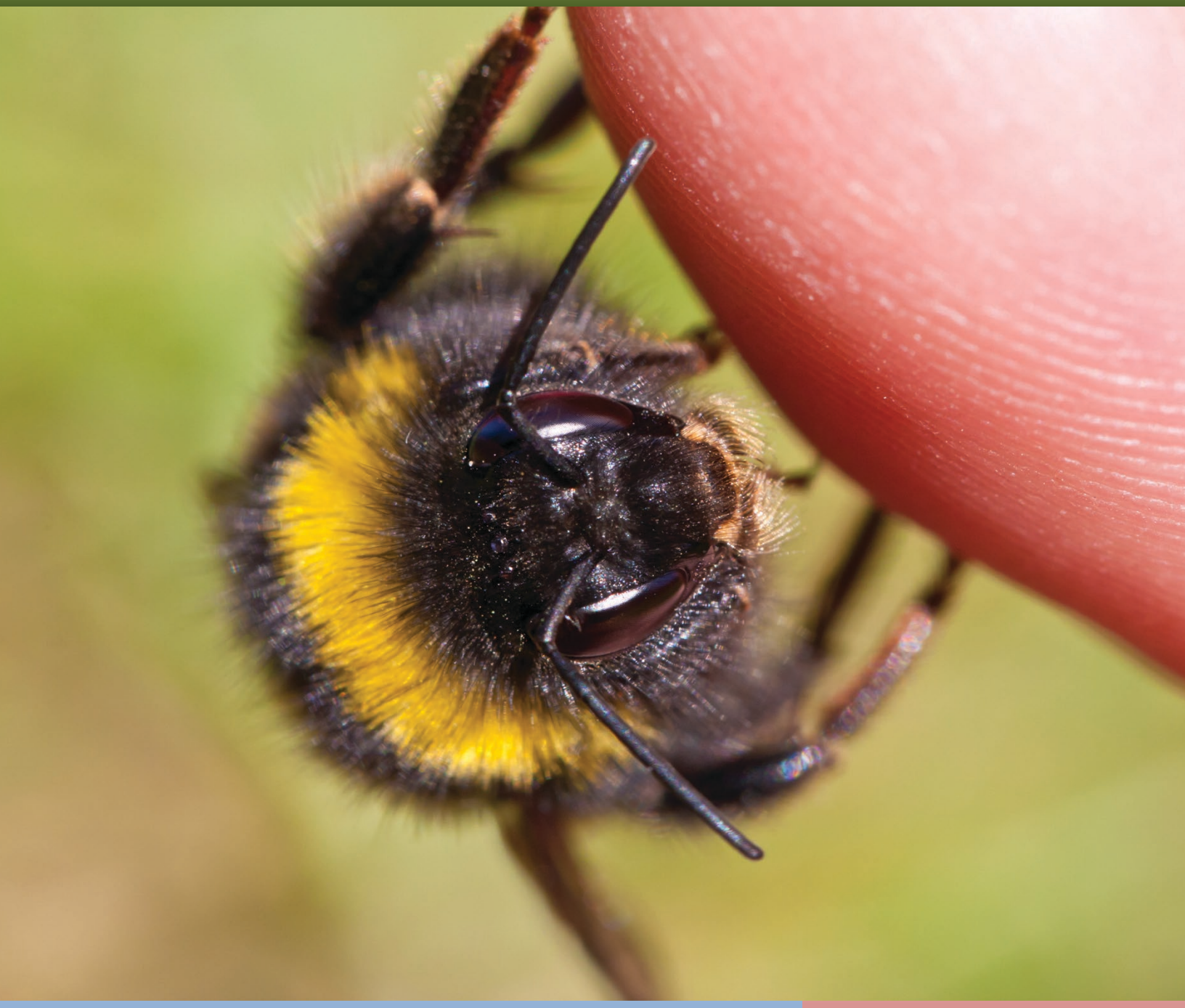
Urban Beekeeping Activity



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Urban Farming

Erasmus+ KA210-VET - Small-scale partnerships in vocational education and training

Preface

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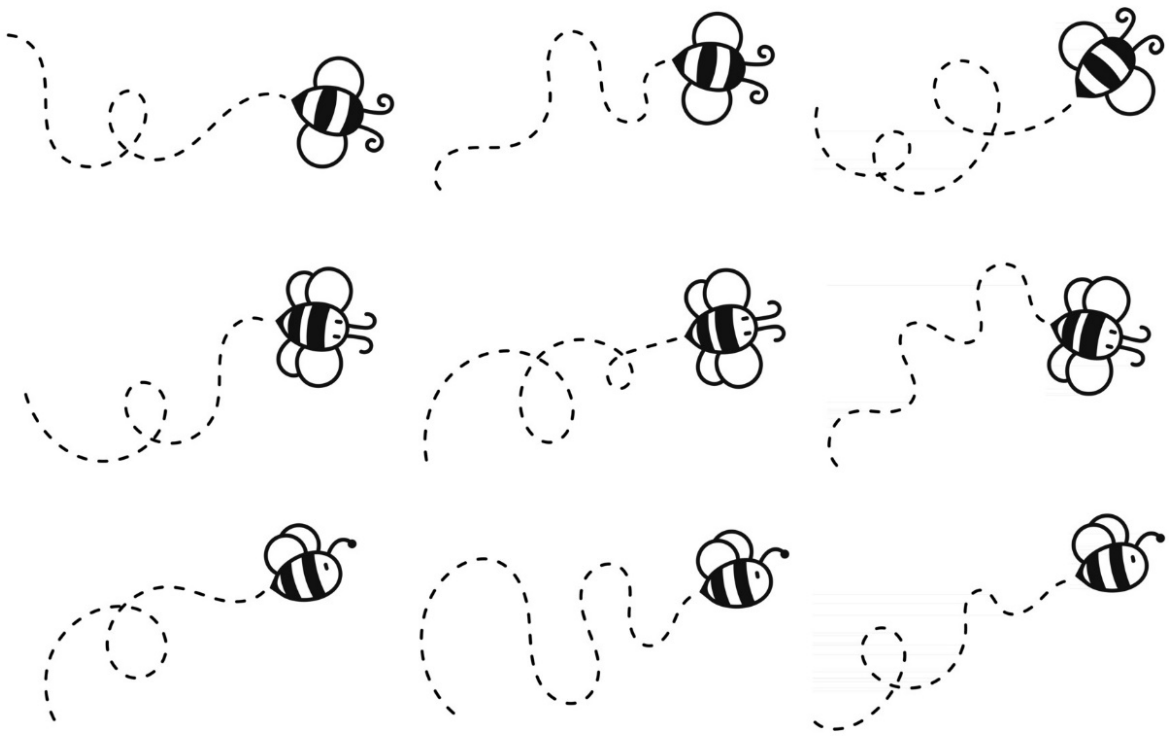

Bee flying path A bee flying in a dotted line - The flight path of a bee to honey
https://www.vecteezy.com/free-vector/flying-bee

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Beekeeping in the EU, Greece and Turkey

As the rest of the world, beekeeping is a developing and important sector in the EU, Greece and Turkey.

In a study conducted by Orr et al. (2020), a comprehensive checklist of bee species distribution was compiled and more than 5 800 000 public bee formation registries were merged in order to define global models of bee biodiversity. Results of this study are given in Figure 1. Turkey, Greece and the EU appears among regions with the highest number of bee species.

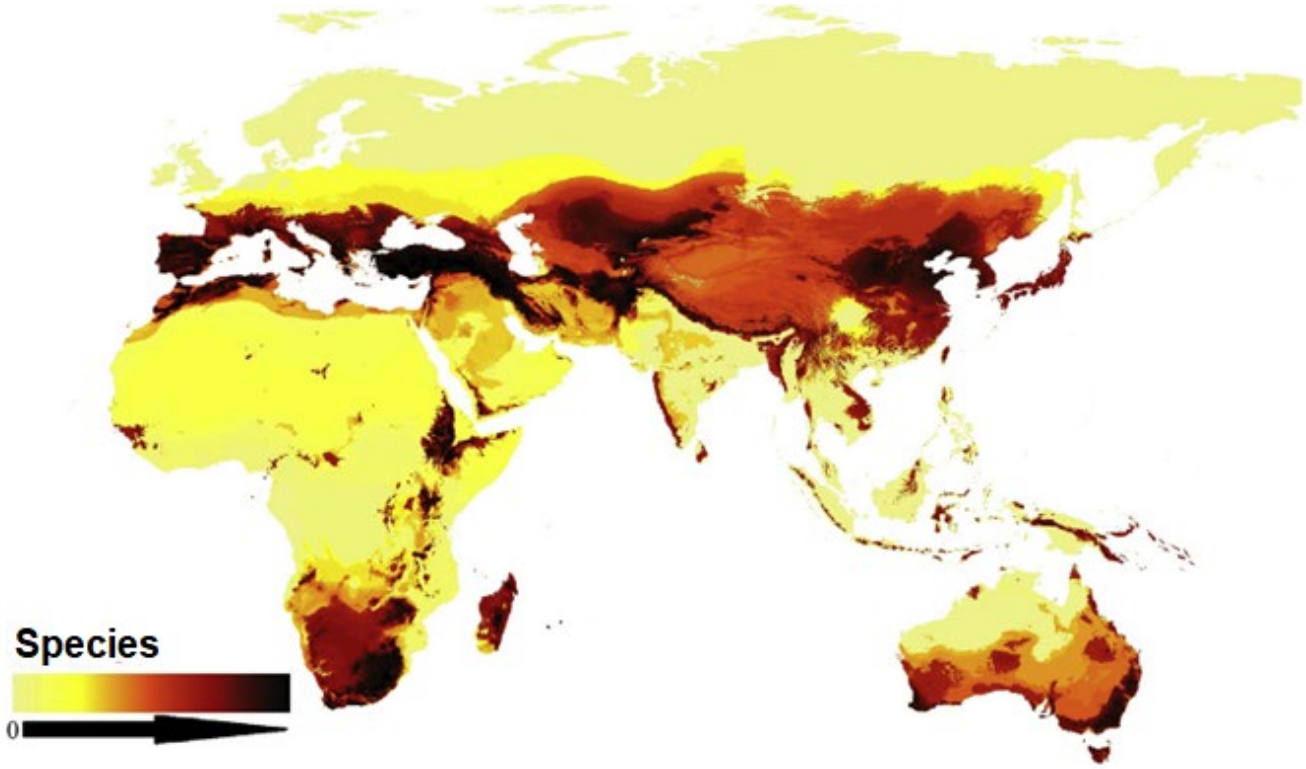

Figure 1. Wealth projections of bee species

Beekeeping is mostly considered as a traditional activity in Europe, a means of increasing rural income in countries such as Spain, Poland, Hungary, Greece and Turkey, an important source of foreign income in Far East, Middle and South Americas; while it is mostly carried out to use bees for pollination in vegetable production in countries such as the USA, Canada and Japan (Firatli et al., 2000; Saner et al., 2005; Vural 2008; Koc et al., 2010; Uzundumlu et al., 2011; Engindeniz et el., 2014; Burucu, 2018), (In TA/2020/SER/0002),

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The number of hives in the world that was 79 683 687 in 2010 increased by 15.79% and reached to 92 265 141 in 2018. According to FAO and TÜİK data from 2018, the total number of hives in the world was distributed as 14.14% in India, 9.81% in China, 8.79 in Turkey, 7.15% in Iran, 6.52 in Ethiopia and 3.45% in Russian Federation.

Total honey production in the world in was 1 545 379 tons in 2010 which increased by 19.77% and reached to 1 850 868 tons in 2018. According to FAO and TÜİK data from 2018, 24.15% of total amount of world honey production was carried out in China, while 5.83% was carried out in Turkey. On the other hand, Greece has almost 2,500,000 bee colonies and produces about 30,000 tons of honey per year, while 65 percent of production takes place in the regions of Chalkidiki, Thassos and Evia, while Crete abounds in thyme honey. Exports are still limited, accounting for approximately 10 percent of Greek honey production, but are constantly rising –in fact, in 2018 exports were up by 15.9 percent compared to the previous year.

According to FAO 2020 data, average yield of honey per beehive in the world was calculated as 20.06 kg in 2018. The average yield of honey per beehive in the same year was 49.29 kg in China, and 13.31 kg in Turkey. Lower average yield of honey per beehive in Turkey indicates that the potential of the honey plants in the country is not used to the fullest extent, and productivity levels of honeybee populations is not adequate. This low level of productivity is caused by some problems of beekeeping in Turkey related to training, bee diseases and pests, use of modern equipment and methods. However, average yield of honey per beehive can reach up to 50-60 kg in countries with advanced beekeeping practices. It is clear that total production across country can be easily increased when average yield of honey per beehive is increased with technical and cultural measures to be taken (GEKA, 2019), (TA/2020/SER/0002). Greek beekeepers possess over 1.4 million beehives, which cover 11% of the total European Union beehives and 1.7% worldwide (FAO). Thus, Greece is an important producer of honey in the EU, for it is ranked 6th in the EU-28, covering 8% of the total European honey production, especially if the country's limited population and area are taken into consideration.

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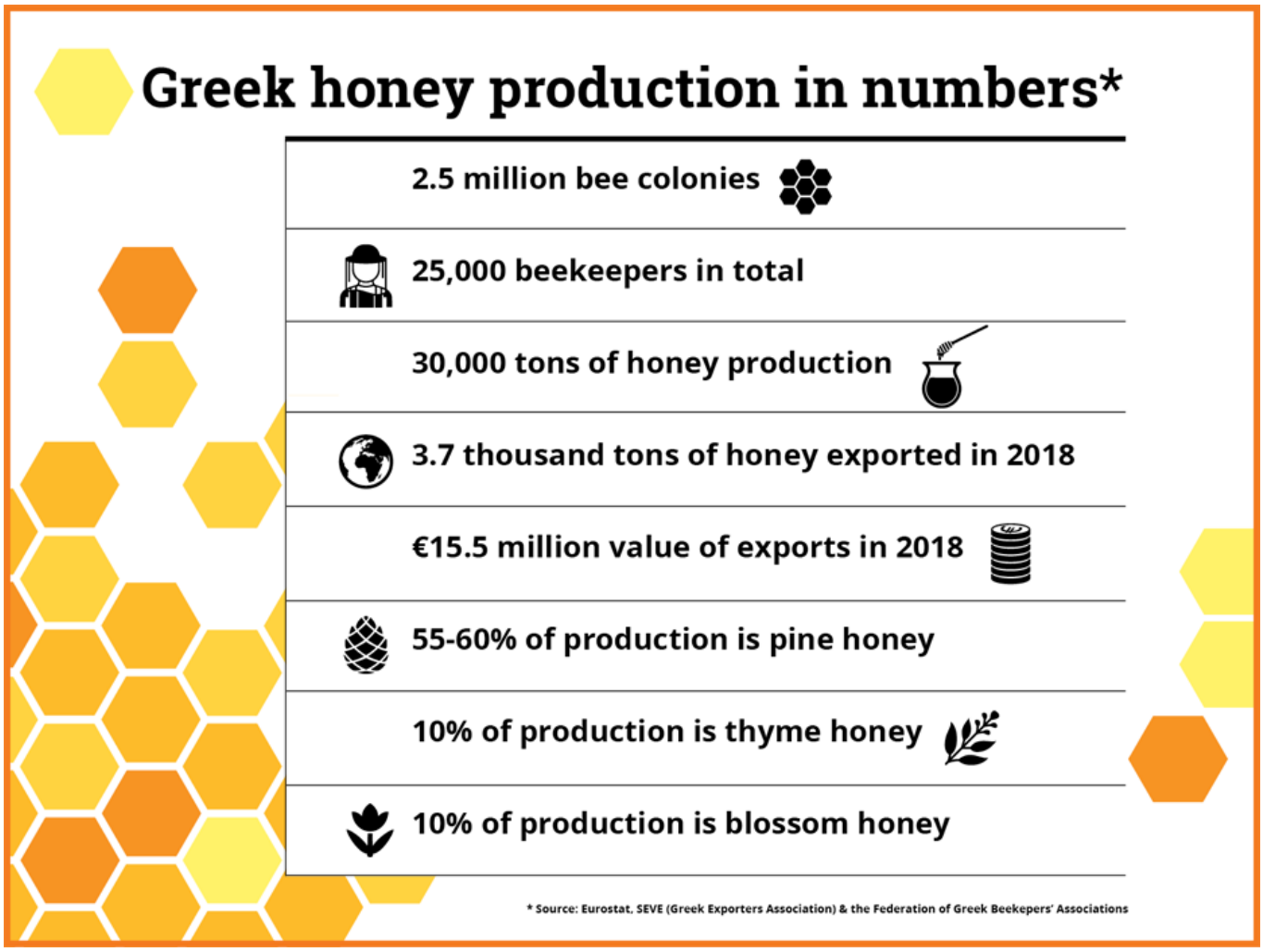

Considering the number of hives and amount of honey production of the EU countries in 2019, EU ranks 2nd with 280 000 tons of production after China. Total number of hives in the EU in 2019 was 18.2 million. Total number of enterprises (beekeepers) was 612 000. Even though beekeeping is considered as a small sector, its use for pollination is critically important (TA/2020/SER/0002).

According to TÜİK 2019 data, the number of beekeeping enterprises in Turkey decreased by 1.41% and occurred as 80 675 hives. The number of hives reached to 8 128 360 in 2019 with an increase by 0.25% from the previous year, while the amount of honey production reached to 109 330 tons in 2019 with an increase by 1.31% from the previous year. The amount of beeswax production that was 3,987 tons in 2018, decreased to 3 791 tons in 2019.

The number of hives demonstrated a continuous increase in 2010-2019 period. However, the increase in the number of hives was higher than the increase in honey production, so yield decreased. Average yield of honey per beehive decreased to 13.45 kg in 2019 while it was 14.48 kg in 2010.

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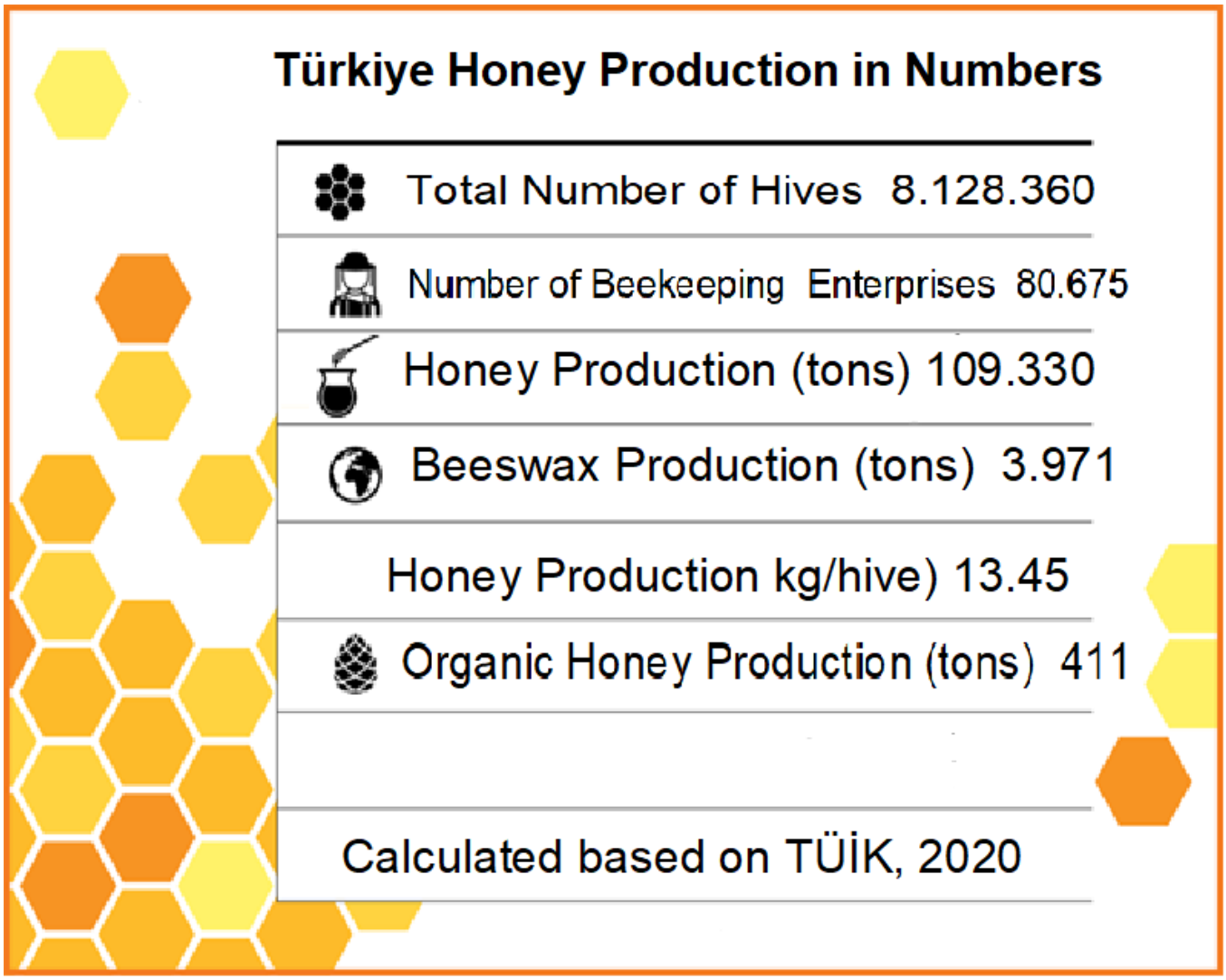

In terms of import figures, EU is 60% self-sufficient in honey. Honey suppliers of the EU are Ukraine and China. The honey trade balance of the EU is negative as its import exceeds import. EU is also a net honey importer from third countries. The average honey import price in the EU in 2018 was 2 €/kg, and the honey imported from third countries is usually cheaper than the honey produced in the EU. It can be concluded from the situation in the EU in terms of honey export figures that the EU export is negligible as relative to import The EU exported 21 000 thousand tons in 2018 (EU, 2020b), (TA/2020/SER/0002).

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Description

The activity will take place in both countries. The location of the activity will be the urban areas or areas close to urban network. The beehives already established in these areas will be located and be used as a paradigm of best practices. In this context the first trainers will be trained in urban beekeeping through natural presence and small videos in YouTube channel, which will be produced for this purpose. In this context a manual of urban beekeeping will be produced for future reference a dissemination taking into account the existing legislation for beekeeping in populated areas.

There will be a workshop/seminar in cooperation with universities / entomology Departments so as to facilitate the idea with more scientific background. The trainers will be given an exam at the end of the activity and a certification of completion. The project team in cooperation with certification bodies will examine the possibility to certify the trainers with a recognized certificate as urban beekeeping technicians, which will motivate especially young people to continue this activity.

Schools of secondary education will be motivated for this purpose and small seminars will take place to inform the students for the challenge of climate change. The same roadmap will be followed for companies and present the concept not only as climate change action but also as an idea for team working, the same frame used in the USA and Canada. The results of the activity will form an implementation plan which will be disseminated to local authorities as a proposal for action in combination with pocket parks.

Target group

The main target group will be young professionals in the field of beekeeping and high school students as in the photo (17-year-old high school student practicing beekeeping around Ymittos mountain, Athens, Greece). This will be the core of the target groups. They will be the trainers. However, they will be facilitated by technicians in beekeeping (beekeepers) who will transfer their technical experience and skills (Photo: Beekeeper Konstantinos Perdikaris).

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The last group will provide the premises and supervise the beehives. Citizens will be involved as trainees as well after the initiation of the course providing the place for the beehives and be responsible for them. There will be an assessment of the performance and the acquisition of skills at the end of the activity. The evaluation of potential urban beekeepers will be the same time assessment of their trainers. Thus, two groups of trainers will produce initially one professional and one of the level of technicians. The second will lack the scientific background of the experts; however, they will acquire all the essential skills.

The third group it is expected to be students participating on their environmental education and they will have less natural presence in beehives, but they will participate in distance learning mostly activities. There will be a provision for a small group to participate in natural presence activity and earn their certification of skills.

Urban Farming

According to the USDA urban agriculture is defined as, “City and suburban agriculture [that] takes the form of backyard, roof-top and balcony gardening, community gardening in vacant lots and parks, roadside urban fringe agriculture and livestock grazing in open space.” Among the types of foods grown are vegetables, mushrooms, medicinal and ornamental plants, and fruit trees. Animal and livestock options in urban agriculture include chickens, fish, goats, and honeybees. The last one (honeybees) is one of the main activities of this Erasmus+ project. While urban agriculture is not defined by U.S. law, the 2018 Farm Bill (Agriculture Improvement Act of 2018, P.L. 115-334) refers to the urban farming demographic as urban, indoor, and other emerging agricultural production (Photo: Beehive, Konstantinos Perdikaris).

For the EU the concept of urban agriculture is not so clear and legally defined. Lohrberg et al (2018) describes the characteristics of urban agriculture in Europe and its origin, which can be traced back to the Ancient Romans. It deals with trade, industrial production, education, and the presence of legal systems and administration. It is not just food production in a city.

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Urban Beekeeping

Recent years there is a great discussion regarding the fate of pollinators. Declining populations pose a threat to food security, considering that bees are pollinating more than 75% of plant species producing our food, which corresponds to 35% of the global farmland. To raise awareness regarding the importance of pollinators, the UN designated 20 May as World Bee Day. (Photo: Apiary in Ymittos mountain, Athens, Greece, Maria Nikoleta Perdikari).

The UN proposes several acts and measures as stated below (Source: www.un.org/en/observances/bee-day):
Individually by:

- planting a diverse set of native plants, which flower at different times of the year
- buying raw honey from local farmers
- buying products from sustainable agricultural practices
- avoiding pesticides, fungicides, or herbicides in our gardens
- protecting wild bee colonies when possible
- sponsoring a hive
- making a bee water fountain by leaving a water bowl outside
- helping sustaining forest ecosystems
- raising awareness around us by sharing this information within our communities and networks; The decline of bees affects us all!

Especially for the beekeepers, or farmers by:

- reducing, or changing the usage of pesticides
- diversifying crops as much as possible, and/or planting attractive crops around the field
- creating hedgerows.

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As governments and decision-makers by:

- strengthening the participation of local communities in decision-making, in particular that of indigenous people, who know and respect ecosystems and biodiversity
- enforcing strategic measures, including monetary incentives to help change
- increasing collaboration between national and international organizations, organizations and academic and research networks to monitor and evaluate pollination services.

Thus, the question is could urban beekeeping contribute to the increase of bee's population? The answer is yes, because there are no farms, thus there are no pesticides, lot of floral species available, many sources of water and especially in this project involved countries (Greece and Turkey) optimum climate. It is commonly accepted among researchers that bees living in urban areas are healthier, produce more honey in some case due to biodiversity and have a better winter survival rate than rural areas. Health is linked to colony collapse disorder (CCD). CCD has no identified cause. However, has contributed to the reduction global bee populations every year.

Someone might consider that bees are dangerous for humans, especially in a city. Well, the truth is that bees are not interested in the presence of humans. Their daily program consists of several activities such as bringing nectar and pollen, water, take care of their eggs etc. Naturally if they consider that there is a threat to their colony, they will use their sting.

URBAN BEEKEEPING IS SIGNIFICANT

Over 35% of global food production depends on pollinators. Bees are responsible for 60-70% of the pollination of flowering plants on earth (arable and non-arable). If bees disappear, 71% of the world's most important vegetable crops, which are pollinated by them, will begin to disappear. Millions of people and animals will suffer from food deprivation, since 1/3 of crops rely on pollination. Beekeeping is one of the few human economic activities that is environmentally friendly and contributes to the rational management of natural resources (Sbonia, Ch., S., 2021).

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About Bees

History

The history of beekeeping begins in the Stone Age, about 8,500 years ago, according to information we derive from Egyptian petroglyphs and wall paintings. There are over 20,000 species of bees in the world, belonging to approximately 700 genera and 10 families, of which 2,000 live in Europe. These include the common bee *Apis mellifera L*. Of the thousands of species of bees, only a few produces honey. The rest live in societies or solitary, in trees and in the soil. Some have stingers some don't; they are black, blue, colorful, big, or small but all of them are pollinators (Sbonia, Ch., S., 2021).

Breeds

In Greece there were the several breeds of bees: a) Apis mellifera *carnica* in the Ionian Islands (Photo: www.carnica.gr), b) the *Apis mellifera macedonica* in Macedonia and Thrace (Photo: facebook.com/ The Macedonian Bee-Η Μακεδονική ΜΕΛΙΣΣΑ-Apis Mellifera Macedonica), c) the *Apis mellifera*. *cecropia* in Central and Southern Greece (Photo: www.orinimelissa.com), and c) the *Apis mellifera adami* in Crete and the Aegean islands (Photo: www.i-diadromi.gr). After 1980, due to the many movements and buying and selling, Greece is a country of great hybridization, dominated by the Macedonian bee.

Especially the Cretan breed *adami* has completely disappeared due to varroa appearance in 1983. The breed had very special characteristics, and there a lot of stories for this bee. She was brave and aggressive, against wasps dared to approach the hive. Hard worker with very good productions considering the dry heat climate of Crete.

When she was about to swarm, she was making a lot of royal cells, and the old queen would not leave the hive unless the new queen came out of her cell first, so there was a warning to the beekeeper to prevent the swarming. Their size was large and dark in color almost black. Able to collect even with a very strong wind. In old painting the bee was presented carrying small stones, which was true. Even today it was discovered that some bees in the Aegean islands they do that for travelling during the strong winds period.

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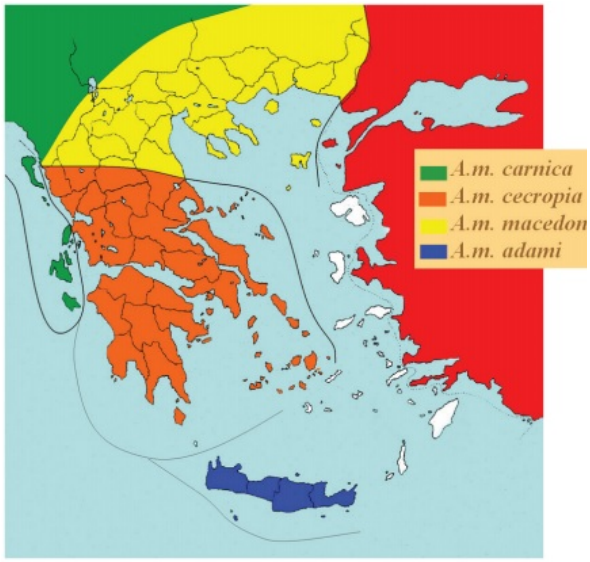
Only in some islands of the Aegean and Larissa have been found minimal populations that do not belong to the "Macedonian bee" species. A. m. macedonica (Macedonian bee) has as initial distribution areas Macedonia, Thrace, and the area above the city line: Ioannina, Metsovo and Kalambaka. The breeds are distributed according to the following map:



A.mellifera subspecies in Greece according Ruttner 1988.

The Carniolan bee (*Apis mellifera carnica*). The Carniolan honeybee is the bee of the Ionian islands. It is a great breed with origin from Slovenia. It is a dusky brown color with lighter brown stripes. It is known also as Carnica. A very gentle bee that is calm and can be easily worked, making it ideal for beekeepers who live in urban areas. It is good at resisting disease and defends the hive strongly against wasps. Carnica are well known for quickly adjusting the size of the colony according to the available nectar supply. This, combined with an unusually long tongue for reaching nectar other bees can't get, results in colonies of Carnicas storing large quantities of honey and pollen. The Macedonian breed not of the Thrace area, probably is origin from Macedonian and Carnica, that is why they are similar. The main difference is that the Macedonian breed builds faster and is more adaptable to most areas of Greece. However, all the above information might not be exact due to lack of information regarding breed and due to extensive mix of them as

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mentioned earlier. (Scheme: Three main branches of morphogenetic evolution of races, Kandemir, I., et al, 2005) Photos provided from Greece are of the Macedonian breed.

In Turkey Anatolia which is Asian part of Turkey is one of the most important bee husbandry centre which is origin of several bee breeds. Those breeds are Anatolian Bee (*Apis mellifera anatolica*) which is the most common breed, Caucasian Bee (*Apis mellifera caucasia*), Armenian Bee (*Apis mellifera armenica*), Persian Bee (*Apis mellifera meda*), and Macedonian Bee (*Apis mellifera macedonia*). (Yilmaz, O., et al, 2016).

As Turkey has a wide variety of topographical and climatic features, it is estimated that twenty percent of the native honeybee ecotypes are in Anatolia. These are Caucasian Bee (*Apis mellifera caucasia*), Persian Bee (Apis mellifera meda), Syrian Bee (*Apis mellifera Syriaca*), Carniolan Bee (*Apis mellifera carnica*), Anatolian Bee (*Apis mellifera anatolica*) 11 and their ecotypes such as Muğla, Gökçeada, Yığılca and Giresun. Each honeybee breed and ecotype reflect their morphological and environmental behavior.

Apis m. meda and *Apis m. syriaca* in the southeastern part of Anatolia, *A. m. caucasica* in the northeastern part of Turkey, on the Georgian border, A. m. anatoliaca with locally adapted ecotypes such as Muğla, Giresun and Yığılca in the North, South, East and West of Anatolia; "Carniolan type" is found in Thrace (Photo: A group of Anatolian bees, Kandemir, I., et al, 2005).

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Caucasian Bee has attracted worldwide attention with its productivity and tameness and has been taken under protection as a pure strain. Caucasian bees are dark gray in color and are gentle and productive bees with a low swarm prone. They also collect high levels of propolis as they are adapted to the plateaus and temperate climate conditions. Spring development is slower than other breeds, but they establish strong colonies throughout the summer and produce high amounts of honey. They tend to plunder weak colonies. They have tongues 0.2 millimeters longer than other species, so it's easier for bees to reach under the flower pistil and pick up nectar from where other bees can't.

Anatolian honeybee is the most common bee breed in Anatolia. It has many ecotypes adapted to different regions, showing great differences in body color, productivity, and certain morphological and physiological characteristics. Muğla bee is the best-known ecotype of Anatolian honeybee. The local honeybee of Southeastern Anatolia may be *Apis mellifera syriaca* or *Apis mellifera meda*. The general characteristics of honeybees in Southeastern Anatolia are small colonies, relatively little honey storage; They are more aggressive than other honeybee or Turkey ecotypes and they swarm easily. These characters are well suited to the fluctuating hot conditions they live in but are not suitable for the beekeeping industry.

Bee Flora in Turkey

Flower honey is produced mainly from cultivated plants, for example, orange, cotton, sunflower, puree, chestnut, linden trees and other orchards. Wild nectar producing plants in all regions of Turkey; clover, acacia, raspberry, strawberry, nectarine etc. Thyme honey is produced in Central Anatolia, Aegean, Black Sea and Marmara regions. Turkey hosts many pollen producing plants such as almond trees (Amigdalus), Castanea sativa, Castanea vulgaris, Salix alba, Robinia pseudoacacia and Erica. The Black Sea Region is known for the most popular and most valuable honey variety produced by Anzer's high plateau plants. These plants bloom only at the end of June and continue until the beginning of August. Therefore, these bees need to hurry as this is the only period for collecting nectar.

The last type is pine honey of Muğla province. Muğla bee, A. m. is an ecotype of anatoliaca and has a rather different life history, adapted to find the bark louse *Marchalleina hellenica* on pine trees, continuing to produce offspring to establish a large population in autumn, while Anatolian bees in other regions stop producing brood to prepare for winter. 75% of Turkey's pine honey comes from this province. A medicinal honey (what the Turks call "Mad honey") is produced in the northern part of Central Anatolia, which runs parallel to the Black Sea from *Rhododendron ponticum* from east to west in September and October.

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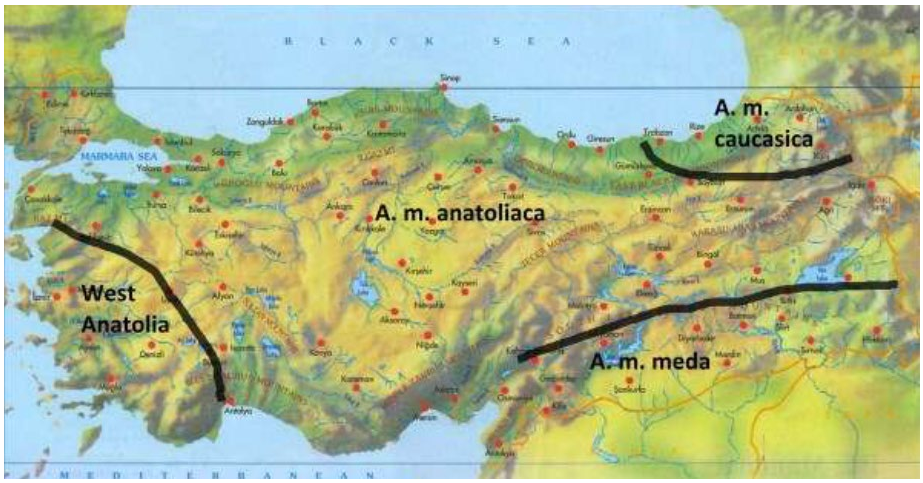
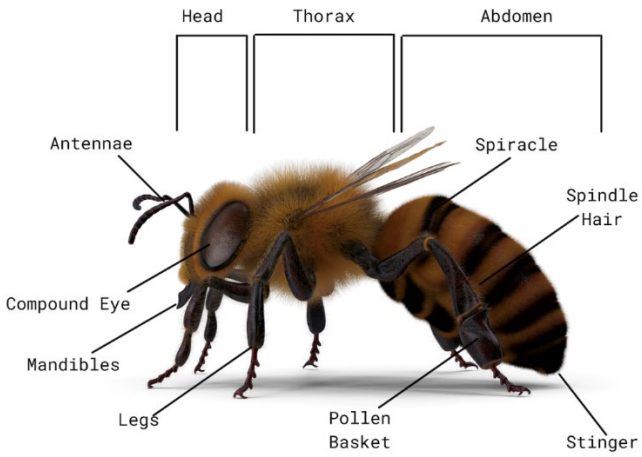


Anatomy

Honeybees have 3 body segments – head, thorax, and abdomen. As all insects have six legs. The Greek philosopher Aristoteles called all insects hexapoda means six legs. The rear legs of honeybee have a pollen basket.



The antennae are very sophisticated sensors doing a lot of tasks such as: data collection related to touch, taste, and smell and not only. It can detect temperature, humidity, and carbon dioxide, gravity, wind speed. In fact, is a multitool.

The head contains the eyes, antennae, and mouthparts. They have five eyes, two compound eyes used for seeing shapes, and three small eyes at the top of the head used for seeing light. They see into the ultra-violet spectrum, means that they can see colors that we cannot. Most flowers have patterns based in the ultra-violet spectrum. This attracts bees and other pollinators to them. They have a memory and according to recent research possibly they recognize faces!!! (Photos: University of Guelph Honeybee Research Centre)

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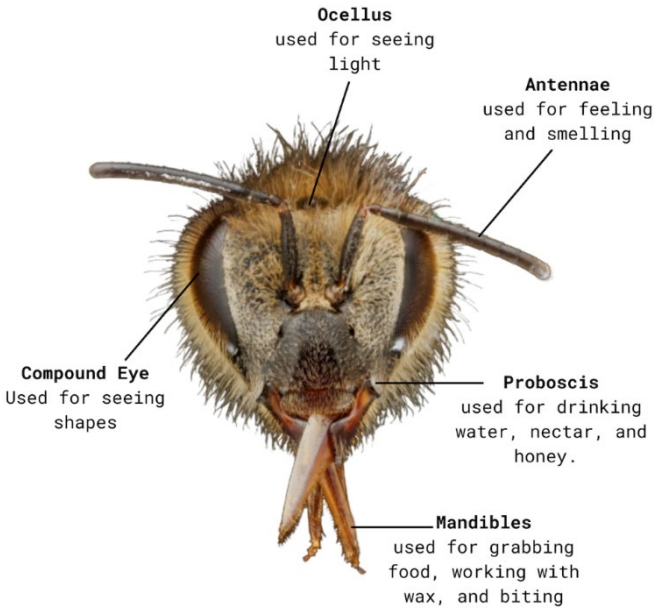
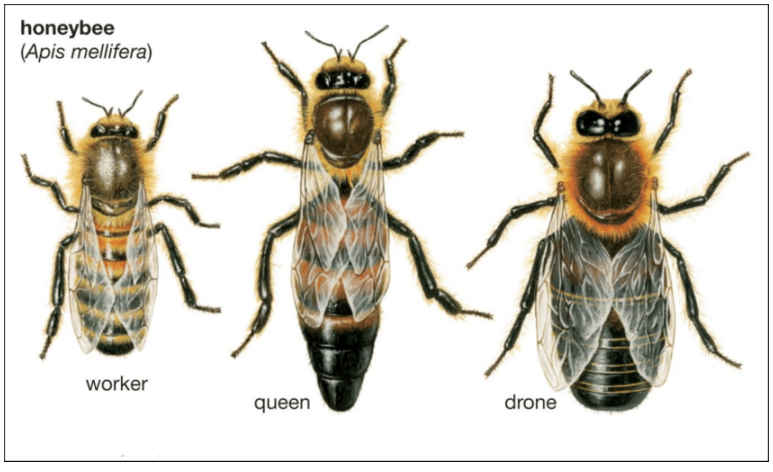


Drones are male honeybees, and they are vital for the survival of honeybee colonies. Their primary role is to mate with a receptive queen honeybee. Most of the beekeepers do not understand their role, which in fact is as important as the queen's, from a genetic point of view as they contribute equally to the genetic material of the colony.

A drone does not have a father but has a grandfather, considering that eggs producing drones are not fertilized eggs. Drones do not have stingers. On the other hand, a female bee, the worker does have one and as workers they do all the job such as: beehive keeping, feeding the queen the younger ones, the drones, and the larvae, collecting the pollen and nectar the older ones, and making the wax.

The queen is a mated female with fully developed reproductive organs. They are developed from larvae selected by worker bees and specially fed to become sexually mature. In the beehive there is only one queen. The type of food in the larval stage determines whether the bee will become a queen or a bee worker. The queen is fed only royal jelly, which is a protein-rich secretion from glands on the heads of young workers. Larva oriented to become worker are fed bee bread which is a mixture of nectar and pollen.



The photo shows the phenotypic differences among males, females, and queen (Photo: Bhokray, Ketan. (2016)). A non-mated queen it looks like something between a mated queen and a worker, thus it is not always easy for a beekeeper to spot it.
The queen has long abdomen compared to worker and drone.

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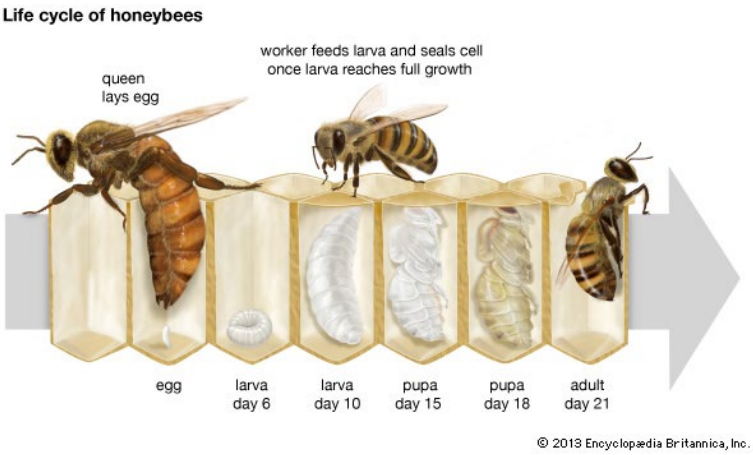
Usually, the beekeepers are looking for eggs see next photo to spot nearby the queen. If there are eggs, there is a queen.



Regarding the number of days for an egg to become one of the above. The life cycle of a bee corresponds to four stages. It starts with an egg, flowed by larva, then pupa and finally the adult. It takes about 16 days for the queen, 18 to 22 days for the worker bees and 24 days for the drones.

Reproduction

The virgin queen will fly out of the beehive on a sunny and warm day, to a place where drones congregate, in Greece some beekeepers call it “coffee shop for drones”, where she will mate with 12 to 5 drones. If the weather is optimum, in some cases returns to the drone place area for several days until she is fully mated, which takes place during the flight. The young queen is able to store up to 6 million sperm from multiple drones in her spermatheca. She can release sperm for the remaining two or up to seven years of her life, but usually the beekeepers or the bees themselves replace her after the second year.

The above may happen earlier if a defect appears to the queen, such as a broken leg due to beekeeper’s handling etc. In that case she cannot properly place the eggs and the workers decide to replace her. If the whole process is sudden, (death of a queen), the workers will attempt to create a new queen by selecting several brood cells where a larva has just emerged and then flood the cell with royal jelly. In that case we notice larger queen cells over the normal-sized worker cells which protrude vertically from the face of the brood comb.

The primary function of a queen is reproduction. A good queen can lay about 1,500 eggs per day during the spring. Worker bees are always around her taking care of her. This is the task for younger bees. Older ones as mentioned are collecting nectar and pollen.

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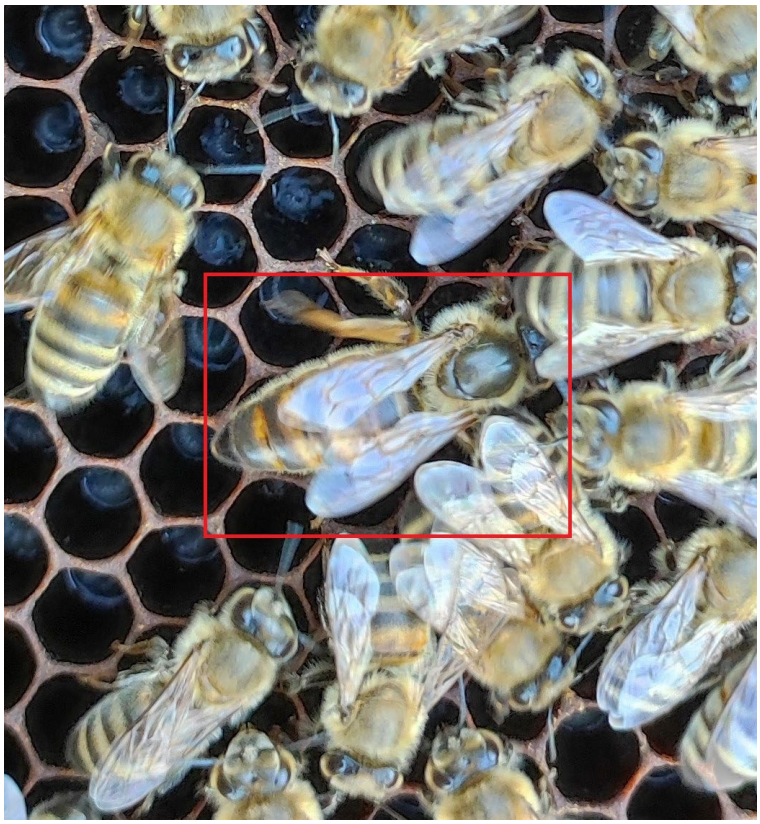
Queen Identification



Especially for a new beekeeper spotting the queen is one of the most difficult tasks. The queen bee's abdomen is longer than the worker bees and longer than a male bee. Imagine when there are thousands of bees in a beehive how difficult is to find a single queen (Photo: Queen bee, Konstantinos Perdikaris).

Some beekeepers use a color to spot them, and different color correspond to different ages. However, the project team did not follow this process as there are many other ways for the beekeeper to identify the presence of a queen, without marking the insect which is not natural.

One certain way is to look for eggs. If there is an egg, there is a queen… It is a simple way and there is less disturbance to the bees.

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Guidelines

General

Throughout history, cities have been at the center of change, from the spread of Greek and Roman civilizations. Over time, Europe has slowly transformed itself away from being a largely rural, agricultural community and become an urban foundation. More than half of the European population was living in an urban area by 1950 (doi: 10.2785/91120). People living in urban areas have a weak link with the environment and the natural processes taking place in rural areas. Most of the young citizens do not even understand the primary production role in food security.

These guidelines aiming at promoting and disseminating the benefits of bees' presence in cities combined with urban apiculture as a mean to improve the quality of the urban environment. It is expected that bees and beekeeping will serve as an instrument with multiple social and environmental benefits for citizens (Photo: Konstantinos Perdikaris).

For the purposes of this project (URBAF) the beehives were set in urban and peri-urban areas of Athens basically in Northern part approximately 215 meters from the nearest houses. The area is very crowded as many people are conducting several activities in the area. The bee population was not disturbed by people neither caused any incident with humans.

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Scope

The first question to ask is what will be the benefits from urban beekeeping. In most European countries urban beekeeping is used for:

To develop a spirit of cooperation among emploees by assigning a beehive, on the roof of a company's building. It is a natural way to create bonds among emploees. It is very common especially in the USA (Photo: www.nytimes.com). It is regarded as an innovative way to build bonds between emploees, employers and the sense that a company is a community. Bee colonies have this view and by "working with them" the beekeeprs get this view and why not adopt it to real life. As a task the emploee gets involved as much as he/she likes.

Use of places which are not in use, by installing beehives or combine them with roof gardens or mini plant spots in a city, like neighbour gardens.

Use urban apiary for environmental training purposes especially for students. Urban beekeeping primarly is oriented to the increase of bee population and secondarily to the production of honey.

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Legislation

According to the Greek legislation it is prohibited It is forbidden to place beehives at a distance of less than twenty-five (25) meters from rural roads and streets and at a distance of less than fifty (50) meters from residential houses, unless they fence them with a special mesh of at least two meters high (Photo: http://samariotiko.blogspot.com). Beekeepers are obliged to place the beehives at fifty (50) meters from flocks and from animal watering places.

It is also prohibited to place hives on cultivated or uncultivated land without the written consent of the owners. Beekeepers are required to write their name, address, and telephone number in a corresponding number of cells. Finally, when placing the beehives in the countryside, the responsible field guard of the area should be informed. (Ministerial Decision 1/2008. Art. 5 – Gazette 1501/B'/30.7.2008).

It is also very important to pay attention to the guidelines set by the fire service very year to avoid setting fires due to smoker use. Considering that the area establishes the apiary was very close to houses, days that was very hot the beekeepers used water with diluted sugar (10%) or liquid smoke could be used or propoline dilute in water. Some elements of propoline can be diluted to water and this seems to calm bees. Different means should be tested because the possibility to set fire is high especially during the summertime.

"Turkish Food Codex Honey Communiqué (2005/49)" is critical for ensuring food safety in honey sector. The objective of this Communiqué is to determine the properties that honey should have at the stages of the hygienic and technique-appropriate production, storage, transportation, and being put on the market of honey. This Communiqué specifies product specifications, additives, contaminators, pesticide residues, tolerance levels for veterinary drugs, hygiene, workplace conditions, packaging, labelling and marking, handling and storage, sampling and analysis methods, conforming to EU requirements, registration and control matters (TR Official Gazette, 2005). This Communiqué has been prepared within the framework of harmonization with the European Union, taking into account the Council Directive 2001/110/EC of 20 December 2001 relating to Honey (TR Official Gazette, 2012).

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There are standards developed by TSE in Turkey for bee products, pollen royal jelly and pollen. These include “TSE Propolis Standard, January 2003, TS 12910”, “TSE Polen Standard, December 2006, TS10255”, “TSE Royal Jelly Standard, December 2006, TS 6666”. However, these are not specifically defined in the food codex (Cukur et al., 2016). Existing standards provide limited definitions and specifications for quality classification. There are not any regulations on bee venom in Turkey yet. Ministry of Health and Ministry of Agriculture and Forestry should create the basis for legislation on this matter (TA/2020/SER/0002)..

Honey analyses are specified in 27.07.2012 dated and 28366 numbered Turkish Food Codex Honey Communiqué (2012/58). These analyses are; moisture, sucrose, fructose, glucose, fructose/glucose, water-insoluble matters, electrical conductivity, diastase number, HMF, difference between protein and honey delta CI3, C4 sugars ratio calculated on protein and honey delta CI3, proline and naphthalene content. Moreover, comb foundations are examined in accordance with paragraph (d) of article five of the communiqué providing that "Comb foundations shall not contain organic matters such as paraffin, ceresin, fat, resin and oxalic acid, and inorganic matters such as bleaching agents that do not exist in natural composition of beeswax (TA/2020/SER/0002).

Legal Frame

Regulation (EU) No 1308/2013 establishing a common market organisation (the CMO) https://eur lex.europa.eu/legal, content/EN/TXT/? qid=1565695003272&uri= CELEX:32013R1308

Commission Regulation (EU) 2015/1366 with regard to aid in the apiculture sector (MSs notifications of number of beehives); https://eur lex.europa.eu/legal content/EN/TXT/? qid=1565605138034&uri=CELEX:32015R1366

Commission Regulation (EU) 2015/1368 with regard to aid in the apiculture sector https eur lex.europa.eu/legal content/EN/TXT /?qid=1565605181573&uri= CELEX:32015R1368

Commission Implementing Decision (EU) 2019/974 approving the national apiculture programmes; https://eur lex.europa.eu/legal content/EN/TXT/?qid=1565605289756& uri=CELEX:32019D0974

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National Apiculture Programmes

The legal frame for the EU apiculture programms is the Single CMO Regulation (EU) No 1308/2013 (Art. 55 57) and they run for three years; the apiculture year runs from 1 August to 31July. The Member States (MSs) contribute 50% each to the expenditure borne by MSs and the EU funding allocated based on number of beehives in the MSs. The EU contribution for 2020 to 2022 programmes is EUR 40 millions/year; an increase by 11% from the previous period of 2017 to 2019 programmes. It is included a study of the production and marketing structure in the beekeeping sector (Source: European Commission).

The Eligible measures are eight:

1. Technical assistance
2. Combating beehive invaders and diseases , particularly varroasis
3. Rationalisation of transhumance
4. Measures to support laboratories for the analysis of apiculture products
5. Restocking of hives
6. Implementation of applied research programmes
7. Market monitoring
8. Enhancement of product quality with a view to exploiting the potential products on the market

Set the apiary

The choice of location is the first thing to consider, as the environment of the apiary determines the survival of the population and the potential future harvests. The beekeeper must avoid installing the apiary in a place where statistically the winds are strong. Temperature and humidity should be appropriate for bees. Sunny places are suitable with no fogs and the apiary exposure should be south-southeast.

We should consider a check for honey collection potential in a radius of 3.5 km, during the succession of seasons. The optimum is to have suitable vegetation most of the time. As soon as we choose the appropriate place certain tasks should be complete.

Then, when the site is chosen, it is needed to clean the area from vegetation, especially during the summer season to avoid causing fire with the smoker. Wood pallets or cement blocks can then be used to isolate the cell from the ground. We do not use car tires, because they are not stable, there is no ecological sense and the possibility to have fire is high.

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The supports must be set I way to avoid any incline in any direction. However, it is necessary to slight forward the beehive to empty naturally the waste and the moisture. The cells are placed on the supports, making sure that they do not wobble (they are stable). These tasks are continuous. Thus, the location of the beehives should compromise all the above plus the legislation regarding, the position of the apiary in terms of public, cultivations etc.

Specific Considerations

What causes the decline of the populations is the industrialization of the rural agriculture, diseases, and climate change. In the city some of these factors ae not present. For example, the first one or at least has minor effect. Thus, urban areas are safer and more friendly than rural areas

The resources for bees in most of the cities are available the whole year, compared to rural areas. There are gardens or parks that provide the essentials for bees. In some cities they do cultivate plants that are bees prefer.

Water is more accessible in urban areas and the possibility to be polluted with chemical elements from cultivations is minor. Also, temperature is higher than rural areas during the wintertime from 1 to 3 degrees Celsius, but this is a problem as well during the summertime causing the reduction of the population. It is an issue the partnership faced in Athens especially the warm period for mid-July to mid-August.

Difference between bees and wasps

They both have similar space. Wasps have distinct yellow/black bands around the abdomen. On the other hand, bees have a non-descript light brown/brown-yellow or grey color. Bees are 'hairy'. This characteristic allows them to carry pollen whilst wasps are bald (Photo: European Institute for Evolution & Integration)

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Swarms

According to Wikipedia swarming is a honeybee colony's natural means of reproduction. In the process of swarming, a single colony splits into two or more distinct colonies. Swarming is mainly a spring phenomenon, usually within a two- or three-week period depending on the locale, but occasional swarms can happen throughout the producing season. Secondary after swarms or cast swarms may happen. Cast swarms are usually smaller and are accompanied by a virgin queen. Sometimes a beehive will swarm in succession until it is almost totally depleted of workers (Photo: European Institute for Evolution & Integration).

Propolis

Propolis or bee glue is a resinous mixture that honeybees produce by mixing saliva and beeswax with exudate gathered from tree buds, sap flows, or other botanical sources (Photo: European Institute for Evolution & Integration). It is used as a sealant for unwanted open spaces in the beehive. Propolis is used for small gaps (approximately 6 millimeters (1⁄4 in) or less), while gaps larger than the bee space (approximately 9 millimeters (3⁄8 in)) are usually filled with burr comb. Its color varies depending on its botanical source, with dark brown as the most common. Propolis is sticky at and above 20 °C (68 °F), while at lower temperatures it becomes hard and brittle (Source: Wikipedia)

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Existing Barriers to Trade

Fluctuations in honey prices, lack of a price standard of products, introduction of abroad-sourced products into market, unfair competition (introduction of adulterated products to market), suspicions on naturality of products, deficiencies in organization producers, low number of cooperatives, changes in consumer demands, and low demand on organic honey are encountered as the most critical problems in marketing and sales (TA/2020/SER/0002).

One of the most important barriers to the sustainability of beekeeping is the marketing problem. Apart from the few number of beekeepers who can create a personal direct marketing network and lead consumers, most of the products produced by beekeepers are marketed and sold by monopoly companies (Çarık, 2020b). In other words, an oligopoly market is dominant among companies marketing honey in Turkey.

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The leading company in terms of purchasing capacity determines the wholesale purchase prices of honey, and other companies purchase products at the determined prices or with 10-20% additional prices. Beekeepers tend to sell their products as wholesale for avoiding transportation costs after harvesting and their needs for cash. In case that the leading company reduces the amount of honey purchase or postpones the supply, honey prices decrease due to the aforesaid transportation costs, need for cash and necessary supplies for the following season (Emir, 2015). In addition to low price, lack of a mechanism in the market awarding high quality products encourages producers to produce low quality products (Sengul, 2020), (In TA/2020/SER/0002).

On the other hand, inadequate level of branding in honey and other bee products, causing lack of an educated marketing strategy are major barriers. Furthermore, unregistered trade must be prevented (Saner et al., 2017; Goksu, 2020, TA/2020/SER/0002).

Four main problems of agricultural products like honey are amount of production (yield), quality, prices and instability of income. Seasonal, climatic and global risks are mostly higher in agricultural products. These problems are related to both demand and supply sides. Especially the problem of price fluctuations is an important problem in seasons other than harvest season. One of the significant ways to cope with this problem is existence of commodity exchanges and licensed storage centres working with them. Existence of futures exchanges is particularly important. The futures exchanges mentioned here is indeed balancing prices for a longer period by means of specific contracts (Bagis, 2017; Goksu, 2020, TA/2020/SER/0002).

The Position of Small Businesses in Value Chain

Major functions in value chain of honey sector are input supply, beekeeping, collection and processing, wholesale/retail sale and end consumption. A precise distinction of functions fulfilled by the actors in the value chain is not possible. In common practice, an actor functions at all stages within the process such as beekeeping, harvesting, processing, wholesale or retail sale starting from input supply. Indeed, this application is more common among large and medium sized enterprises/actors than actors conducting this business at micro levels. Especially large-sized actors manage the whole value chain. An encouraging environment for cooperation between large sized and small sized actors is not likely to exist under current circumstances (DAP, 2016). (In TA/2020/SER/0002).

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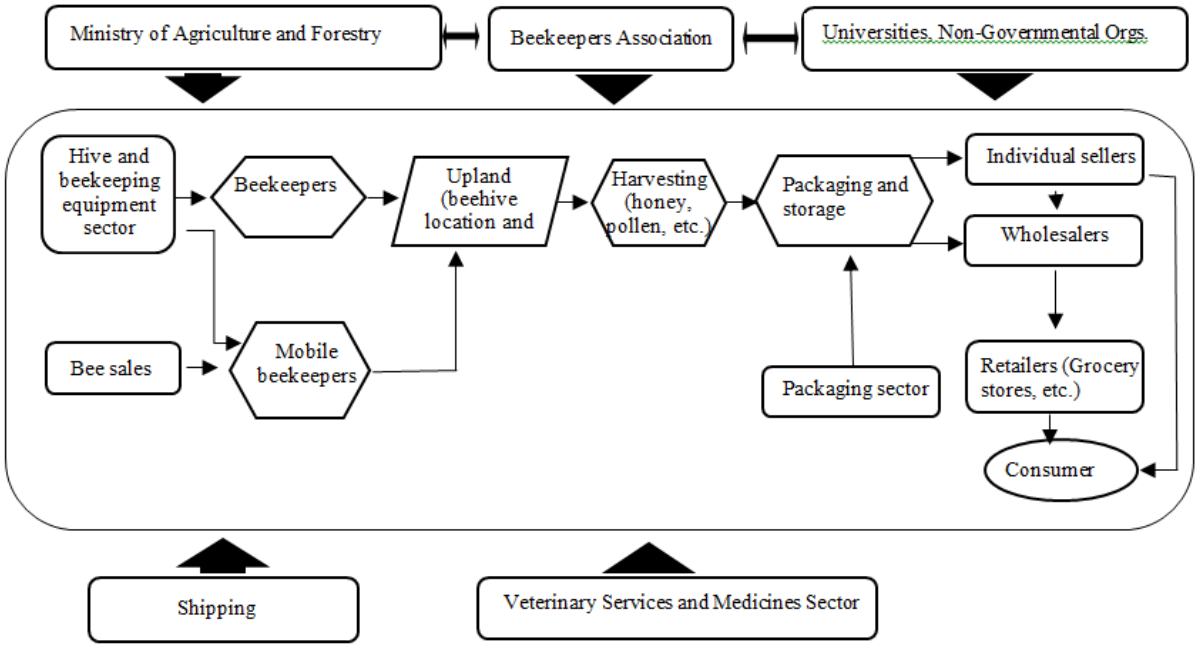
Honey Value Chain



Reference TA/2020/SER/0002

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