

APICULTURE AND AQUACULTURE

WEEK 1-INTRODUCTION TO APICULTURE

LECTURER: Jackson Mulokozi
Kumi University - Eastern Uganda
E-mail: mulokozi.jackson@gmail.com

Learning outcomes

At the end of this lecture, you will be able to:

- To explain etymological origin of the term Apiculture
- Define apiculture
- Describe the state of apiculture globally, continentally and specifically in Uganda
- Enumerate different products from apiculture
- Explain the importance of apiculture
- Explain the challenges facing the apiculture industry with reference to Uganda.

Etymological origin and meaning of Apiculture

- ❑ The term "apiculture" originates from two Latin roots: "api-" and "cultura."
- ❑ The prefix "api-" is derived from the Latin word "apis," meaning bee (Abrol, 2012).
- ❑ This prefix is closely associated with the most commonly domesticated bee species, **Apis mellifera**, also commonly known as the Western honeybee, which is central to modern beekeeping practices (Winston, 2014).

Etymological origin and meaning of Apiculture continues

- The second component, "**culture**", comes from the Latin word "**cultura**," which means **cultivation** or **care**.
- In agriculture, the word often signifies the systematic effort to cultivate or manage living organisms, such as plants, livestock, or in this case, bees.
- In the context of apiculture, it denotes the structured management and nurturing of bee colonies by humans for both agricultural and ecological purposes (Seeley, 2010).

Definition of Apiculture

- ▶ Apiculture, also known as beekeeping, is the practice of maintaining honeybee colonies, typically in hives, for the purpose of collecting honey, beeswax, propolis, and other bee products, as well as for the pollination of crops and the conservation of bees.

Definitions of apiculture according to different scholars

- ▶ Crane (2009) defines apiculture as the **controlled breeding and care of honeybees**, focusing on both their **commercial value** and their ecological importance. According to Crane, beekeeping not only provides economic benefits but also helps in the **conservation of pollinators** and the preservation of biodiversity.
- ▶ Seeley (2010) highlights that apiculture is the **management of bee colonies for agricultural and environmental benefits**. Seeley emphasizes that honeybees contribute significantly to the **ecosystem** by pollinating flowering plants, thus supporting biodiversity and food security.

Definitions of apiculture continues ...

- ▶ **Winston (2014)** describes apiculture as the **human practice of keeping and nurturing bee colonies** for honey production and ecological services, such as **pollination**.
- ▶ **Green (2015)** suggests that apiculture is a **sustainable agricultural practice** that involves the **maintenance of bee colonies** for pollination and honey production. **Environmental services** provided by bees, especially in terms of **ecosystem sustainability**, make apiculture a critical component of modern agriculture.

Global state of apiculture

- ✓ Apiculture, or beekeeping, has grown significantly across the globe, driven by the increasing demand for honey, other bee products, and the critical role bees play in pollination. According to the **Food and Agriculture Organization (FAO)**, there are over **90 million beehives worldwide**, producing approximately **1.9 million tons of honey annually** (FAO, 2020).
- ✓ The global honey market was valued at **\$9.21 billion in 2021** and is projected to reach **\$13.53 billion by 2029**, growing at a **CAGR of 5.4%** (Fortune Business Insights, 2022). **China** is the leading producer of honey, contributing around **24%** of global production, followed by countries like **Turkey, the United States, and Ukraine** (FAO, 2020).

State of apiculture in different global regions or continents

ASIA

- ▶ Asia is the largest honey-producing continent globally, led by countries like **China, India, and Vietnam**. **China** is the world's leading producer of honey, contributing approximately **24%** of global honey production, with an annual output exceeding **450,000 tons** (FAO, 2020).
- ▶ **India**, another significant player, produces around **120,000 tons of honey annually** and has seen rapid growth in the apiculture sector due to increasing demand for organic honey and the expansion of pollination services (Raina, 2020). Other countries like **Vietnam** and **Thailand** have also become key exporters of honey, especially to the **European Union and North America**.

State of apiculture in different global regions or continents cont

- ▶ Asian apiculture faces several challenges, including **pesticide use**, the spread of **pests like the Varroa destructor**, and **habitat destruction** due to urbanization and agricultural expansion (Tan et al., 2018).

State of apiculture in different global regions continues ...

Oceania

- ▶ Apiculture in **Oceania** is mainly concentrated in **Australia** and **New Zealand**. **New Zealand** is particularly famous for its **Manuka honey**, which has strong medicinal properties and commands high prices globally. New Zealand produces around **19,000 tons of honey annually**, and **Manuka honey** represents a significant share of the country's honey exports, generating over **NZD 300 million annually** (New Zealand Ministry for Primary Industries, 2021).

State of apiculture in different global regions continues ...

- ▶ Australia produces approximately 30,000 tons of honey per year and is home to a diverse range of bee species, including the **European honeybee** and **native stingless bees** (Australian Honey Bee Industry Council, 2022).
- ▶ However, the Australian apiculture sector has faced challenges from **wildfires** and the spread of **exotic pests**, such as the **small hive beetle** and the **Varroa mite**, which threaten bee populations. The government has initiated **biosecurity programs** to mitigate these risks and promote the health of bee colonies.

State of apiculture in different global regions continues ...

North America

- ▶ In North America, the United States, Canada, and Mexico are key players in apiculture. The United States alone has over **2.71 million managed beehives**, producing around **157,000 tons of honey annually** (USDA, 2021).
- ▶ Beekeeping in the U.S. is particularly important for **pollination services**, with honeybees contributing over **\$15 billion** to the economy annually by pollinating crops such as **almonds, blueberries, and apples** (Calderone, 2012).
- ▶ Canada also has a robust apiculture industry, producing approximately **41,000 tons of honey** annually, with **Alberta** being the leading honey-producing province (Canadian Honey Council, 2020).

State of apiculture in different global regions continues ...

South America

- ▶ **South America** has a thriving apiculture industry, especially in countries like **Argentina, Brazil, and Chile**. **Argentina** is the largest honey producer on the continent, exporting around **80,000 tons of honey annually**, primarily to **Europe and the U.S.** (FAO, 2019).
- ▶ **Brazil**, known for its production of **organic honey**, contributes approximately **40,000 tons annually** (Peralta et al., 2019). The Amazon rainforest provides a rich source of **wild honey**, which is valued for its unique flavors and medicinal properties.

State of apiculture in different global regions continues ...

- ▶ South American beekeepers face challenges from **deforestation, climate change**, and the spread of **Africanized honeybees**, which are more aggressive but also more resistant to diseases (Oliveira et al., 2020).
- ▶ Despite these challenges, the sector remains economically significant, with increasing interest in **sustainable and organic apiculture**.

State of apiculture in different global regions continues ...

- ▶ **Europe:** Apiculture is a well-established industry in Europe, with **Romania, Spain, Hungary, and Germany** being the leading honey producers. Europe is home to around **18 million beehives**, contributing **250,000 tons** of honey annually (European Commission, 2020).
- ▶ The European Union (EU) is particularly focused on **sustainable beekeeping** practices, offering subsidies and support to apiculturists through programs like the **Common Agricultural Policy (CAP)**. However, European beekeepers face challenges such as **pesticide regulations**, the spread of **invasive species** like the Asian hornet, and **climate change** affecting forage availability (EFSA, 2020).

State of apiculture in different global regions continues ...

Antarctica

- ▶ **Antarctica** is the only continent where apiculture is not practiced due to its **extreme climate** and **lack of flowering plants**.
- ▶ Bees are unable to survive in the harsh Antarctic environment, which experiences **freezing temperatures** year-round and lacks the biodiversity necessary for their survival (Convey et al., 2012). Consequently, there are no records of apiculture activities on the continent.

State of apiculture in different global regions continues ...

Africa:

- Apiculture in Africa is predominantly practiced as a **subsistence activity** by smallholder farmers. The continent has enormous potential for beekeeping due to its **diverse flora** and **favorable climate**. Countries like **Ethiopia, Tanzania, and Kenya** are the leading honey producers in Africa, with Ethiopia producing **over 53,000 tons** annually, accounting for approximately **27% of Africa's honey** (FAO, 2018).
- In many African countries, apiculture is seen as an **alternative livelihood strategy** for rural communities, particularly in dryland regions where crop farming is less viable (Abrol, 2012).

State of apiculture in Uganda

- ▶ In Uganda, apiculture is emerging as a key sector for **income generation** and **sustainable agriculture**. Uganda produces approximately **5,000 tons** of honey annually, with the potential to produce over **500,000 tons** due to its rich biodiversity and favorable climatic conditions (Uganda Beekeepers Association, 2020).
- ▶ The honey produced in Uganda is primarily consumed domestically, though there is increasing interest in exporting to regional and international markets.

State of apiculture in Uganda continues...

- ▶ Apiculture is seen as a **pro-poor** livelihood option in Uganda, especially in regions like **Karamoja** and **West Nile**, where traditional agriculture faces challenges due to climatic variability (Gichora, 2003).

Importance of apiculture

- ▶ **Pollination Services** Apiculture plays a crucial role in crop pollination. Honeybees are responsible for pollinating **75% of global food crops**, including fruits, vegetables, and nuts. This enhances both the quality and quantity of food production. For example, **almond production in California** is entirely dependent on bee pollination.
- ▶ □ **Honey Production** Honey is the primary product of apiculture and is widely consumed for its nutritional and medicinal properties. In 2020, global honey production was estimated at **1.9 million tons**, with countries like China, Turkey, and Argentina being major producers.

Importance of apiculture continues

- ▶ **Environmental Conservation** Bees help maintain biodiversity by pollinating wild plants, ensuring the survival of various species. This, in turn, supports healthy ecosystems. By sustaining plant diversity, apiculture contributes to **soil health** and **water conservation**.
- ▶ **Employment Creation** Apiculture provides employment opportunities, especially in rural areas where beekeeping is often a family or small-scale enterprise. In countries like **Ethiopia**, beekeeping provides livelihoods for over **1.5 million people**, contributing to poverty alleviation.

Importance of apiculture continues ...

- ▶ **Beeswax Production** In addition to honey, bees also produce **beeswax**, which has diverse applications in cosmetics, pharmaceuticals, and candle-making. Beeswax is valued for its natural properties and is used in products like lip balms and skin moisturizers.
- ▶ **Income Diversification** Beekeeping provides an additional source of income for farmers, especially in regions where crop farming may not be feasible year-round. In Uganda, for example, beekeeping offers an alternative income source in regions like **Karamoja**, where agricultural productivity is low.

Importance of apiculture continues ...

- ▶ **Production of Other Bee Products** In addition to honey and beeswax, bees produce **royal jelly, propolis, and bee venom**, all of which have health benefits and are used in **alternative medicine and cosmetics**. Propolis is used for its antimicrobial properties, while royal jelly is consumed for its anti-aging benefits.
- ▶ **Medicinal Value** Honey has **antibacterial, anti-inflammatory, and antioxidant properties** and is used in traditional and modern medicine for wound healing and as a natural remedy for coughs and sore throats. In New Zealand, **Manuka honey** is particularly prized for its potent medicinal properties.

Importance of apiculture continues ...

- ▶ **Contribution to Food Security.** By enhancing crop pollination, apiculture contributes to increased food production and availability.
- ▶ **Smallholder farmers** can use beekeeping to improve yields of food crops, thereby contributing to local food security and agricultural sustainability.
- ▶ **Cultural and Educational Importance** In many cultures, beekeeping is part of traditional practices and knowledge, passed down through generations. Additionally, apiculture provides educational opportunities, such as teaching about biodiversity, ecology, and sustainable agricultural practices in schools and community programs.

Importance of apiculture continues ...

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Challenges facing the apiculture sector in Uganda

- ▶ **Limited Access to Modern Beekeeping Equipment:** Most beekeepers in Uganda still use traditional hives, which yield lower honey production compared to modern beehives like Langstroth hives. This reduces productivity and profitability. Example: Traditional log hives are prevalent in rural areas, which produce less honey and are difficult to harvest.

Challenges facing the apiculture sector in Uganda cont...

- ▶ **Lack of Technical Knowledge and Skills:** Many beekeepers lack proper training on modern beekeeping techniques, pest control, and honey harvesting, which affects the quality and quantity of honey produced. Example: Improper handling of bees during hive inspection can lead to colony disturbance and reduced honey yields.
- ▶ **Pests and Diseases:** Bee pests like varroa mites and diseases such as American Foulbrood can devastate bee colonies, leading to a decline in honey production. Example: Beekeepers in the northern region have reported significant losses due to varroa mites.

Challenges facing the apiculture sector in Uganda

- ▶ **Climate Change and Environmental Degradation:** Unpredictable weather patterns and deforestation reduce the availability of nectar and pollen, which are essential for bees' survival. Example: Extended dry seasons in the Karamoja region have reduced floral resources, leading to bee starvation.
- ▶ **Limited Market Access:** Beekeepers struggle to find consistent markets for their honey and bee products. Many rely on local markets where prices are often low. Example: Beekeepers in rural areas often sell honey in raw form at low prices, without access to larger urban markets or export opportunities.

Challenges facing the apiculture sector in Uganda cont.....

- ▶ **Poor Quality Control:** A lack of quality standards for honey and other bee products in Uganda leads to the sale of adulterated or substandard products, which diminishes consumer trust and market value.
Example: Some honey sold in urban markets is mixed with sugar syrup, reducing its purity and harming the reputation of Ugandan honey.

Challenges facing the apiculture sector in Uganda

- ▶ **Inadequate Government Support and Policies:** The apiculture sector lacks adequate government support in terms of subsidies, extension services, and favorable policies to promote beekeeping. Example: There is limited government intervention to promote modern beekeeping techniques or to regulate the industry effectively.
- ▶ **Competition with Other Agricultural Activities:** Land use for crop farming or livestock grazing can conflict with apiculture, as pesticides and land clearing reduce the availability of forage for bees. Example: Pesticide use on commercial farms in regions like Mukono has led to bee poisoning and colony collapse.

Challenges facing the apiculture sector in Uganda

- ▶ **Low Levels of Investment:** The apiculture sector in Uganda receives little investment from both private and public sectors, which hinders the growth and modernization of the industry. Example: Many beekeepers struggle to afford modern equipment or expand their operations due to limited financial support or credit access.
- ▶ **Inconsistent Honey Yields:** Seasonal variations in flowering and nectar production lead to fluctuating honey yields, making it difficult for beekeepers to maintain consistent production and income. Example: In regions like Lira, honey production drops significantly during the dry season due to reduced flowering plants.

References

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End of lecture

- ❖ Thank you for your attention.
- ❖ You have been such a good class.
- ❖ The next lecture is scheduled for next week