



## Medicinal Beekeeping for Beekeepers (MEDI-BEEB)

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# BEEKEEPING SITUATION ANALYSIS OF TÜRKİYE FOR MEDI-BEEB



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### **Summary**

Beekeeping in the world is an agricultural activity that can be done with a small capital in a short time and without the need for land. In addition, due to the importance of the bee in pollination, the benefit it provides to nature is much more important in terms of sustainable life and the balance of nature.

The main purpose of honeybee breeding in Turkey and in the world is to produce honey, which is an important agricultural product in human nutrition. Apart from honey, bee products such as pollen, royal jelly, propolis, bee venom, apilarnil, and beeswax are commercially seen as products that bring an additional income besides honey.

The importance of bee products (honey, pollen, propolis, bee venom, bee larvae, beeswax, bee bread) used in the field of health for centuries is increasing. The demand for these products for apitherapy in the field of health and cosmetics will gradually increase. However, beekeepers who produce apitherapy and bee runes for apitherapy purposes need to be trained and informed on this subject. The correct production, storage, and use of bee products to be used in health are now important for human and animal health.

According to 2020 data, India, which ranks first in the world's total amount of hives, has a share of 13.6% with 12.2 million hives. China is in the second place with a share of 10.1% with 9.2 million hives, and Turkey is in the third place with a share of 9.0% with 8.2 million hives.

Although it is at the forefront in terms of the number of hives in Turkey, honey production per hive is not sufficient. Apitherapy applications are increasing gradually in Turkey and in the future, production of other bee products for apitherapy purposes will be important in certain standards, apart from honey.



## **BEEKEEPING STATE ANALYSIS OF TURKEY**

### **Introduction**

According to 2020 data, India, which ranks first in the world's total amount of hives, has a share of 13.6% with 12.2 million hives. China is in the second place with a share of 10.1% with 9.2 million hives, and Turkey is in the third place with a share of 9.0% with 8.2 million hives (FAO, 2021).

Having a share of 24.0% in world honey production in 2020, China ranks first with a production of 458 thousand tons, while Turkey with a share of 6.2% in honey production is the second with 104 thousand tons and a share of 4.2%. and Canada ranks third with 80 thousand tons of production. While the honey yield of India, which is the leader in the number of hives in the world, is 5.1 kg, the honey yield of China, which is in the second place, is 49.7 kg, and the honey yield of Turkey, which is in the third place, is 12.7 kg (FAO, 2021; Burucu, 2021).

Beeswax, which is a bee product, is used in metal industry, cosmetics industry, textile industry, medicine making, candle making and many other fields (Burucu, 2021). Turkey is among the top five countries in beeswax production (TUIK, 2022)

### **Current Situation of Beekeeping in Turkey**

Beekeeping comes to the fore and gains importance as an activity that can be done almost anywhere from sea level to high plateaus in Turkey, which has a very large flora and the flowering times are spread throughout the year.

Since the beginning of the pandemic process in Turkey, effective policies have been implemented in order for beekeepers to continue their beekeeping activities without any problems in the production stages, in access to the market and in the next process, and beekeepers can continue their activities with the efficient operation of rapid decision-making mechanisms. Studies show that honey production will increase even more in Turkey. According to 2016 data, around 106 thousand tons of honey was produced in Turkey, and it is predicted that this amount will be between 121 thousand and 125 thousand tons in 2023 (Burucu and Gülse Bal, 2017).

At the micro level, beekeeping, which is effective in providing additional income or the main income to its producers, contributes indirectly to the Turkish economy by increasing the production amount and fruit quality through pollination activities, in addition to its direct contribution to the Turkish economy at the macro level.

The total number of colonies in Turkey was around 8.1 million in 2020. Muğla, which has 901 thousand beehives, ranks first with a share of 11.0% in the total amount of beehives in Turkey, while Ordu, with a 7.0% share and with 573 thousand hives, ranks second and Adana with a 5.9% share and with 481 thousand hives ranks the third. Aydın province is in the 4th place with the number of beehives of 278.210.

There are 89,361 beekeeping enterprises in Turkey and there are 8,733,394 hives in total. Looking at the honey yield by years, it is noteworthy that while the yield per hive was 14.3 kg in 2013, it was 12.7 kg in 2021.

However, honey production decreased by 7.4% compared to the previous year and became 96 thousand 344 tons in 2022 (TÜİK, 2022).

Table1. Status of beekeeping in Turkey by years

Year	Number of villages in apiculture <sup>(1)</sup>	Number of agricultural holdings in apiculture	New hives number	Old hives number	Honey (tons)	Wax (tons)
1991	21 540	-	3 161 583	266 859	54 655	2 863
1992	21 931	-	3 289 672	250 656	60 318	2 916
1993	21 975	-	3 450 755	234 692	59 207	3 110
1994	22 050	-	3 567 352	219 236	54 908	3 353
1995	21 987	-	3 701 444	214 594	68 620	3 735
1996	22 329	-	3 747 578	217 140	62 950	3 235
1997	22 145	-	3 798 200	204 102	63 319	3 751
1998	22 302	-	4 005 369	193 982	67 490	3 324
1999	22 447	-	4 135 781	185 915	67 259	4 073
2000	22 571	-	4 067 514	199 609	61 091	4 527
2001	22 606	-	3 931 301	184 052	60 190	3 174
2002	22 423	-	3 980 660	180 232	74 554	3 448
2003	22 110	-	4 098 315	190 538	69 540	3 130
2004	22 133	-	4 237 065	162 660	73 929	3 471
2005	22 550	-	4 432 954	157 059	82 336	4 178
2006	22 305	-	4 704 733	146 950	83 842	3 484
2007	21 560	-	4 690 278	135 318	73 935	3 837
2008	21 093	-	4 750 998	137 963	81 364	4 539
2009	21 469	-	5 210 481	128 743	82 003	4 385
2010	20 845	-	5 465 669	137 000	81 115	4 148
2011	21 131	-	5 862 312	149 020	94 245	4 235

2012	21 307		- 6 191 232	156 777	89 162	4 222
2013		- 79 934	6 458 083	183 265	94 694	4 241
2014		- 81 108	6 888 907	193 825	103 525	4 053
2015		- 83 475	7 525 652	222 635	108 128	4 756
2016		- 84 047	7 679 482	220 882	105 727	4 440
2017		- 83 210	7 796 666	194 406	114 471	4 488
2018		- 81 830	7 904 502	203 922	107 920	3 987
2019		- 80 675	7 929 368	198 992	109 330	3 971
2020		- 82 862	7 956 933	222 152	104 077	3 765
2021		- 89 361	8 456 305	277 089	96 344	3 766

Source: Ministry of Agriculture and Forestry

(1) Number of villages in apiculture have been revised as "number of agricultural holdings in apiculture" since 2013.

TÜİK (2022).

### **Educational Status of Turkish Beekeepers**

In a study conducted on the subject in beekeeping enterprises, the rates of primary, secondary, high school and university graduates were reported as 70%, 7%, 14% and 6%, respectively (Kekeçoğlu and Rasgele, 2013). In another study, in which the classification at education level was made as primary, high school and university, education levels were found to be 78%, 17% and 5%, respectively (Öztürk, 2013). In studies carried out in various provinces of Turkey, the education levels of producers are 50%, 58%, 42%, 69% secondary school graduates, 15%, 16%, 20%, 19% high school graduates and 20%, 17%, 19%, 12% respectively (Soysal and Gürçan, 2005, Ören et al., 2010, Uzundumlu et al., 2011, Tunca and Çimrin, 2012). In another study conducted throughout Turkey, it was determined that 57% of beekeepers were primary and secondary school graduates and 31% were high school and associate degree graduates (Emir, 2015).

Although there are differences in the education levels of beekeeping business owners according to regions and provinces, it is noteworthy that more than 50% of beekeepers in Turkey are primary school/primary education graduates. While there is a proportional increase in university graduates among beekeeping business owners across Turkey (Demir et al. 2017), it is thought that this increase may also be due to beekeeping by the educated people in order to generate additional income. It is seen that primary school graduates always constitute the numerical majority in the last ten years in the education level of beekeepers (Çevrimli and Sakarya, 2018).

### **Turkey Beekeepers' Age Range**

The average ages determined in the studies conducted in terms of the average age of the producers are 43.35 in İzmir and Muğla (Saner et al., 2005), 43.88 in Bursa (Vural and Kahraman, 2009), and 40.85 in Adana (Ören et al. , 2010). These ages were found to be similar

to the findings of the study, which is 49 years old (Emir, 2015) in Turkey. Another type of classification in studies is in the form of percentage distribution according to age ranges. In a study conducted in the province of Bingöl, it was reported that 55.5% of beekeepers were 51 years and older (Uzundumlu et al., 2011). In the North-eastern Anatolia Region, 70.9% of them are in the 35-64 age group (Sezgin and Kara, 2011), and in Ordu, 42.8% are over 50 years old (Öztürk, 2013), In Albania, 76.9% of the beekeepers are between the ages of 30-60 (Dedej et al., 2015), and in an EU-wide evaluation, it was reported that 34.5% of the beekeepers are 65 years and older, 24.48% of them are between 55-64 years old and 21.20% are between the ages of 45-54. The remaining 19.82% beekeepers are under the age of 45 (EC, 2013).

The fact that the average age of beekeepers in the EU is higher than the general age of Turkey is a situation determined by both this study and other studies. However, when the studies from the past to the present are examined chronologically, it is noteworthy that the average age of beekeepers in Turkey has come from the 40s to the 50s. This situation gives an idea that young people are not interested in beekeeping, that new generations do not engage in beekeeping activities enough and that beekeeping activities are carried out by elderly and retired people (Çevrimli and Sakarya, 2018).

In terms of the professional experience of beekeeping business owners, the findings in different studies are 16, 20, 18 and 24 years, respectively (Saner et al., 2005, Kekeçoğlu et al., 2007, Ören et al., 2010, Öztürk, 2013). In a study conducted throughout Turkey, this period was determined as 21 years (Emir, 2015).

In terms of professional experience in beekeeping, an average of 20 years or more was determined in two studies, while the average experience period in the remaining studies was found to be between 15-20 years, and similar results were obtained in the findings of our research. The fact that both the education level, the average age and the duration of professional experience remain at the same levels even after years can be interpreted as the fact that a certain age group and education level regularly participate in the beekeeping profession and leave this profession when they reach a certain age and experience (Çevrimli and Sakarya, 2018).

## **Apitherapy**

The term apitherapy comes from the Latin *apis*, meaning "bee". Apitherapy or bee therapy is the use of honey bee products for therapeutic purposes. The history of apitherapy goes back to ancient Egypt, Greece and China. Apitherapy, as a Word meaning, is the use of bee products and bee venom for treatment (Selçuk et al., 2010; Bektaş et al., 2016). In apitherapy, the usage

areas, the usage ways and the doses of bee products, possible undesirable and toxic effects and the points to be considered when using these products are discussed (Atayoğlu and Atayoğlu, 2015). In today's apitherapy centres, therapeutic activities related to apitherapy are mostly carried out according to the principle of homeopathic treatment (Korkmaz and Korkmaz, 2015). The therapeutic efficacy of a substance given in very small doses in a particular disease, by showing the same symptoms caused by that disease, is known as the principle of homeopathic treatment. In apitherapy, which is applied in a 4-5 day period with each session within a certain program, there is a 2-3 day rest period after each session and the treatment lasts for several sessions. In this way, with the rest period between sessions, both the elimination of complaints that may occur during the treatment and the minimization of possible undesirable effects are ensured (Kelle, 2007; Bektaş, 2016).

Bee products, in addition to being considered as nutrients, have also been used for therapeutic purposes throughout history due to the many biologically active substances they contain. In this treatment option, called apitherapy, products such as honey, beeswax, propolis, pollen, royal jelly and bee venom are used. The origin of apitherapy is as old as human history and goes back to ancient Egypt 6000 years ago. Over time, the Romans and Greeks also used bee products for medicinal purposes. Today, in parallel with the re-gaining importance of alternative medicine, apitherapy centres that apply this method have started to become widespread in recent years due to the re-emergence of apitherapy (Ulusoy, 2012; Topal et al., 2015; Bektaş, 2016; Çelik and Aşgun, 2016).

It is known that apitherapy was used in Ancient Egyptian Medicine 6000 years ago, and bees and bee products were used for therapeutic purposes in Ancient Greece and Rome. Apitherapy includes support and/or treatment wholes in which bee and bee products are used in order to control the disease state, protect the current health, prevent and heal the diseases and sustain the healing. Apitherapy products used for this purpose are honey, propolis, bee pollen, bee bread, royal jelly, bee venom and beeswax. In general, apitherapy products with wide indications are widely used on various system diseases and some dermatological problems. In addition, various therapeutic effects of these products such as antibacterial, antifungal, antiviral, antioxidant, anti-carcinogenic, anti-inflammatory, anti-diabetic and immunomodulatory effects have been investigated in many in vitro and in vivo studies. Although the data obtained from in vitro studies are valuable, the evidence value is low when not supported by clinical studies (Sipahi et al., 2021).

### **Apitherapy in Turkey**

Today, bee products are registered among the natural elements used since the beginning of prehistory to supplement and improve food and later to combat and prevent human suffering. Apitherapy, as a traditional practice, dates back to ancient times in human history (Çelik 2019).

Physicians working in the field of Complementary and Alternative Medicine (CAM) and doctors with an apitherapy course certificate issued by the Ministry of Health are considered authorized for treatment with apitherapy in Turkey. Although Traditional and Complementary Medicine (TCM) practices, including apitherapy, have been on the WHO agenda since 1977 and legal regulations have been made in many countries, the first serious step in Turkey was only taken in 2011. The Regulation on Traditional and Complementary Medicine Practices, the first comprehensive legislation in Turkey, was published in 2014 (Tokaç 2021). Apitherapy is defined as "the way bee and bee products are used as a preventative and in the treatment of some diseases" in the Regulation on Traditional and Complementary Medicine Practices issued by the Ministry of Health in Turkey on October 27, 2014. In order to get good results in apitherapy applications, the issue of suitable product comes at the beginning of the necessary conditions. The deficiencies in the standardization of the products used in apitherapy are among the main factors that make it difficult to conduct clinical studies on apitherapy (Atayoğlu, 2019)

It is known that the bee and bee products used in this treatment, which is becoming increasingly widespread in the field of medicine, are not used in any way. These productions are made by beekeepers and if they do not produce them correctly, healthily and consciously, the use of these products will bring more harm than good for both human and animal health.

In terms of food safety, the risks arising from food are evaluated separately during the processing, transportation, storage, purchasing, preservation, preparation and cooking stages of the food from production to consumption and are grouped as physical, chemical and biological risks. Food safety in Turkey is a system carried out according to the risk-based inspection procedure. The official authority responsible for food safety is the Ministry of Agriculture and Forestry in Turkey. Applications and storage conditions at every stage of food from production to consumption are important for health. Bee products are an extremely important food group that is also evaluated therapeutically in terms of food safety due to its use in both food and apitherapy (Artık and Beykaya, 2021)

It should not be forgotten that beekeepers play a key role in the use of bee products for human and animal health purposes. For this reason, products to be used for apitherapy cannot be expected to be beneficial enough unless they are produced by beekeepers who are trained on



the subject and whose production steps are supervised. For this reason, it is important to train beekeepers who will produce bee products for apitherapy and to establish medical bee products manufacturers and MEDICAL BEEPRESIAL for certified apitherapy over time. The studies to be done in this field will positively affect the studies to be done both in the field of apitherapy and in the field of health, as well as increase the importance of beekeeping and the income level of beekeepers in the agricultural field. For this, success in this field will be possible with the cooperation and support of the health and agriculture sectors.

## REFERENCES

- Akyüz, E. (2015). Arı zehri bazı nörolojik ve romatizmal hastalıklara çare olabilir mi? Alınmıştır: Arı Ürünleri ve Sağlık (Apiterapi). Ed.: Akçiçek, E., Yücel, B. Sidas, İzmir, s: 158-163
- Artık N, Beykaya M., 2021. Apiterapi ürünlerinde gıda güvenliği. Atayoğlu AT, editör. Apiterapi. 1. Baskı. Ankara: Türkiye Klinikleri; 2021. p.16- 25.
- Atayoğlu, A.T., Apiterapiye Genel Bakış 2019. Journal of BSHR. 3(Özel Sayı):61-66
- Atayoğlu, A.T., Atayoğlu, A.G. (2015). Dünyada ve Türkiye’de apiterapi. Alınmıştır: Arı Ürünleri ve Sağlık (Apiterapi). Ed.: Akçiçek, E., Yücel, B. Sidas, İzmir, s: 24-28.
- Bektaş, N. (2016). Apiterapide Arı Zehrinin Kullanımı. Ankara Üniversitesi Sağlık Bilimleri Enstitüsü, Doktora Semineri.
- Bektaş, N. (2016). Apiterapide Arı Zehrinin Kullanımı. Ankara Üniversitesi Sağlık Bilimleri Enstitüsü, Doktora Semineri.
- Bektaş, N., Altıntaş, L., Tutun, H., Sevin, S. (2016). Apiterapide Arı Zehrinin Kullanımı. 5. Uluslararası Muğla Arıcılık ve Çam Balı Kongresi, 01-05 Kasım 2016, Muğla, Türkiye, p.: 352-353.
- Bektaş, N., Altıntaş, L., Tutun, H., Sevin, S. (2016). Apiterapide Arı Zehrinin Kullanımı. 5. Uluslararası Muğla Arıcılık ve Çam Balı Kongresi, 01-05 Kasım 2016, Muğla, Türkiye, p.: 352-353.
- Burucu, V., 2021. Arıcılık Ürün Raporu. Tarımsal Ekonomi ve Politika Geliştirme Enstitüsü TEPGE Yayın No: 330, ISBN: 978-605-7599-63-6
- Çelik, K., Aşgun, H.F. (2016). Arılarla Gelen Sağlık “Apiterapi”. Erişim Adresi: <http://apitherapyproject.eu/pdf/20160920/apitherapyhandbook-tr.pdf>. Erişim Tarihi: 01.10.2018.
- Çelik, K., 2019. Be(e) therapy Handbook P:15, 1st printing Oct. Ankara-Türkiye
- Çevrimli, M. B., & Sakarya, E. (2018). Arıcılık işletmelerinin yapısal özellikleri ve sorunları; Ege Bölgesi örneği. *Eurasian J Vet Sci*, 34(2), 83-91.

Dedej S, Delaplane KS, Gocaj E, 2015. A technical and economic evaluation of beekeeping in Albania. *Bee World*, 81(2) 87-97.

Demir P, Aydın E, Yazıcı K, Kırmızıbayrak T, 2017. Ardahan ilinde arıcılık işletmelerinin sorunları ve beklentileri. *Eurasian Journal of Veterinary Sciences*, 33(4) 260-267.

EC, 2013. European Commission Agricultural and Rural Development Evaluation of measures for the apiculture sector final report. [http://ec.europa.eu/agriculture/honey/programmes/index\\_en.htm](http://ec.europa.eu/agriculture/honey/programmes/index_en.htm) Erişim Tarihi: 09/01/2018.

Emir M, 2015. Türkiye’de arıcıların sosyo-ekonomik yapısı ve üretim etkinliği. Doktora Tezi, Ondokuz Mayıs Üniversitesi Fen Bilimleri Enstitüsü, Samsun.

Food and Agriculture Organization (FAO). (2020a). Livestock Primary. <https://www.fao.org/faostat/en/#data/QCL>

Kekeçoğlu M, Rasgele Göç P, 2013. Düzce ili Yığılca ilçesi arıcılık faaliyetleri üzerine bir çalışma. *Uludag Bee Journal*, 13(1), 23-32.

Kelle, I. (2007). Apiterapi. *Dicle Tıp Dergisi*, 34 (4): 311-315.

Kokuludağ, A. (2015). Arı zehiri içeriği ve tıbbi özellikleri. Alınmıştır: Arı Ürünleri ve Sağlık (Apiterapi). Ed.: Akçiçek, E., Yücel, B. Sidas, İzmir, s: 147-151.

Korkmaz, A., Korkmaz, V. (2015). Arı zehri üretimi ve apiterapi. 1.Baskı. Samsun İli Arı Yetiştiricileri Birliği, Samsun.

Ören MN, Alemdar T, Parlakay O, Yılmaz H, Seçer A, Güngör C, Gürer B, 2010. Adana İlinde Arıcılık Faaliyetinin Ekonomik Analizi. Tarımsal Ekonomi Araştırma Enstitüsü (TEAE) yayın no: 178, Ankara

Öztürk G, 2013. Ordu ili arıcılık sektörünün ekonomik yapısı üzerine bir araştırma. Yüksek Lisans Tezi, Atatürk Üniversitesi Fen Bilimleri Enstitüsü, Erzurum.

Öztürk G, 2013. Ordu ili arıcılık sektörünün ekonomik yapısı üzerine bir araştırma. Yüksek Lisans Tezi, Atatürk Üniversitesi Fen Bilimleri Enstitüsü, Erzurum.

Saner G, Engindeniz S, Çukur F, Yücel B, 2005. İzmir ve Muğla illerinde faaliyet gösteren arıcılık işletmelerinin teknik ve ekonomik yapısı ile sorunların üzerine bir araştırma. Ege Üniversitesi Yayınları, Yayın No:126, İzmir

Selçuk, M., Dinç, H., Karabağ, K. (2010). Bal arısı zehrinin biyokimyasal yapısı ve tıptaki yeri. MYO-ÖS 2010- Ulusal Meslek Yüksekokulları Öğrenci Sempozyumu.

Selçuk, M., Dinç, H., Karabağ, K. (2010). Bal arısı zehrinin biyokimyasal yapısı ve tıptaki yeri. MYO-ÖS 2010- Ulusal Meslek Yüksekokulları Öğrenci Sempozyumu

Sezgin A, Kara M, 2011. Arıcılıkta verim artışı üzerinde etkili olan faktörlerin belirlenmesine yönelik bir araştırma: TRA2 bölgesi örneği. *Harran Tarım ve Gıda Bilimleri Dergisi*, 15(4), 31-38.

Sipahi N, Göç Rasgele P, Kaya E. Apiterapi ürünlerinin farmakolojik özellikleri. Atayoğlu AT, editör. Apiterapi. 1. Baskı. Ankara: Türkiye Klinikleri; 2021. p.55-60

Soysal Mİ, Gürcan EK, 2005. Tekirdağ ili arı yetiştiriciliği üzerine bir araştırma. Tekirdağ Ziraat Fakültesi Dergisi, 4(2), 161-165.

Şahinler, N. (2000). Arı ürünleri ve insan sağlığı açısından önemi. MKÜ Ziraat Fakültesi Dergisi. 5 (1-2): 139-148.

Tanyüksel, M. (2015). Tıp açısından apiterapi. Alınmıştır: Arı Ürünleri ve Sağlık (Apiterapi). Ed.: Akçiçek, E., Yücel, B. Sidas, İzmir, s: 29- 35

Tokaç M., 2021. Apiterapide mevzuat ve etik . Atayoğlu AT, editör. Apiterapi. 1. Baskı. Ankara: Türkiye Klinikleri; 2021. p.1-5.

Topal, E., Yücel, B., Kösoğlu, M. (2015). Arı Ürünlerinin Hayvancılık Sektöründe Kullanımı. Hayvansal Üretim. 56 (2): 48-53.

Tunca Rİ, Çimrin T, 2012. Kırşehir ilinde bal arısı yetiştiricilik aktiviteleri üzerine anket çalışması. Iğdır Üni. Fen Bilimleri Enst. Der, 2(2), 99-108.

TÜİK (2022). Türkiye İstatistik Kurumu Hayvancılık İstatistikleri Veri Tabanı. <https://biruni.tuik.gov.tr/hayvancilikapp/hayvancilik.zul> Erişim Tarihi: 05.01.2018

Ulusoy, E. (2012). Bal ve ariterapi. U. Arı D. / U. Bee J.. 12(3): 89-97

Uzundumlu SA, Aksoy A, Işık HB, 2011. Arıcılık işletmelerinde mevcut yapı ve temel sorunlar; Bingöl İli Örneği. Atatürk Üniv. Ziraat Fak. Derg, 42(1), 49-55.

Vural H, Karaman S, 2009. Socio-economic analysis of beekeeping and the effects of beehive types on honey production. Not. Bot. Hort. Agrobot. Cluj, 37(2), 223-227.