

# General Beekeeping Structure in Sivas, Türkiye

## Arı Yetiştiriciliğinin Genel Yapısı Sivas, Türkiye

Erhan ARSLAN<sup>1</sup>   
Metin BAYRAKTAR<sup>2</sup> 

<sup>1</sup>Food, Agriculture and Livestock Directorate, Sivas, Türkiye  
<sup>2</sup>Department of Animal Science, Faculty of Veterinary Medicine, Fırat University, Elazığ, Türkiye



Geliş Tarihi/Received: 01.01.2023  
Kabul Tarihi/Accepted: 07.04.2023  
Yayın Tarihi/Publication Date: 16.08.2023

Sorumlu Yazar/Corresponding Author:  
Erhan ARSLAN  
E-mail: erhan.arslan@tarimorman.gov.tr

Atıf: Arslan E, Bayraktar M. Arı yetiştiriciliğinin genel yapısı Sivas, Türkiye *Vet Sci Pract.* 2023;18(2):65-70.

Cite this article as: Arslan E, Bayraktar M. General beekeeping structure in Sivas, Türkiye. *Vet Sci Pract.* 2023;18(2):65-70.



Copyright@Author(s) - Available online at [veterinarysciences-ataunipress.org](http://veterinarysciences-ataunipress.org)  
Content of this journal is licensed under a Creative Commons Attribution NonCommercial 4.0 International License

### ABSTRACT

In this study, the level of beekeeping activities in Sivas, which has a wide area, and the technical, economic, and market possibilities of honey production and its by-products were evaluated. As well as, it is foreseen to be a source for studies on beekeeping. A survey was conducted in a total of 325 enterprises out of 2097 beekeeping enterprises existing in Sivas province center and in 16 districts. The data obtained were evaluated by considering appropriate statistical methods and the current situation, problems, and development opportunities of beekeeping in Sivas province were tried to be revealed. It has been observed that breeders have problems such as harsh and long winter conditions, wintering problems, shortage of quality and suitable queen bees, inability to find the market opportunity for the produced honey, and insufficient activities of the organizations. It has been concluded that increasing the number of hives through education, encouraging wandering, and producing mutual projects with government programs will increase honey production per hive. With the increase in honey production and the availability of suitable market conditions, the income of the rural people will increase as well as population migration will be prevented.

**Keywords:** Beekeeping, honey production, number of colonies, socioeconomic structure, Türkiye

### ÖZ

Bu çalışmayla yüzölçümü geniş bir alana yayılan Sivas ilinde arıcılık faaliyetlerinin düzeyi ve buna bağlı olarak bal üretimi ile yan ürünlerinin üretiminin teknik, ekonomik ve pazar-piyasa olanakları değerlendirilmiştir. Bununla birlikte arıcılık ile ilgili çalışmalara kaynak teşkil etmesi öngörülmüştür. Sivas ili merkez ve 16 ilçede halen mevcut olan 2097 arıcılık işletmesinden toplam 325 işletmede anket çalışması yapılmıştır. Elde edilen veriler uygun istatistiksel metotlar göz önünde bulundurularak değerlendirilmiş ve Sivas ilinde arıcılığın mevcut durumu, problemleri ve gelişme olanakları ortaya konulmaya çalışılmıştır. Yetiştiricilerin sert ve uzun geçen kış şartları, kışlatma problemleri, kaliteli ve bölgeye uygun ana arı sıkıntısı, üretilen balın pazar-piyasa olanağını bulamaması, örgütlerin faaliyetlerinin yetersiz olması gibi sıkıntıları olduğu görülmüştür. Bu tespitlerle ilgili kovan sayısının eğitimle artırılması, gezginciliğin teşviki ve örgütlerin hükümet programları ile karşılıklı projeler üretmesi kovan başına bal üretimini artıracak kanaatine varılmıştır. Bal üretiminin artması ve uygun pazar şartlarının bulunmasıyla kırsal kesimin gelirinde artış olacağı gibi nüfus göçünün de önüne geçilecektir.

**Anahtar Kelimeler:** Arı yetiştiriciliği, bal üretimi, koloni sayısı, sosyo-ekonomik yapı, Türkiye

### INTRODUCTION

Beekeeping production provides very important contributions to the business and therefore to the country's economy. It is an attractive line of business with its features such as using less labor force compared to agricultural branches, low operating costs, easy storage of its products, and selling at value prices. It is accepted that beekeeping provides jobs, income, and healthy nutrition opportunities to the rural population in developing countries.<sup>1</sup>

The geography of Türkiye has a high potential for beekeeping in terms of both its location and the richness of the climate.<sup>2</sup> Since beekeeping is an indispensable element of agriculture and its contribution to pollination will increase the yield and quality of plant production, it will make the producer smile, encourage the profession and make beekeepers economically strong.<sup>3,4</sup>

As in other agricultural activities in Türkiye, new technical developments are being implemented in beekeeping day by day.<sup>5</sup> Türkiye ranks second in the world in honey production with over 6 million colonies. The average honey yield per colony is quite low in Türkiye. One of the most important reasons for this is the lack of technical information such as bee individuals and colonies, their behavior, as well as the lack of sufficient information about diseases and pests, and the lack of timely and accurate combat.<sup>6</sup>

When similar studies on beekeeping are examined, the average age of beekeepers was reported as 40.91 in a study conducted in Bahçesaray district of Van province.<sup>7</sup> In a study conducted in Bingöl province, it was reported that 43% of beekeepers were primary school graduates and 21% were secondary school graduates.<sup>8</sup> In a study conducted in Gaziantep province, it was reported that 54% of beekeepers learned beekeeping as their sole source of income, 34% learned beekeeping from another beekeeper (experienced), and 28% from their father.<sup>9</sup> In the study conducted in Kırşehir province, the loss of colony in the last 3 years was reported as 13%. It has been reported that varroa is seen with the highest rate of 65%, lime disease is encountered secondly with 18%, and foulbrood is encountered with a rate of 9%.<sup>10</sup> In the findings of the research conducted in the Trakya Region, it was reported that 70% of the beekeepers did not care and feed before winter.<sup>11</sup> In the research conducted in the Southern Marmara Region, it was reported that the organization was 70%, 44% did not follow the publications related to beekeeping, and 76% of the beekeepers raised the queen beekeepers themselves.<sup>12</sup>

Beekeeping is one of the most suitable branches of agricultural activity to support the agricultural economy in Sivas, in terms of its geographical location, land structure, climate, and vegetation, as well as the socioeconomic structure of its people. Sivas province, on the other hand, has the second largest area of Türkiye and has more area than some European countries such as Kosovo and North Macedonia. It is also on the transit route of itinerant beekeepers.

Sivas province ranks fourth among the provinces in terms of both the number of colonies and honey production in beekeeping in Türkiye.<sup>13</sup> With this study, which will be carried out in Sivas province and its surroundings, it is aimed to evaluate the beekeeping potential in the region, to raise awareness of the producer mass, to evaluate the positive and negative factors that affect the production of honey and by-products, and to increase the yield per hive by examining the demographic and socioeconomic structure of beekeeping.

## MATERIALS AND METHODS

The research material consisted of 325 beekeeping establishments that can best represent the population at 95% confidence

level and 10% confidence interval, from 2097 beekeeping enterprises engaged in beekeeping in the center and 16 districts of Sivas, using the proportional sampling method.<sup>14</sup> The data source of the research consisted of face-to-face survey data made with these enterprises selected by random stratified sampling method among the total enterprises. The study was prepared in accordance with the Declaration of Helsinki.

The total number of existing beekeeping enterprises in the center and 16 districts of Sivas province was taken from the records of the Provincial Directorate of Food, Agriculture and Livestock, and the number of beekeeping enterprises to be surveyed was determined in direct proportion to the number of enterprises owned, and these are given in Table 1.

The questionnaire questions used in the research were prepared by making use of similar studies. Before starting the survey, a trial survey was conducted to test the accuracy and comprehensibility of the survey questions, thus minimizing the possible negative effects.

In the research, the Direct Interview method was used during the collection of the material. In this method, the questionnaire forms were prepared in advance and filled in by the researcher under the supervision of the producer.

The questionnaire forms filled with the beekeepers were examined and the necessary controls and arrangements were made, and this information was summarized and thus the analysis was made ready for evaluation. Using the Statistical Package for Social Sciences (SPSS) version 22.0 (IBM Corp.; Armonk, NY, USA) statistical package program from the data obtained, their frequencies, percentages, and honey yield averages were calculated and summarized in the frequency distribution tables.

## RESULTS AND DISCUSSION

There is no scientific study that can serve regional beekeeping in Sivas. In the research conducted on beekeepers in Sivas province, the level of knowledge of the breeders on beekeeping and regional problems was collected by interviewing face-to-face. In the research, the issues that will shed light on the studies were emphasized, the problems related to beekeeping were discussed and it was aimed to help the projects to be done. Research findings are gathered under the main headings of socioeconomic characteristics, beekeeping activities, organization and supports, diseases and enemies, and marketing trade.

### Socioeconomic Qualifications

#### Age and Gender

No female breeder could be identified from randomly selected breeders in the surveys. It has been observed that the contribution

Table 1. Number of Existing and Surveyed Beekeeping Enterprises in Sivas Province Districts

District	Number of Existing Businesses	Number of Selected Businesses	District	Number of Existing Businesses	Number of Selected Businesses
Akıncılar	28	4	Kangal	63	10
Altınyayla	18	3	Koyulhisar	136	21
Divriği	173	27	Merkez	241	37
Doğanşar	23	4	Suşehri	111	17
Gemerek	37	6	Şarkışla	61	9
Gölova	23	4	Ulaş	50	8
Gürün	155	24	Yıldızeli	160	25
Hafik	331	51	Zara	302	47
İmranlı	185	29	<b>TOTAL</b>	<b>2097</b>	<b>325</b>

Table 2. Distribution of Beekeepers in Sivas Province by Age and Honey Yield

Age Groups	Bee Business		Honey Yield
	Number	Percent	Avg ± Standard Error
15-25	4	1.23	21.50 ± 2.02
26-35	40	12.31	22.44 ± 1.66
36-45	99	30.46	21.53 ± 1.02
46-55	86	26.46	21.37 ± 1.07
<55	96	29.54	22.23 ± 1.00
Total	325	100	

of women is mostly limited to helping their spouses in beekeeping and honey production activities.

Especially the young population of Türkiye migrates to cities and big cities. Unfortunately, there is an elderly population in rural areas and villages. The most important reasons for migration are unemployment and financial difficulties. Beekeeping is a field of activity that will show itself as a profession and livelihood for the young population, additional income for the elderly population, vitality to the plant product, and contribution to the country's economy as a line of business that can be done in areas where urban development is far away, without the need for large lands. Age distribution and honey yield of beekeepers in Sivas province are given in Table 2.

As can be seen in Table 2, it was determined that most of the beekeepers (86.5%) were breeders over the age of 35. The research shows that the average age is 47 years, and unfortunately, it is seen that the majority of beekeeping activities are carried out by the elderly population. The research reveals the necessity of preventing the disappearance of the young workforce in rural areas or their migration to the cities. The beekeeping profession should be encouraged to young people, they should be informed with courses, and they should be supported with credits or hive incentives.

### Education Status

The results of the questions investigating the effect of education on honey yield are given in Table 3.

According to the results of the research, 42.46% of 138 breeders stated that they were primary school graduates. The number of illiterates is low at 8 (2.46%). The beekeepers, who are 23 (7.08%) graduates of college, are retired beekeepers whose beekeeping activities do not go beyond making use of their spare time. It was determined that illiterate people had the least honey yield. Similar results were also seen in studies conducted in Bingöl and Adana. In a study in Bingöl, when the relations between the yield per hive and the education level of the household head were examined, it

Table 3. Distribution of Beekeepers in Sivas Province According to Their Education Level and Honey Yield

Education Status	Bee Business		Honey Yield
	Number	Percent (%)	Avg ± Standard Error
Not literate	8	2.46	16.13 ± 1.59
Primary school	138	42.46	22.10 ± 0.83
Middle school	68	20.92	22.54 ± 1.10
High school	88	27.08	21.92 ± 1.13
Collage/faculty	23	7.08	19.61 ± 2.45
Toplam	325	100	

was seen that the producers who received education at the primary school level obtained more honey per hive. The reason for this is that these people, who are generally above the middle age group, do not see beekeeping as a hobby.

In Türkiye, beekeeping is generally done with ancestral methods and unconsciously. As people who do this job, beekeepers themselves stated that they should be trained practically and theoretically. They stated that some beekeepers emphasized the importance of conscious beekeeping and education in honey yield by giving an example that they had obtained an average of 20 kg honey yield before and increased it to 50 kg as a result of beekeeping training.<sup>15</sup>

### Beekeeping Experience

In the study, it was seen that 44.62% of beekeepers have been beekeeping for more than 20 years. In honey yield, it has been observed that they have more honey on average than beekeepers with 6-10 years of experience.

In normal conditions, efficiency is directly proportional to experience. For this, the growers were asked about their honey yield in the last 3 years, and the results are given in Figure 1.

According to the results of the survey, 26% of the growers stated that they bought honey over 30 kg. The costs of people who do not have a level of knowledge with many hives at the beginning will bring a financial burden, and the negativities of inexperience will reduce the excitement of beekeepers. In the survey conducted with the breeders, it was determined that people who do not have beekeeping experience should start their beekeeping activities with 5 hives. The average honey yield of all beekeepers was calculated as 21.82 ± 0.55 kg.

### Beekeeping Activities

#### Bee Breeds Used in Production

Questions were asked about the demands and works of the breeders regarding the bee breeds used in the region. About

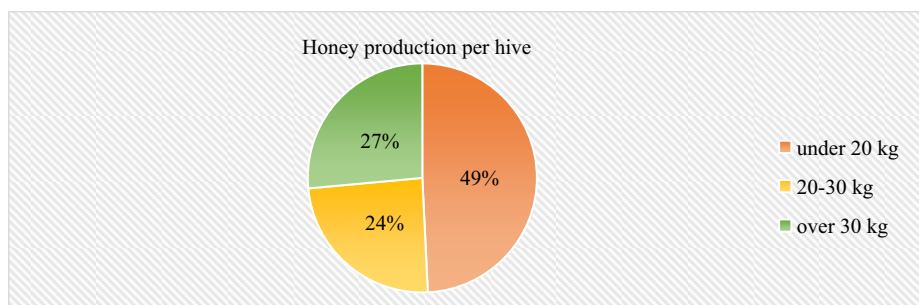


Figure 1. Distribution of beekeepers in Sivas province according to their average honey production

81.23% of the breeders stated that they use Caucasian hybrids and that it is a breed that adapts to the region. While 39.69% were dissatisfied with the queen bee they bought commercially, 28% of the beekeepers stated that there was no change in the yield. Again, beekeeping institutes should be able to reach beekeepers for quality queen rearing and state policies should support queen breeding.

### Beekeeping Knowledge Level

As a result of the questions asked about acquiring and increasing beekeeping knowledge, 59.69% of the breeders stated that they received information from experienced beekeepers, others from various publications, courses, and institutions. Similar results were obtained in the study conducted in Tekirdağ province. In the study, it was stated that 26% of beekeepers learned beekeeping from their fathers and 50% from the environment.<sup>16</sup> While there are beekeeping departments in many universities, beekeeping college programs have been opened, and there are people appointed as beekeeping specialists in every Food, Agriculture and Livestock directorate, it is a fact that modern beekeeping techniques still cannot be accepted by producers.<sup>17</sup> Manufacturers should improve themselves and get all the necessary information. For this, they should attend courses, congresses, symposiums, and seminars. They should read books on beekeeping, be in constant dialogue with successful producers, and get help from the relevant programs of universities.<sup>18</sup>

### Wandering Status

According to the results of the research, 35.69% of the breeders stated that they did fixed beekeeping, and 12.92% of them stated that they moved their colonies to nearby towns or villages once. In the study, it is seen that the honey yield of those who carry their hives to nectar-rich places once or more than 3 times a year is 22 kg; while the mean yield of less movers is 21 kg and below. In a study conducted in Elazığ, it was determined that 50% of the beekeepers were fixed beekeepers and the other half were nomadic beekeepers.<sup>19</sup>

The application of mobile beekeeping to a large extent is due to the insufficient nectar period in Sivas, since the season starts late and ends early. Accommodation poses a problem for both mobile beekeepers and stationary beekeepers. Wandering beekeepers face difficulties due to features such as rent, suitable and productive vegetation, and water source, while stationary beekeepers complain about the excessive amount of itinerant beekeepers coming to their region, hence the nectar deficiency, in short, the lack of capacity regulation. In this regard, under the leadership of the Ministry of Food, Agriculture and Livestock and with the participation of the unions, areas with suitable flora can be allocated to the wandering beekeepers and they can be accommodated in return for rent.

### Beekeeping Costs

The results of the research are in the first place, 40%-80% of the beekeeping costs of 91% are spent on feeding expenses, and secondly, 1%-20% of the 90% are related to transportation, labor, and accommodation expenses, especially medicine and other variables (packaging, honeycomb, etc.) proved to be spent.

### Queen Bee Breeding and Replacing

About 78.15% of the beekeepers in Sivas stated that they change their queen bees every 2 years. The results of the research indicated that 36% of the breeders were not satisfied with the commercial queen bees they used in their businesses, while 28% of

them stated that it did not affect their yield much. In the interviews, it was stated that the breeder reared his own queen after several unsuccessful commercial queen trials. According to the results of the research, the most important problem that beekeepers want to see as state support is the queen bee. For this, studies should be carried out with the necessary public institutions and private organizations to ensure quality and appropriate queen bee supply. It is also a very important necessity to raise queen bees that have been improved according to the conditions of the country.

## Organization and Support

### Organization

In the research, while the number of breeders who are members of a union or cooperative related to beekeeping was 284 (87.38%), the number of breeders who are not members of any union was 41 (12.62%). About 68.3% of the members of unions or cooperatives stated that they were dissatisfied with the union they were a member of, whereas 19.8% stated that the unions were sufficient.

The breeders stated that the organizations and unions could not fully fulfill their goals. They stated that the courses and seminars were insufficient, and the cooperatives and unions only required membership due to government support and stated that they did nothing but collect dues, that the produced honey was released to the market very cheaply, and that they could not show a presence in important matters such as branding, cheap input, and quality breeding. The reason why farmer organizations collect monthly and annual dues is that they work for the benefit of their members. It is important to organize courses, seminars, meetings, and organizations for the benefit of beekeepers in their unions and cooperatives, to inform beekeepers, to inform them of innovations, and to help them find the market for their products with cheap and high-quality inputs. According to research done, it has been determined that the producers in Elazığ mostly sell honey at retail. It has been determined that the problems faced by the producers in marketing are that the honey cannot be sold at the value it deserves, foreign products enter the market uncontrollably, hesitations about the naturalness of the products, the absence of cooperatives that will be effective in marketing and the lack of price standards for their products. One of the biggest problems of beekeepers is the marketing problem. The fact that honey prices are not established under free market conditions has created the main problems for the producer. The price issue will be resolved by the producers coming together and providing the organization to market their own products.<sup>20</sup>

### Credit Usage

According to the survey results, 72.62% of the breeders stated that they did not use credit. About 15% of the breeders who used loans in amounts higher than 30 000 TL stated that they used the loan they received on behalf of beekeeping not only for beekeeping but also for amortizing other farming activities. For this, it is important to run the monitoring and inspection mechanism of credit institutions and the state.

## Disease and Enemies

### Bee Diseases

The breeders were asked questions about the diseases they encountered and the solution methods, and the diseases encountered by the beekeepers in Sivas are given in Table 4.

**Table 4. Distribution of Beekeepers in Sivas Province According to Bee Diseases They Encountered in Their Farms**

Disease	Bee Business	
	Number	Percent
Varroa	256	78.77
Foulbrood	64	19.69
Nosema	0	0.00
Lime disease	5	1.54
Leave the colony	0	0.00
Total	325	100

As can be seen, varroa has a high effect on colony existence and honey production on bees and beekeepers. In the study, the breeders stated that they had problems with the use of drugs, either they could not find an effective drug or they could not use it because it left a residue in the honey. While 224 (68.92%) of 256 of 325 beekeepers surveyed are struggling with varroa, they are fighting against varroa in early spring and late autumn, while 29 (8.92%) are struggling with varroa. In addition to these, one breeder stated that he did not apply any precautions while another breeder struggled for precautions in the spring. In this regard, especially academicians and institutes should work together consciously, and beekeepers should put forward ways of fighting with treatment methods that will help them in their fight against diseases and pests.

### Bee Pests

In the dialogues made with the breeders during the survey, they stated that they encountered bee enemies such as bears, bees, and hornets, but they were isolated and did not cause great colony losses.

In a study, it was tried to remove drone and worker bees from closed eyes with oxalic acid, lactic acid, perizin, orange peel, eucalyptus peel, and leaf. As a result, applications that can be an alternative to drug administration and that do not harm human health have been identified.<sup>21</sup> It is certain that with similar studies, beekeepers will be beneficial in combating bee pests and preventing colony losses, thus increasing honey yield.

### Marketing Trade

In the research, the breeders were asked about the most important problem of beekeepers, such as high input prices, lack of quality breeders, accommodation and rent, agricultural spraying, lack of education, credit, wrong support policy, high transportation costs, security, and marketing of other bee products other than honey. In the first question, 91 (28.00%) people wrote high input prices for their first choice, while 89 (27.38%) people wrote high input prices for their second choice. The last choice that the breeders do not see as a problem is the marketing of bee products other than honey, with 92 (28.31%), the reason being that there is almost no production of bee products other than honey in the region.

### Marketing Problem

In the survey, growers were asked to rank the options related to problems in marketing, such as illegal or imported honey entry, consumer's distrust of honey, lack of standard production, forward sales, and fraud options. According to the results, 256 people (78.77%) attributed the first choice to smuggled or imported honey, the second choice was attributed to the insecurity of 233 (71.69%) consumers, and the third choice was the lack of standard production by 204 people (62.77%).

According to the research, it is seen that the problems of beekeepers is a common problem in Türkiye. Unions and cooperatives with a membership of 87.38% should focus on marketing or branding of honey and implement activities that will provide publications such as films, brochures, and seminars to raise awareness of consumers about the benefits and quality of honey in coordination with the ministry.

As a result, it is important that the Ministry of Food, Agriculture and Livestock carries out policies on providing rich nectar resources to beekeepers, especially training and supervision of beekeepers. Unions and Cooperatives, which are farmers' organizations, are required to create a market for their products with cheap raw materials for their members. Universities and institutes are required to carry out bee breeding studies suitable for their regions along with treatment against bee diseases and pests. Considering the precautions and suggestions for the problems of beekeepers in Sivas province, it has been concluded that honey production per hive can be increased by producing solutions to important problems such as bee losses, marketing, and employment due to conscious beekeeping.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Research Planning – M.B.; Literature Review – E.A.; Preparation of Survey Questions – M.B.; Survey Study – E.A.; Entering Study Data to Excel – E.A.; Evaluation of Data with Statistical Programme – M.B.; Interpretation of Results – E.A.; Critical Review – M.B.; Writing Manuscript – E.A.

**Declaration of Interests:** The authors declare that they have no competing interest.

**Funding:** The authors declared that this study has received no financial support.

**Hakem Değerlendirmesi:** Dış bağımsız.

**Yazar Katkıları:** Araştırmayı Planlama – M.B.; Literatür Taraması – E.A.; Anket Sorularını Hazırlayan – M.B.; Anket Çalışması – E.A.; Çalışma Verilerini Excel Programına Girme – E.A.; İstatistik Programında Verileri Değerlendirme – M.B.; Bulguları Yorumlama – E.A.; Eleştirel İnceleme – M.B.; Araştırmayı Yazma – E.A.

**Çıkar Çatışması:** Yazarlar çıkar çatışması bildirmemişlerdir.

**Finansal Destek:** Yazarlar bu çalışma için finansal destek almadıklarını beyan etmişlerdir.

### REFERENCES

1. Karacaoğlu M, Gençer HV, Uçak AK, Kahya Y. Arıcılık sektöründe mevcut durum kısıtlar ve fırsatlar. Türkiye ziraat mühendisliği IX. *Teknik Kongresi Bildiriler Kitabı*. 2020;2:159-174.
2. Polat R, Esim N, Ürüşan Z, Caf A, Ahıskalı M, Canlı D. Solhan (Bingöl) Florasının arıcılık açısından değerlendirilmesi. *Türk Doğa ve Fen Dergisi*. Yıl 1. 2020;9(Özel Sayı):1-10. [CrossRef]
3. Kuvancı A. Bal Arılarının Polinasyona (Tozlaşma) olan etkisi. *Arıcılık Araştırma Enstitüsü Derg.* Yıl 1. 2009;2(12):12-15.
4. Sıralı R, Uğur A, Türkmen M. Bal Arılarının sebze Üretimindeki rolü. *Arıcılık Araştırma Enstitüsü Derg.* Yıl 3. 2011;3(6):3-6.
5. Kumova U, Korkmaz A. Türkiye arı yetiştiriciliğinde Çukurova bölgesinin yeri ve önemi. *Hayvansal üretim*. 2000;41:48-54.
6. Güneşoğlu M. *Bal Arısı Kolonilerinde Bulunan Arı Zararlısı İle Savaşımında Erkek Arı Gözlerini Tuzaklama Yöntemi Etkinliğinin Araştırılması*. Ömer Halis Demir Üniv. Türkiye: Fen Bilimleri Enstitüsü; 2019.

7. Erkan C. *Van İli Bahçesaray İlçesi Arıcılık Faaliyetleri ve Sorunları*, Y.Y.Ü. Türkiye: Fen Bilimleri Enstitüsü; 1998.
8. Uzundumlu AS, Aksoy A, Işık HB. Arıcılık işletmelerinde mevcut yapı ve temel sorunlar; Bingöl İli örneği, Atatürk Üniv. *Ziraat Fak Derg.* 2011;42(1):49-55.
9. Kutlu MA. Gaziantep ili arıcılık düzeyinin saptanması, sorunları ve çözüm yolları. *TTDBD.* 2014;1(4):481-484.
10. Tunca Rİ, Çimrin T. Kırşehir ilinde bal arısı yetiştiricilik aktiviteleri üzerine anket çalışması, Iğdır Üniversitesi Fen bilimleri Enstitüsü. *Dergisi.* 2012;2(2):99-108.
11. Sıralı R, Doğaroğlu M. Trakya bölgesi arı hastalıkları ve zararlıları üzerine anket sonuçları. *Uludağ Arıcılık Dergisi.* 2005;5:71-78.
12. Çakmak İ, Aydın L, Seven S. ve ark. Güney Marmara bölgesinde arıcılık anket sonuçları. *Uludağ Arıcılık Derg.* 2003;3(1):31-36.
13. Türkiye İstatistik Kurumu, 2013. *Hayvansal üretim istatistikleri, iller bazında bal verimi.* Türkiye.
14. Çözüm Araştırma. <http://www.cozumarastirma.com.tr/Default.asp?P=0&K=0&K1=60>; 2014. Accessed 05.02.2014.
15. Kekeçoğlu M, Gürcan EK, Soysal Mİ. Türkiye arı yetiştiriciliğinin bal üretimi bakımından durumu. *JOTAF.* 2007;4(2):227-236.
16. Soysal Mİ, Gürcan EK. Tekirdağ ili arı yetiştiriciliği üzerine bir araştırma. *Trakya Üniversitesi Ziraat Fakültesi.* 2005;2(2):161-165.
17. Günbey VS. Gezgin Arıcılık. *Arıcılık Araştırma Dergisi.* Yıl 1. 2009;1(40):40-43.
18. Köseoğlu M. Teknik Arıcılık Koşulları ve İlkbahar Bakımı. *Hasad Yayıncılık Dergisi.* 2009;(287):42-49.
19. Özcan İ. Tarımsal Üretim ve Geliştirme Genel Müdürlüğü Arıcılık Faaliyetleri. *Arıcılık Araştırma Dergisi.* Yıl 1. 2009;2:35-38.
20. Seven İ, Akkılıç ME. Elazığ'daki arıcılık işletmelerinin üretim ve pazarlama problemlerinin tespiti ve çözüm önerileri, Lalahan hay. *Araşt Enst Derg.* 2005;45(2):41-52.
21. Çetin M. *Bal Arısı (Apis mellifera L.) Kolonilerinde Varroa destructor'un Kontrolünde Bitkisel, Kimyasal ve Biyoteknik Uygulama Yöntemlerinin Karşılaştırılması* [Yüksek Lisans Tezi]. Çukurova Üniversitesi Fen Bilimleri Enstitüsü, Zootekni Anabilim Dalı, 2010.