

# The development of beekeeping in Bulgaria and the European Union in the last ten years. An overview

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**Citation:** Nikolova, T., Dimitrova, I., & Teneva, A. (2023). The development of beekeeping in Bulgaria and the European Union in the last ten years. An overview. *Zhivotnovadni Nauki*, 60(1), 37-45 (Bg).

## Abstract

The overview includes an analysis of the state, trends, and prospects of beekeeping. The article traces the development of the sector in our country and in the European Union over the last 10 years. The number of bee families, the number of beekeeping farms and the amount of honey produced by them are reflected. And also, number of bee families in farms with different number of hives. The data from the Department of Agri-statistics of the Ministry of Agriculture and Eurostat for a period of ten years are summarized. The purpose of the study was to summarize and analyze data over a period of ten years. During the period (2012–2021), an increase in the number of bee colonies and honey production and a significant decrease in bee colonies in our country have been observed. Within the borders of the European Union, losses of bee colonies have been observed in the last two years.

**Key words:** beekeeping, bee families, development in Bulgaria

## Развитие на пчеларството в България и Европейския съюз през последните десет години. Обзор

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## Резюме

Обзорът включва анализ на състоянието, тенденциите и перспективите на пчеларството. В статията е проследено развитието на сектора в нашата страна и в Европейския съюз през последните 10 години. Отразени са броят на пчелните семейства, броят на пчеларските ферми и количеството на добития от тях пчелен мед в страната. А също и брой пчелни семейства в стопанства с различен брой кошери. Обобщени са данните от отдел Агростатистика на Министерството на земеделието и Евростат за период от десет години. Целта на изследването е да се обобщят и анализират данните за период от десет години. През период (2012–2021 г.) се наблюдава увеличение на броя пчелни семейства и добива на пчелен мед и съществено намаляване на пчелините в страната. В границите на Европейския съюз също се наблюдават загуби на пчелни семейства през последните две години.

**Ключови думи:** пчеларство, пчелни семейства, развитие в България

## Introduction

Beekeeping occupies one of the most important shares in global agriculture. In addition, it contributes to the production of bee products, such as honey, pollen, wax and propolis, and pollination of agricultural crops. Bees are one of the most effective natural pollinators of wild flora and agricultural crops. This leads to an increase in biodiversity and improves the balance of the ecosystem (Klein et al., 2003; Yirga, 2010; Hanley, 2015; López, 2017; John, 2017; Wood, 2018; Aryal, 2020; Patel et al., 2021) Beekeeping is an economic activity of the agricultural sector and an environmentally sustainable production model, crucial for biodiversity and agriculture (Allsopp et al., 2008).

The development of beekeeping in Bulgaria from the beginning of the last century to the present has not changed significantly. However, technologies have developed in beekeeping and different types of hives are used. New technologies have been introduced for monitoring the weight, humidity, and temperature of a hive by placing sensors. The long-standing traditions and suitable environmental and, climatic, conditions in Bulgaria favor the development of the sector. In recent years, there has been an increased interest in honey and bee products.

Beekeeping is an economic activity of the agricultural sector and an environmentally sustainable production model that is critical for biodiversity and agriculture (Allsopp et al., 2008). It provides additional income for many poor communities, creates new crops in rural areas and improves the livelihoods of many families (Jaffé et al., 2015; Slaa et al., 2006). In addition, the pollination service provided by honeybees generates increases in yields (Chambó, 2014) and contributes to ecosystem balance and biodiversity (Paxton, 1995).

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Research on bees over time allowed the modern beekeeper to apply economically viable and sustainable technologies for intensive production and environmental resource management. In this way, the modern beekeeper can collect bee products from the hive with great ease and increased efficiency (Kubačka, 2018)

The development of beekeeping in Bulgarian lands dates back to the ancient times of the Thracians, Slavs and proto-Bulgarians who mastered the art of beekeeping to perfection. For centuries, our country has been famous for its large production of honey and high-quality wax.

After liberation of Bulgaria in 1878, a process of intensive modernization began in the beekeeping sector. Primitive hives made of twigs, also called "grass hives", have been replaced by modern "frame hives", but the traditions of beekeeping and the production have been preserved have been preserved until nowadays.

The development of beekeeping among the proto-Bulgarians dates back to when they inhabited the lands around the Sea of Azov and the rivers Kama and Volga. For hundreds of years, our country has been known as one of the largest producers of honey and wax.

The 21-st century is period of intense economic development accompanied with increasing degradation of the natural environment. Among the countries in Europe, Bulgaria is in one of the first places in terms of flora species diversity (National Beekeeping Program, 2011–2013). The geographical and ecological features of the country also favor the development of beekeeping in all regions of the state.

After economic transition in Bulgaria, beekeeping has developed as a small, family restricted activity. The main part of employed in the sector are close to retirement or post-retirement age. Despite subsidies aimed at increasing bee colonies, the sector is still not very popular and not well developed (National Beekeeping Program, 2017–2019, 2020–2022).

The natural resources of the country and especially the variety of important plants for hon-

ey production allow to obtain pure high-quality honey, royal jelly, pollen, propolis, beeswax, bee venom and other bee products.

Bulgarian honey is successfully exported to European Union countries and especially to Germany, which is one of the largest consumers of honey. The development of this sub-sector of animal husbandry is favored by suitable natural and climatic conditions. Our country is in one of the first places in Europe in terms of species diversity of the important plants for honey production. The geographical and climatic conditions of Bulgaria creates favorable opportunities for raising bee families and obtaining high quality products from the sector which is closely related to organic farming and the producing of ecologically clean foods. Beekeepers in our country manufacture also products such as royal jelly, pollen, and bee glue which like Bulgarian bee honey contains some extremely valuable ingredients, as:

- enzymes / diastase, invertase, amylase;
- amino acids – 18 types / lysine, proline, methionine, tryptophan, arginine, leucine etc;
- vitamins / A, C, E, K, and from group B – B1, B2, B3, B5, B6, B7 and B9;
- trace elements / calcium; sodium; potassium; phosphorus; sulfur; magnesium; iron; chromium; zinc; manganese etc;
- natural antibiotic substances.

Bulgarian beekeeping is going through a number of structural changes that are characteristic of agriculture in our country after joining the EU (Kostadinova, 2017, 2020) and under the influence of institutional support for the sector.

### **Development of beekeeping in Bulgaria**

Official statistics report 876.6 thousand registered bee families (Agrarian Report, 2020), but the real number is higher due to the fact that around 20% are unregistered and can be considered that there are actually over one million families in Bulgaria. The number of organic bee colonies reached 33% of the total in 2016, and

then began to decline to 27.6% (Agrarian Report, 2020, 2021).

From one million bee families, organic hives represent about 25% of the national beekeeping sector (250,000 compared to 750,000 conventional ones). Both conventional and organic beekeeping require space and labor to function.

The main part of apiaries in Bulgaria, with the exception of mobile beekeeping, are located on their own agricultural lands, but their volume is significantly smaller compared to that formed by agricultural holdings.

This sector is distinguished from others in animal husbandry. The main part of the bee farms, and mostly the best developed of them are located mainly in the urbanized territories of the rural areas. The smallest number are apiaries located on agricultural land, the average price of which in 2020 is about BGN 1,100/dka. For the acreage far from the big cities one decare of undeveloped yard space in the villages has an average price of over 3,000 BGN/dka, and for the acreage nearby the big cities – over 10,000 BGN/dka. The large proportion of apiaries located within the boundaries of urbanized areas creates overcrowding and competition between bee colonies resulting in a drop in yields, but which plays a role as a potential driver of this market now and in the future.

Organic beekeeping however requires larger areas outside urbanized areas. The layout of a beehive of 100 hives requires an area of at least 1 dka. Each beehive requires at least one square meter of built-up area for storage of bee inventory and premises for extraction and storage of bee products.

In recent years, there has been a trend towards an increase in honey production and an increase in the number of bee families but on the other side, although there has been a tendency trend towards a decrease in the number of farms registered in the sector.

In Table 1 are presented the three most important factors expressing the status of Bulgarian beekeeping and its concentration in the last ten years – the number of bee colonies, the number of bee farms, the total volume of honey produced in the country.

**Table 1.** Number of beekeeping farms, bee colonies and honey production in Bulgaria in the last ten years

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Number of bee farms	19 283	17 185	16 143	17 969	15 306	13 431	12 260	13 771	11 626	10 801
Number of bee colonies	529 117	541 564	577 304	747 434	754 105	765 772	783 348	867 561	863 283	837 955
Extracted honey (tons)	9 186	10 065	9 268	11 388	10 218	11 388	10 388	11 518	9 066	11 638

Source: Ministry of Agriculture, Agrostatics department, surveys "Beekeeping in Bulgaria"

The results presented in Table 1 were published by the Department "Agrostatics" in the Ministry of Agriculture and Food for the beekeeping sector by year. They show that the number of farms with bee colonies in 2012 was 19,283, and the number of bee colonies in the same year decreased by 3.4% compared to the previous year and reached 529,117. In 2012, 9,186 tons of honey were collected, which is 4.2% less than in 2011.

The number of beekeeping farms decreased significantly in 2013 and they were just over 17,185. The number of bee colonies increased by 2.4% compared to the previous year and reached 541,564 units. According to the study, the average yield of honey from one bee colony last year reached 21.13 kg. In 2013, 10,065 tons of honey were collected in Bulgaria. Its production increased by 9.6% compared to 2012.

In 2014, the number of bee families reached 577,304, which is 35,000 more than the previous year. Conversely, the number of farms with bee colonies in 2014 decreased and was 16,144. The spring and early summer of 2014 were rainy and relatively cool, and as a result, the period of grazing and pollen collection was shortened, which reflected in the amount of honey produced, which is significantly less than the previous year and is about 800 tons less than in 2013.

In 2015, the number of bee colonies and farms increased by 27% and 11.3%, respectively, compared to the previous year. The honey produced is also 2100 tons more than in 2014.

On October 1, 2016, the number of bee colonies was only 1% more than in 2015, and the honey produced from them was 10,218 tons, which

is 10.3% less than in 2015. On the other hand, the difference in the number of bee colonies between 2015 and 2016 is very small, 747,434 in 2015 and 754,105 in 2016. Honey produced is 592,987 in 2015 and 610,631 in 2016 – a difference of only 3%. From 2017 to 2019, the number of bee colonies increased and reached 867,561 in 2019. The amount of honey produced is not always proportional to the number of bee colonies, but in 2019 it reached 11,518 tons. From 2017 to 2019, the number of bee colonies increased and reached 867,561 in 2019. The amount of honey produced is not always proportional to the number of bee colonies, but in 2019 it reached 11,518 tons.

After a slight decrease in 2020, the number of bee families in 2021 reached 837,955, which is a decrease of 15.6% compared to the previous year. Farms engaged in beekeeping are also gradually decreasing and in 2021 it will reach – 10,801 units. The trend is opposite in terms of collected honey, the amount of which reaches the highest level in 2021 – 11,638 tons.

The number of bee families in farms in our country according to the official statistics of the Ministry of Agriculture for the period 2012–2021 is presented in Table 2. There is a gradual decrease in the number of farms with up to 9 and up to 49 bee colonies and an increase in farms with more bee colonies. Thus, in 2012 from total 19283 bee farms – 39.48% were farms with up to 9 bee families, 43.21% of them with up to 49 bee colonies, 15.12% with bee colonies within 50–149 and only 2.2% with over 150 bee colonies. In 2021, the number of farms drops to 10,801, with micro farms (1–9 colonies) representing 11%, small farms (10–49 colonies) are 36.52%, medium farms

**Table 2.** Number of bee families in farms

Number of bee families in a farm	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
от 1 до 9	7 612	6 569	6 091	5229	3858	2 804	2 510	2 440	1 968	1 188
от 10 до 49	8 332	7 214	6 537	7487	6196	5 239	4 584	5 678	3 689	3 945
от 50 до 149	2 915	2 848	2 748	4282	4172	4 188	3 526	4 093	4 273	3 819
150 more	424	554	767	971	1080	1 200	1 640	560	1 696	1 849

Source: Ministry of Agriculture, Agrostistics department, surveys "Beekeeping in Bulgaria"

(50–149) are 35.36% and large farms (over 150) are 17.12%. Assuming that large farms with over 150 hives achieve an average labor productivity of BGN 7.32/hour, i.e. BGN 1220/month, medium farms (50–149 hives) about 50% of it, small farms (10–49 hives) about 25% of it and micro farms about 5% of it, we will have labor markets in the national beekeeping sector for over BGN 75 million/year (Table 2). There are 13 771 bee farms in Bulgaria, of which 2 440 bee farms breed 1 to 9 bee families, in 5 678 10 to 49 bee families are kept, in 4 093 50 to 149 bee families are bred and in 1,560 over 150 bee families are bred. (Agriculture Report, 2020).

During the studied period, was observed a significant decrease in the number of bee families in small farms (with 1 to 9 hives) – in 2012 they were 7,612, and in 2021 – 1,188. A significant decrease was also observed in farms from 10 to 49 beehives. Their number in 2012 was 8,332, and in 2021 they were significantly less, 3,945. Farms with 50 and more bee families have grown significantly in recent years, from 2,915 in 2012 to 3,819 in 2021. A significant increase was observed in professional apiaries with 150 and more hives from 424 at the beginning of the period to 1,849 in 2021. The production of Bulgarian honey increased in the period after the country's accession to the EU. In recent years, the level of production has stabilized at around 10,000 tons.

### The significance of beekeeping in Europe

Honey bees have been domesticated in Europe for several millennia (Crane, 1999) mainly

for honey production and pollination of a wide range of crops and wild plants. It is estimated that 84% of European crops in the Union depend, at least in part, on pollination by insects (Williams, 1994) and honeybees, the most important pollinators. (McGregor, 1976; Delaplane and Mayer, 2000).

In Europe, losses of bee populations were mainly due to the Varroa destructor mite, which has been a major enemy since its introduction into Europe in the 1970s (Stokstad, 2007).

While Ghazul (2005) has questioned the "global pollinator crisis", there has been an increasing number of local reports in recent decades suggesting that honey bee colony numbers are declining. In the USA, statistics show losses in bee colonies in the periods 1947–1972 and 1989–1996 (National Research Council, 2006), as well as large losses in the last two years (Van Engelsdorp et al., 2008).

For Europe, evidence is patchy and often poorly documented, despite severe losses of honey bees in a number of regions (Rosenkranz and Wallner, 2008).

On a European scale, the number of beekeepers has not been tracked (Moritz et al., 2007). Colonies of wild horntails and honey bees are also declining in the USA and Europe (Kraus and Page, 1995; Moritz et al., 2007; Jaffé et al., 2009) most likely due to high prevalence of the V. destructor mite.

EU beekeepers have to face many challenges to preserve their beehives and sustain honey production. Rising costs, serious competition in the face of cheap honey imported from third countries, losses of bee colonies, diseases combined

with monocultures are factors that put a lot of pressure on the sector.

With a production of around 250,000 tonnes per year, the EU is the second largest producer of honey in the world after China, yet it does not produce enough honey to meet its own consumption. In 2015, the percentage of self-sufficiency was around 60%. The Member States with the highest production of honey are mainly located in the southern part of the Union, where the climatic conditions are more favorable for beekeeping. In general, honey production in the EU has seen slow growth with annual fluctuations depending on climatic conditions. However, for beekeepers, maintaining this level of production may become more difficult due to the challenges they face in terms of bee health and habitat loss as a result of agricultural intensification. Production conditions are deteriorating, production costs are increasing, and increasing imports of cheaper honey from third countries are increasing competition.

The prices of honey vary greatly depending on the quality and the place of sale. The price range for multiflora honey is in the range from EUR 2.54/kg in Poland sold at wholesalers to EUR 15.18/kg for honey sold on the spot in the England.

The production and consumption of honey in the member states of the European Union (EU) are indicators based on which the EU is considered the second largest producer of bee products in the world and a major player in the beekeeping market. According to Eurostat data, honey production in the EU was around 250 000 tonnes in 2018, representing 13.3% of global production. However, EU production has increased slightly over the last ten years (+ 6% compared to 2010), with negative or positive annual variations depending on climate and weather conditions. According to statistics, European honey production covers only 60% of the annual needs of European consumers. According to Eurostat, honey consumption at the European level represents approximately 20–25% of global honey consumption, thus representing an average consumption of 0.70 kilograms per person per year. The EU is thus one of the largest importers of honey, with

annual honey imports ranging from 120,000 to 150,000 tonnes. The main suppliers of honey are China with 63 900 tons (43% of total EU imports), Argentina with 22,300 tons, Mexico with 21,200 tons and Ukraine with 8,900 tons of honey. At the same time, the lower price of bee products from China is a determining factor leading to a decrease in honey exports from EU member states.

The support provided to European beekeeping in recent years by the EU's Common Agricultural Policy is represented by a number of policies through which support programs and measures for beekeepers have been implemented. These Common Agricultural Policy measures have taken into account a number of problems that European beekeepers often face, namely the huge loss of bee colonies, the rising production costs of honey and the fierce competition in the beekeeping market.

In Europe, the number of hives has strongly decreased over the years, while the amount of honey produced has remained fairly stable. Thus, the number of hives decreased by 25% in 2016.

The reasons for the decline in the number of beehives in the EU are due to:

- economic factors (low profitability due to pressure on imports and increased purchasing power of large intermediaries, such as wholesalers and retailers);
- biological factors (pests and diseases);
- chemical factors (insecticides and pesticides);

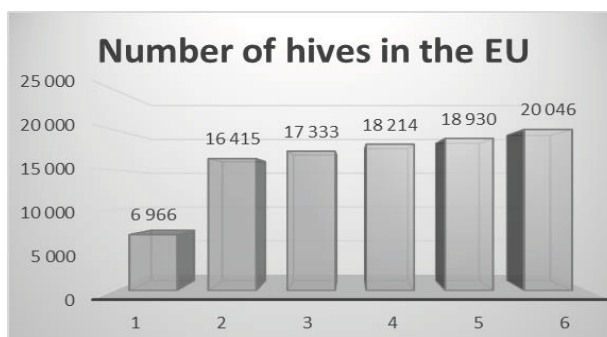


Fig. 1. The number of beehives in the EU, (Eurostat, 2021)

- environmental factors (anthropogenic degradation).

The analysis of these factors allows the measurement of:

- decline of bee colonies;
- identifying causes and solutions;
- lack of access to the results of applied research;
- insufficient understanding of the economic opportunities offered by the diversification of production, the integration of several horizontal and vertical activities and the marketing of products other than honey.

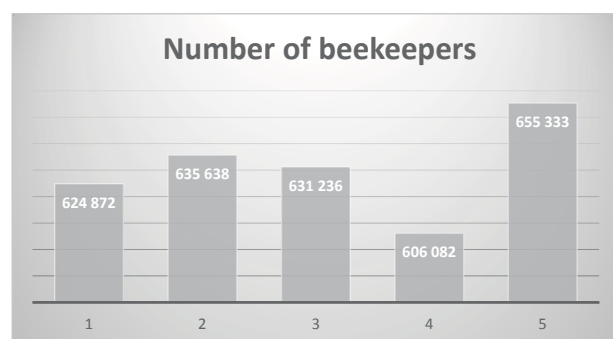
Apiaries, which can be found in all EU Member States, vary greatly in number and size. In Germany one in six is a beekeeper, in Cyprus, Luxembourg and Malta only a few hundred beekeepers can be found. In Italy, beekeepers who have over 150 hives also own 60% of all bee colonies. About 72% of the total number of beekeepers in the EU are organized in professional associations. According to the agricultural statistics of EUROSTAT, this trend of decreasing the number of beehives in France, Italy, Poland and Spain is confirmed. These countries have seen a sharp decline in the number of beekeepers and the number of hives in recent years.

In the European Union, according to EUROSTAT data, there are about 600,000 beekeepers who managed 16 million hives in 2016, according to data reported by member states. Of the total number of beekeepers registered in the EU, only 4% of them own more than 150 hives. This number of 150 hives is considered the minimum

threshold for professional farmers that can provide them with the income necessary for subsistence. However, the figure only shows an average value of the number of hives that provides the farmer with a viable income, since this boundary between professionals and amateurs can differ from region to region depending on the profitability of the production activity or income levels that differ in the different regions.

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In Romania, 40,000 beekeepers are registered at the national level and over 60% of them are members of the Association of Beekeepers. These beekeepers manage 900,000 bee colonies. According to the Romanian Ministry of Agriculture and Rural Development, the highest honey production was recorded in the counties of Braila, Caras Severin, Mures, Sibiu and Vilca. In Romania, beekeeping has long been one of the important branches of the agricultural sector. The ancestors of the Romanians kept bees for the production of honey and wax. Romania has always had natural conditions favorable to beekeeping. This is due to the significant resources for honey production and the specific climatic conditions favoring the production of high-quality bee products. Romanian honey is recognized for its healing properties and variety in international competitions. The statistical office of the European Union Eurostat publishes the most up-to-date data on international trade with this product. In 2021, EU countries imported 173,400 tons of unprocessed honey from non-EU countries, worth \$405.9 million. In comparison, in the same year



**Fig. 2.** Number of beekeepers in the EU, (Eurostat, 2021)

they exported only 25,500 tons of this product to countries outside the EU, worth \$146.6 million. Compared to 2016, last year the volume of bee honey imported from countries outside the European Union grew by 7 percent. At the same time, exports from the EU to countries outside the Community decreased by 10 percent.

### The largest importer of honey among the EU countries

In 2021, 51,900 tons of honey were imported into Germany from countries outside the EU, which is equivalent to 30 percent of all imports of the product into the European Union. This makes Germany the largest importer of honey from countries outside the EU. It was followed by Poland (32,200 tons, 19 percent of total imports), the Czech Republic, Belgium (25,600 tons, 15 percent of total imports) and Spain (14,500 tons, 8 percent of total imports).

### The largest exporter of honey to EU countries

The most bee honey in EU countries was imported from Ukraine (53,800 tons, which is equal to 31 percent of all imports of the product into the EU from countries outside it). This is followed by China (48,000 tonnes, 28 percent of total EU imports), Mexico (15,500 tonnes, 9 percent of total EU imports), Argentina (14,400 tonnes, 8 percent of total EU imports) and Brazil (7,900 tons, 5 percent of total imports).

### Conclusions

From the overview of the state of beekeeping with statistical data for the period 2012–2021, an increase in the total number of bee families and honey production and a significant decrease in bee farms is established. A significant increase is seen in professional apiaries with 150 and more hives to 1,849 in 2021.

The bee population in the EU has grown by nearly 50% in the last 10 years. There are around 17 million beehives and 600,000 beekeepers in the EU, producing around 250,000 tonnes of honey each year.

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