa, its full benefits have not been achieved due to several challenges (FAO, 2023a). As a result, beekeeping is still in its infancy in most African countries, including Botswana; hence, there is limited documented information on this agricultural activity. This review endeavoured to present the history of beekeeping in Botswana and discuss its current status, challenges, opportunities, and prospects.

Socio-economic importance of beekeeping

Beekeeping is an important undertaking adopted by African governments to improve livelihoods and diversify agricultural output. It offers enormous potential for income generation, poverty alleviation, sustainable use of forest and agricultural resources, and export base (FAO 1990). Beekeeping is a source of income, food (honey, pollen, royal jelly, and brood), and medicines (honey, propolis, and bee venom) for rural populations (FAO, 2005; Mwandifura *et al.*, 2021). Bafo *et al.* (2019) in Botswana reported that honey from stingless bees was consumed as a fluid and a substitute for sugar in tea. According to Vural and Karamal (2010) and Agboola *et al.* (2021), beekeeping is the main source of income for beekeepers. Beekeeping improves livelihoods as a source of income for small farming communities in rural areas (FAO, IZSLT, Apimondia and CAAS, 2021). For a long time, humans have used honey to treat ailments of the heart, liver, stomach, and asthma. In addition, honey has been used to treat skin wounds and burns (Eroğlu and Yüksel, 2020; Nwaiwu *et al.*, 2024), ulcers, and control sore throats and colds (Nwaiwu *et al.*, 2024). Also, Bafo *et al*. (2019) reported that honey was used to treat cough, flu, and stomach aches. Honey has anti-inflammatory, immune-boosting properties and exhibits broad-spectrum antibacterial activity (Abeshu and Geleta, 2016; Nwaiwu *et al.*, 2024). However, the authors mentioned that using honey as medicine has been limited because of the inadequacy of scientific reports.

Beekeeping is a source of raw materials for industries (FAO, 2005; Agera, 2011). Honey is used as a sweetener or antioxidant in the food industry, while wax is utilised in batik making (Agera, 2011). Mwandifura *et al.* (2021) in Zimbabwe reported that other benefits of keeping bees are the creation of scenery for tourism and income-generating projects that produce honey processing machines, the opening of shops that sell honey packaging materials, and the cultivation of flowers and citrus trees that attract bees. Honey has protective and therapeutic properties. The study by Vrabcová and Hájek (2020) showed that 90% of honeybees' benefit to humans lies in their pollination capacity, with 10% lying in bee products (honey, propolis, wax, etc.). FAO (2023a) states that bees deliver about 85% of crop pollination, contributing approximately 34% of the global food supply due to their unique natural characteristics, such as greater foraging, full-time foraging ability, and consistency in foraging. According to FAO, IZSLT, Apimondia, and CAAS (2021), the bees' pollination activities support biodiversity, making it the most important agro-environmental service. It is estimated that the value of bee pollination is 30-50 times greater than that of wax and honey (FAO, IZSLT, Apimondia, and CAAS, 2021).

History of beekeeping in Botswana

In Botswana, beekeeping was pioneered by the Kweneng Rural Development Association (one of the country's brigades) in 1977 through the assistance of International Voluntary Services Inc. (Washington), which provided Ephraim Kilon, a Tanzanian agriculturist, to initiate a beekeeping project and train those who showed interest (Moody, nd). According to Moody (nd), the project started with 15 modified Langstroth hives and five Top Bar hives built in the Brigade workshop using pine wood and weather-proof chipboard, with two additional Standard Langstroth hives imported.

In its endeavour to develop the apicultural subsector, the Government of Botswana came up with some initiatives which included the Agricultural Extension Small Projects programme (AE10), Financial Assistance Policy (FAP), Poverty Eradication programme (PEP), Women Economic Empowerment programme, Citizen Entrepreneurial Development Agency (CEDA), and Thuo Letlotlo programme. These programmes, except CEDA, provided grants to individual farmers and groups to start beekeeping projects. It is, however, worth noting that the Government's support to farmers through FAP and AE10 was instrumental in developing beekeeping enterprises countrywide. Beekeeping enterprises mushroomed throughout the country when FAP was operational but decreased when it was replaced by CEDA which has more stringent regulations. Through FAP, grants were given to individuals to start beekeeping businesses while AE10 aided groups to start beekeeping projects.

In 2011, the Government of Botswana established a PEP with the main aim was to assist individuals or groups to graduate from extreme poverty or abject poverty through sustainable income generation and employment initiatives, capacity building and skills development, and providing funds to promote micro and small-scale entrepreneurship (World Bank, 2022). Some sustainable economic empowerment projects funded by the PEP included backyard gardening, small ruminants (sheep and goats) and beekeeping. This programme was envisaged to enhance food security and sustainable livelihoods for disadvantaged individuals and households. The PEP was coordinated by the Office of the President (FAO/Government of Botswana, 2014). To benefit from the PEP, an individual must be a Botswana citizen aged 18 years and above and earn a monthly income not exceeding P300.00 (USD 22); and a spouse's monthly income should not exceed P300.00 (USD 22) unless such income is seasonal, occasional, or temporary. In addition, the applicant must own six (6) cows/ or 15 small ruminants stock and be a beneficiary of the PEP.

According to FAO (2023b), persons above 35 years dominate the beekeeping subsector in Botswana, while the participation of youth (18 to 35 years) is estimated at 4.41%. As with other livestock species such as cattle and small ruminants, men dominate the apiculture subsector with 54%, while women account for 46%. There are 2079 traditional hives in the country. On average, 15 kg of honey is harvested per hive.

Production systems

In Africa, the traditional production system is of the hunter-gatherer type or farming using fixed bar hives (Wilson, 2006). In most African countries, honey hunting is commonly practised, followed by the adoption of a wide range of local-style hives to keep bees (FAO, IZSLT, Apimondia and CAAS, 2021). Traditionally, Botswana nationals (Batswana) are honey hunters. Honey hunters are commonly involved in subsistence farming. They hunt for honey in the wild to diversify their food supply and sell honey to earn extra income. Fire and smoke are used to remove bees from their nests, thereby destroying colonies and igniting wildfires. This practice deleteriously affects pollination services (Hilmi *et al.*, 2011).

As mentioned earlier, beekeeping started in the late 1970s to diversify the country's economy, which is dominated by minerals, especially diamonds. Bareki *et al.* (2019) reported two honeybee production systems in Botswana: traditional backyard beekeeping and forest honey harvesting. According to Gilbert *et al*. (2021) and Keakopa *et al*. (2022), farmers collect honey from the forest and use modern hives to raise honeybees in their backyards. In Ethiopia, Kebede and Tadesse (2014) and Bihonegn and Begna (2021) reported that the backyard beekeeping production system is more commonly practised than the transitional, movable frame hives.

The common beehives in Botswana are Tanzanian Top Bar (transitional) and Langstroth (commercial type) (FAO, 2023b). The study by Piiru *et al*. (2025) in Ghana reported that the three types of hives, namely traditional, transitional (Kenyan top bar), and modern (Langstroth) were used to keep bees, with most beekeepers shifting towards transitional hives. In the traditional backyard production system, beekeepers construct traditional hives using locally available materials and indigenous knowledge. In Ethiopia, traditional beehives are made from wood and are hung on forest trees (Mahamed *et al.*, 2022). In addition, Piiru *et al*. (2025) reported that traditional beehives were made from materials such as clay pots, drum barrels, logs, palm fronds, and roofing sheets.

In Botswana, beekeepers are categorised into three groups based on the number of colonies, which range from 1 to above 100. The three categories are small-scale, medium-scale, and large-scale. Small-scale beekeepers are those with ≤ 30 colonies, and these predominate. These are mostly hobbyists and are characterised by low productivity. Honey from small-scale production is used mainly for home consumption. Medium-scale beekeepers are those with colonies ranging from 31 to 60, which can produce between 175 and 500 kg of honey *per annum*. On the other hand, large-scale beekeepers are those with 61 hives and above. Large-scale beekeepers harvest honey at least two times a year and can produce 1000 to 1200 kg of honey *per annum* (FAO, 2023b).

Honey production in Botswana

Although beekeeping can be practised across the country, the two districts with favourable climatic conditions for beekeeping are the Southeast and Northwest (Ngamiland). In most districts, the major honey flow period is from August to February (FAO, 2023b). According to the Ministry of Agriculture (2020), Botswana's annual demand for honey is 40 tonnes, while the local honey production is only

5 tonnes. This implies that a large proportion of the honey consumed in the country is imported. Figure 1 shows the honey production trends in Botswana over 11 years. It is clear from Figure 1 that honey production decreased over time. Production declined at a rate of 7.2 tons a year. The decline in honey production could be attributable mainly to drought, wildfires and natural disasters such as the Dineo Cyclone. Botswana experienced droughts from 2014 to 2017 (Statistics Botswana, 2018), 2018/19 (SASCAL, 2020) and from 2021 to 2023 (IFRC, 2024). Drought leads to a dearth of bee forage and water, resulting in low honey production. Cyclone Dineo, which hit Botswana on 17th February 2017, caused heavy rainfall resulting in flooding across the country (Moses and Ramotonto, 2018), which could have affected pollination activities and honey production. SADC, IUCN, and UNCCD (2022) reported that 40,000 cattle died, and water scarcity led to a 70% decline in land cultivation in Botswana.

According to Maabong and Mphale (2021), wildfires are caused by lightning, which usually occurs during the rainy season; however, humans cause unnatural wildfires. In Botswana, wildfires caused by humans, intentionally or unintentionally, are most frequent in the drier months of the year, i.e., from August to October. It was reported that the Ghanzi and Ngamiland districts were mostly affected by wildfires between 2006 and 2017 (Maabong and Mphale, 2021). Heavy rains such as Cyclone Dineo, which occurred mainly in the northern part of the country, coupled with high temperatures, contributed to outbreaks of diseases and pests. Munthali and Turner (2011) and Keakopa *et al*. (2022) cited diseases and pests as one of the major challenges in beekeeping in Botswana. The common bee diseases are chalk brood, chilly brood, and African foul (Ministry of Agriculture, 2020). Keakopa *et al.* (2022) identified wax moth, ants and yellow jackets as pests of bees in Botswana.

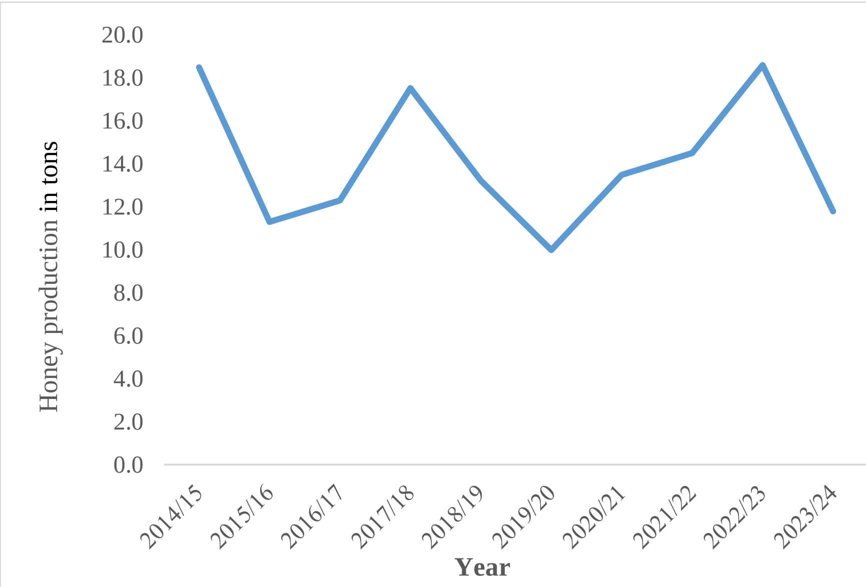

Figure 1: Honey production in Botswana (2014/15 to 2023/24)
Source: Department of Aquaculture and Apiculture Databases (2025)

Exports and imports of honey

In 2023, Botswana exported honey worth USD 650 to Namibia (USD 427), South Africa (USD 207) and Canada (USD 13) and France USD 3). During the same year, honey was the 736th most exported product (out of 964) in Botswana (OECD, 2023). This indicates that the apiculture subsector is still evolving in Botswana.

Botswana imported honey from South Africa (USD 906k), Zambia (USD 170k), India ($30k), China (USD 575), and Tanzania (USD 350) (World Integrated Solution, 2023). Between 2022 and 2023, Zambia, the United States, and Kenya were the fastest-growing exporters of honey to Botswana (OEC, 2023).

Figure 2 shows that honey imports are greater than exports. It is apparent from figure 2 that exports are negligible. This is expected as local production accounts for only 13% of the national demand. The high honey imports observed in 2017 could be due to an increased local demand that the domestic honey production could not meet, resulting in heavy dependence on imports from South Africa and Zambia. According to SASCAL (2023/24), Angola, Botswana, Namibia, and Zambia experienced drought in 2022, which negatively affected honey production. The decline in honey imports could also be ascribable to a series of tropical cyclones and tropical storms which hit Southern Africa in the first months of 2022 (World Meteorological Organisation, 2023).

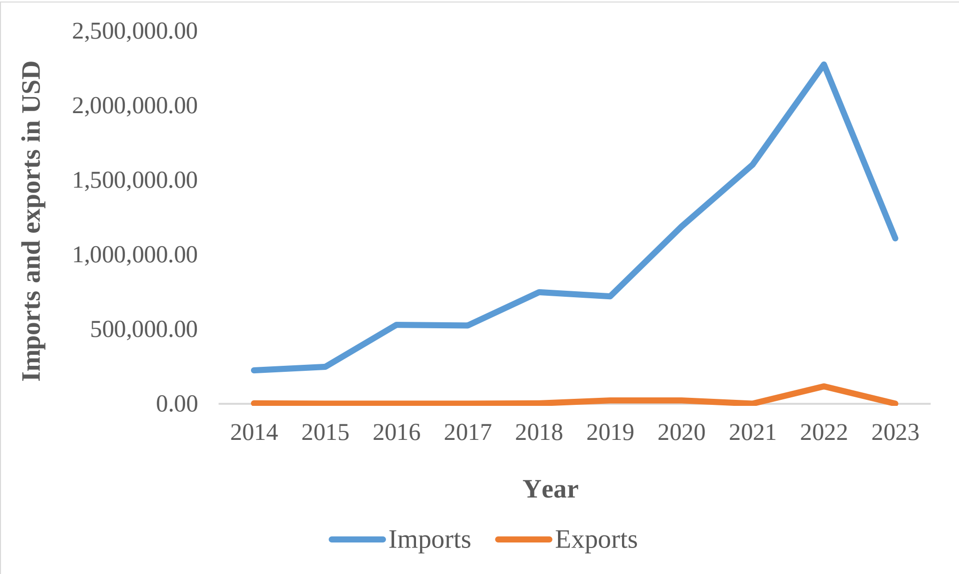

Figure 2: Value of imports and exports in USD
Source: Trend Economy (2023)

Marketing of honey in Botswana

The nutritious primary products of the beehive include honey, pollen, bee bread, brood, whole comb, and royal jelly, which can be eaten fresh or processed. Other primary products are beeswax, propolis, and bee venom, but these are not edible (Mutsaers *et al*., 2005). In Africa, most hive products are consumed within the household, with honey mainly used in beer making (Wilson, 2006). According to Mutsaers *et al*. (2005), honey can be sold as liquid, cream, honeycomb, chunk honey, or crushed honey. Wilson (2006) stated that although honey is usually sold as a honeycomb, it can be processed, packaged, and sold as pure honey. The author posited that the demand for natural honey exceeds supply, resulting in the existence of internal and external markets.

The market for honey in Botswana is vast, as most of the honey consumed locally is imported mainly from South Africa, Zambia, and India. Honey is mainly sold as honeycomb or processed honey. Beekeepers in rural areas package honey in plastic jars and sell it to their neighbours. According to FAO (2023b), the marketing of honey is mainly informal, with sales made through price negotiations but not using a structured marketing channel. Farmers receive a relatively high honey price by selling directly to individual consumers rather than selling to wholesalers and retailers. Compared to imported honey, local honey is regarded as organic as it is unblended. The three market outlets for honey in Botswana are retail (supermarkets), tourism, and the informal market (FAO, 2023b). The informal market absorbs most of the national honey production. Honey sold through the tourism market outlet fetches higher prices compared with the other two market outlets, indicating that the tourism market is more lucrative. However, tourism markets are found mainly in Maun, Kasane, and Okavango, where tourism activities occur. As the demand for honey outstrips local production, most of the honey in the supermarkets is imported.

Lack of markets, bee handling equipment, knowledge of pricing, and honey processing equipment for small-scale processors were cited as some of the major challenges in beekeeping in Botswana (Bareki *et al.*, 2019; FAO, 2023b). Similarly, Mahamed *et al*. (2022) identified major challenges in the honey marketing system in the Erer Zone of the Somali Regional State of Ethiopia as a lack of market information, a lack of known market route or channel, a lack or inappropriate functioning of marketing cooperatives, and lack of awareness on post-harvest handling of their products. The government and other actors can address marketing challenges in many ways. Government and Non-governmental organisations can support the establishment of additional honey-processing plants by providing grants to farmer associations, which can also serve as marketing centres for farmers. Furthermore, intensifying the training of farmers in beekeeping with an emphasis on business management will equip them with the necessary skills to manage their businesses more effectively. It is also important that the extension service provides farmers with marketing information. This should guide farmers as to where they can sell their products.

Challenges

The challenges of beekeeping in Botswana and other countries are summarised in Table 1. These challenges can be categorised as technical, production, marketing and processing, climate, financial, and policy-oriented. It, however, appears that technical challenges dominate, pointing to the inadequacy of extension services, leading to low productivity and poor honey processing by farmers. According to Lowore and Ciriello (2022), beekeepers' main challenges are common in many parts of the world. The authors stated that these challenges entail changes in seasonal patterns, the use of pesticides, deforestation, and shifts in local farming practices. In addition, most beekeepers lack the financial resources to purchase modern equipment such as hives, protective clothes and tools (FAO, 2023a), and chemicals (i.e., herbicides and pesticides).

Drought and wildfires result in the unavailability of bee forage, leading to low bee productivity. In addition, wildfires contribute to the destruction of beehives and the absconding of bee colonies. The absconding of bee colonies is cited as one of the challenges in beekeeping. FAO (2005) attributed the absconding of bee colonies in Botswana to pests (e.g., ants, bee pirates, hive beetles, and wax moths), drought, lack of proper bee management, insecticides/chemicals, and animal and human disturbances. Chemical applications on crops, especially at the flowering stages, will deleteriously affect bee activities. Bihonegn and Begna (2021) in Ethiopia identified chemical applications as the major reason for colony decline, followed by lack of management, predators, pests, drought, and absconding.

Long and short torrential rains and low and high temperatures affect beekeeping performance (FAO, 2005), indicating that climate change influences bees' productivity. Climate change affects the production of herbage for bees (Gikungu, 2009; Mekonnen *et al*., 2018; Terekegn, 2022; Nwaiwu *et al*., 2024), which will in turn have a deleterious effect on honey production. According to FAO (2005), a bee colony managed well in a top bar hive under the right climatic conditions in Botswana can produce between 15 kg and 20 kg of surplus comb honey for a beekeeper annually. However, unfavourable climatic conditions such as drought and Cyclones such as Dineo would lead to a decrease in honey production.

As beekeeping is undeveloped in Botswana, diseases and pests are not adequately documented. Varroa mite (varroasis) was reported by Munthali and Turner (2011) in Botswana. According to FAO (1987), varroa attacks bee colonies by weakening the honeybee colonies, causing a decline in honey production. The parasite can be controlled using Perizin ® Bayer and the organic acids (lactic and oxalic acids) (FAO, 1987). Termites cause damage to wooden beehives, thus affecting honey production (FAO, 2023a). Other pests that pose a challenge to bees are wax moths, ants, and yellow jackets (Keakopa *et al*., 2022; Piiru *et al*., 2025).

According to the Ministry of Agriculture (2020), the common bee diseases in Botswana are chalkbrood, chilly brood, and American foulbrood (AFB). Chalkbrood is a fungal disease caused by *Ascosphaera apis* that affects the brood (FAO, 2017). Chilly brood emanates from exposing the brood to suboptimal temperature conditions. AFB caused by the spore-forming bacterium *Paenibacillus larvae* was reported in South Africa in 2009. AFB is an extremely contagious and difficult disease to eradicate that can reduce honey production by up to 60% in affected colonies (FAO, 2023a). In a more recent study, Piiru *et al*. (2025) reported that 56.9% of beekeepers attempt to control pests and prevent swarming or absconding by dividing overcrowded colonies, providing food and water, and preventing predator disturbances by clearing apiary bushes.

Efforts of Research and academic institutes in beekeeping and honey production in Botswana are limited by the inadequacy of funding, perhaps explaining the unsatisfactory performance of the subsector.

Table 1 - Some identified challenges in beekeeping in Botswana and other countries

Category	**Challenges**	**Sources**
Technical	Pests and diseases, e.g., *Varroa destructor* mite, wax moths, etc.	Wilson (2006); Munthali and Turner (2011); Gebretsadik and Negash, 2016); Mushonga *et al*. (2019; Keakopa *et al*. (2022); Lowore and Ciriello (2022); Gakenia *et al*. (2024); Piiru *et al*. (2025)
	Indiscriminate use of pesticides and herbicides	Gikungu (2009); Munthali (2011); Gebretsadik and Negash, 2016); Mekonnen *et al*. (2018); Keakopa *et al*. (2022); Terekegn (2022); Gakenia *et al*. (2024)
	Lack of skills and knowledge of beekeeping	Kaitano (2013); Gebretsadik and Negash, 2016); Bareki *et al*. (2019); Mushonga *et al*. (2019); Gakenia *et al*. (2024)
	Inadequate extension services	Wilson (2006); Turner and Moreki (2017); Tadesse *et al*. (2021); Terekegn (2022); Gakenia *et al*. (2024)
	Insufficient qualified technical skilled personnel	Kaitano (2013)
	Weak/poor extension services	Gichora (2009); Bareki *et al*. (2019); Bihonegn and Begna (2021)
	Low adoption of technologies	Turner and Moreki (2017)
	Farmers' inability to adhere to food safety standards	Turner and Moreki (2017
	Lack of research	Turner and Moreki (2017)

	Low-level technology	FAO (2005)
	Lack of education	Mushonga *et al*. (2019)
	Poor agricultural practices	Nwaiwu *et al*. (2024)
Production	Absconding and migration of colonies	FAO (2005); Gebretsadik and Negash, 2016); Mekonnen *et al*. (2018);
	Deforestation and shifts in local farming practices	Gikungu (2009); Lowore and Ciriello (2022); Nwaiwu *et al*. (2024)
	Swamming	Gebretsadik and Negash, 2016); Bihonegn and Begna (2021)
	High costs of honey packaging materials	Kaitano (2013
	Low productivity	FAO (2005)
	High prices of beehives	FAO (2023b)
	Lack of modern technology	FAO (2023b)
	Lack of grading systems	FAO (2023b)
	Inadequate implements	Mushonga *et al*. (2019)
	Lack of packaging and storage materials	Tadesse *et al*. (2021)
	Low-quality products	FAO (2005)
	Lack of modern apicultural equipment.	Mushonga *et al*. (2019); Tadesse *et al*. (2021)
	Inadequate protective equipment and improper bee smoking practices	Wilson (2006)
	Inadequacy of traditional hives	Wilson (2006)
	Bee colony decline	Bihonegn and Begna (2021)
	Theft of beehives	Nwaiwu *et al*. (2024)
	Water scarcity	Mahamed *et al*. (2022)
Marketing and processing	Lack of bee-handling equipment	Bareki *et al*. (2019)
	Lack of honey processing and packaging equipment for small-scale processors	Wilson (2006); Kaitano (2013); Bareki *et al*. (2019)
	Lack of market information	Tadesse *et al*. (2021), FAO (2023b)
	Poor market linkages	Tadesse *et al*. (2021)
	Low price of the products	Tadesse *et al*. (2021)
	Farmers' weak bargaining power	Tadesse *et al*. (2021)
	Long distance to market	Tadesse *et al*. (2021)
	Lack of access to credit	Tadesse *et al*. (2021); FAO (2023b)
	Illegal traders	Tadesse *et al*. (2021)
	Lack of coordination among the institutional bodies involved in honey production, processing, trading, and consumption.	Wilson (2006)
Climate change	Unfavorable/harsh climatic conditions	Bareki *et al*. (2019); Keakopa *et al*. (2022); Gakenia *et al*. (2024)
	Shortage of bee forage	Gikungu (2009); Gebretsadik and Negash, 2016); Mekonnen *et al*. (2018); Terekegn (2022); Mahamed *et al*. (2022); Nwaiwu *et al*. (2024)
	Drought and wildfires	FAO (2005); Gikungu (2009); Ministry of Agriculture (2020); Terekegn (2022); FAO (2023b); Nwaiwu *et al*. (2024)
	Changes in seasonal patterns	Lowore and Ciriello, 2022

Finance	Non-availability of credit or expensive credit for a start-up	Wilson (2006)
	Lack of financial resources	Bareki *et al*. (2019); FAO (2023a)
	Lack of business support services	Gebretsadik and Negash, 2016);
	Limited investment	FAO (2005)
Policy	Lack of legal framework to guide the development of the sub-sector	Turner and Moreki (2017)
	Untargeted government projects	FAO (2023b)
	Lack of policy	FAO (2023b)

Opportunities

- Honey can be supplied to niche markets as an organic product.
- Production of queens and other by-products such as beeswax, propolis, venom, and royal jelly.
- Strengthening beekeepers' associations by encouraging their formation and equipping them with knowledge and skills.

Prospects

Local production can be increased by expanding existing beekeeping projects or starting new ones, developing the value chain, and intensifying extension outreach by involving the private sector and government.

Conclusion and Recommendations

Despite government support, beekeeping is mainly practised at the subsistence level. Local honey production accounts for only 13% of the national demand, estimated to be 40 tonnes *per annum*. This indicates that honey imports are greater than local honey production. The beekeeping subsector faces many challenges, including a lack of skills and knowledge of beekeeping due to inadequacy of extension service, diseases and pests, frequent droughts and wildfires, indiscriminate use of chemicals (i.e., herbicides and pesticides), and lack of research. Opportunities exist in value addition (i.e., processing), production of other products (e.g. beeswax, propolis, venom, and queens), and organic production. Honey production prospects include expanding existing projects, starting new projects, developing the value chain, and intensifying extension outreach. It is recommended that awareness campaigns be mounted to convince the public about the nutritional benefits of consuming honey and the economic benefits of keeping bees. Information about beekeeping can be disseminated through social media, radio and TV talk shows, and print media.

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