GENERAL BEEKEEPING STRUCTURE OF TURKEY

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Abstract: This review is aimed to investigate the general structure, potential and their some important characteristics of Turkish beekeeping. Additional, important apicultural areas, amount and type of bee hives, bee races, bee flora, migratory beekeeping, honeybee products, honeybee management, diseases and pests, main problems and some effected factors on apicultural yield were presented and their solutions suggested.

Key words: Beekeeping, Turkey, Bee Products, Beekeeping Problems

TÜRKİYE ARICILIĞININ GENEL DURUMU

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Özet: Türkiye doğal koşullarının, uygun iklim ve zengin floral zenginliği doğrultusunda büyük bir arıcılık potansiyeline sahiptir. Arıcılık, bitkisel üretime olan katkısı ve insan sağlığındaki önemi nedeni ile de Türkiye'nin en yaygın ve geleneksel tarımsal etkinliklerden biridir. Türkiye coğrafi konumu ve ekolojisi ile özellikle nisan ve eylül ayları arasında arıcılık faaliyetleri için ideal bir ülke konumundadır. Ülkenin zengin turunçgil alanlarına, kültür bitkilerinin çeşitliliğine ve dağlık bölgelerdeki doğal floral kaynaklara sahip olması nedeniyle pek çok arı yetiştiricisi kolonilerini kışlatmak, geliştirmek ve üretim amacıyla yoğun gezginci arıcılık faaliyeti göstermektedir.

Türkiye'de farklı iklim ve ekolojik şartlara uyum sağlamış bal arısı ırk ve ekotiplerinin büyük genetik çeşitliliği söz konusudur. Her bir arı ırkı ve ekotipi morfolojik, fizyolojik ve davranış karakterleri açısından bulundukları bölgenin özelliklerini yansıtmaktadırlar.

Bugün dünyada yaklaşık 52 milyon koloniden 1,100,000 ton bal üretilmektedir. Türkiye 4.3 milyon dolayında koloni sayısı ile dünyada üçüncü, 67,259 ton bal üretimi ile dördüncü sıradadır. Ancak, koloni başına ortalama bal verimi 1999 yılı resmi rakamlarına göre 15.6 kg'dır. Koloni sayısı ve bal verimi her yıl durmadan artış göstermesine karşın, bu durum ülkenin var olan ekolojik zenginliğinin gerektirdiği potansiyel açısından tatmin edici değildir. Yetersiz ana arı üretimi, yaşlı ana arı ve standart olmayan arı kovanı kullanımı, yanlış balarısı yönetimi ile hastalık ve zararlılar ülkedeki düşük bal veriminin başlıca nedenlerindendir. Dünyada sadece Türkiye ve Yunanistan'da üretilebilen çam balı, ihracatta söz sahibi olabileceğimiz büyük bir fırsat olarak düşünülmelidir. Ancak bu büyük arıcılık potansiyeli de ne yazık ki gerektiği gibi değerlendirilememektedir.

Devlet tarafından arıcılığa gerekli desteğin sağlanmaması, üreticinin ve ihracatçının belirli düzenlemelerle birlik altına alınmaması, bazı arı ürünlerinde hileye başvurulması, arı ürünleri ile ilgili standartların güncel şartlarda düzenlenmemesi, teknik ve eğitime dayalı bir çok sorun, arı ürünlerinin dış alım ve satımında zorlukların yaşanmasına neden olmaktadır. Bazı olumsuz koşullara rağmen, her türlü bitkisel ve hayvansal faaliyetin yoğun bir şekilde yapıldığı ülkede arıcılık önemli bir tarımsal girdi olarak, üretim ve pazarlama sistemi içerisinde potansiyelini geliştirebilecek bir yapı ve ülke ekonomisine önemli bir oranda girdi sağlayacak nitelik göstermektedir.

Bu çalışmada Türkiye arıcılığının genel yapısı, potansiyeli ve önemli özelliklerinin incelenmesi amaçlanmış, ayrıca önemli arıcılık yöreleri, kovan tipi ve sayısı, arı ırkları, arı florası, gezginci arıcılık, bal arısı ürünleri, bal arısı yönetimi, hastalık ve zararlılar, başlıca sorunlar ile arıcılıkta verim üzerine etkili olan bazı unsurlar sunulmuş ve bunlara ilişkin çözüm önerileri öne sürülmüştür.

Anahtar Kelimeler: Türkiye, Arıcılık, Arı Ürünleri, Arıcılığın Sorunları

INTRODUCTION

Beekeeping has been popular in Turkey, since the ancient times of Anatolian civilizations, Seljuk's State, Anatolian Turks Principalities and Ottoman State (Şenocak, 1988). Turkey has only a short history of beekeeping after the introduction of modern apiculture and the problems arising from the environment in each area have not all been identified and solved (Nakamura, 1999).

Beekeeping sector has developed very fast after World War II in Turkey. Beekeeping is possible within the all seven geographical regions of Turkey. Climatically and environmental conditions were always very suitable to practice the art of rearing bees (Akbay, 1986). Just now, there are supposed to be about 4.3 million honeybee colonies on Turkish soil. Turkey is in the third place with honeybee potential and in forth place with honey production in worldwide (Gülpınar, 2000).

Many people make a living from bees. Today in our country, we have 40,000 professional beekeepers (Kaftanoğlu, 1998). Because, beekeeping is a most important income source over 141,000 families in Turkey (Kumova, 2000). Although most of our beekeepers are teachers, farmers, retired, religious leaders and hobbyist who have only a few hives and who simply enjoy working with these fascinating and useful insects (Kayral and Kayral, 1983). Even today the beekeepers in Turkey gain from the experiences of their forefathers. But basically we do not have many professionals. Most of our beekeeping is supplementary to other activities realized by people in rural areas (Spartinos, 1990).

"Unfortunately, Turkey has lagged behind other nations in the systematic use of honeybees to enhance pollination in order to improve crop yield and quality. The irony is that Anatolia region does have a very large bee industry focused on honey production. This honeybee potential is based on its utilization of many different *Apis mellifera* races and ecotypes, which are native to Anatolia and Thrace peninsulas" (Çakmak, 1999).

The aim of this present review was to investigate the general apicultural potential and their some important characteristics of Turkish beekeeping.

Important Apicultural Areas

Every different region of Turkey has specific beekeeping and climatically condition, flora and management. Most beekeeping in Turkey takes place in Black Sea, Aegean, Eastern and Central Anatolian, Marmara and Southeastern Anatolia regions (Şenocak, 1988; Genç, 1993; Kumova, 2000). Very important honey production districts in Turkey are high plateaus of Kars, Erzurum, Bitlis, Kayseri, Tunceli, Ağrı, Yozgat, Şırnak, Batman, Hakkari, Bingöl, Van, Muş, Gümüşhane, Artvin, Giresun, Rize, Erzincan, Bayburt, Adıyaman, Malatya, Sivas cities, Çukurova, Harran, Ergene and Menderes plains, Karacadağ, Anzer, Ovit, Sultanmurat, Alucra, Çamoluk, Zigana, Sahara, Sarıbulut, Santa, Toros mountainous areas and northern area of Thrace (Kayral and Kayral, 1983; Şenocak, 1988). Most beekeeper in Turkey takes place in Muğla, Ordu, Adana, İzmir, Antalya, Aydın, Erzurum, Sivas, Konya, Kars, İçel and Ankara cities (Kumova, 2000).

Amount and Type of Bee Hives

Turkey has great beekeeping potential over 4.3 million beehives. Turkey, counting about five bee colonies per km^2, is included among the countries with the highest density of beehives in the world (Table 1). The numbers of honeybee colonies in northern and western areas are larger than other regions of Turkey. Only about 14 percent of total beehives of Turkey are in Muğla city (Aegean region) and 8 percentages in Ordu city (Black Sea region) (Gökçe, 2001). Nearly half of our colony numbers is considered to be subject for migratory beekeeping (Genç, 1993).

Most beekeepers have langstroth hives in Turkey. Only about 4.2 % of total beehives are still kept in traditional hives. Many beekeepers of Central Anatolian region generally use the cylindrical hives made from wood branches covered by mud. In the northern region of Anatolia, beekeeping is using traditional log hives. Wood box hives are used in many districts of South-Eastern Anatolia. The average quantity of honey collected is 2 to 5 kg per hive (Kayral and Kayral, 1989; Genç, 1993).

In many districts of Marmara and Central Anatolian regions, some people are doing traditional beekeeping; they still keep in ancient styled beehives made from *Salix* ssp. branches covered by mud with straw and manure. It is that during the honey flow period, they can get as much as 3-5 kg honey from a hive (Kayral and Kayral, 1989; Genç, 1993).

All traditional beehives are called Turkish **"karakovan" or "sepetkovan"** (primitive hive). As a result, the honey yields of traditional beehives in Turkey are low generally. However, products of all these traditional hives are more expensive than modern bee hives (Kayral and Kayral, 1989; Genç, 1993).

Table 1. Number of colonies in Turkey

Years	Old Type	Index 1935=100	Modern Type	Index 1935=100	Total	Index 1935=100
1935	1.095.000	100.00	800	100.00	1.095.800	100.00
1945	1.000.369	91.66	26.489	3311.13	1.026.855	54.19
1955	1.167.525	106.62	113.529	14191.13	1.281.054	67.60
1965	1.320.969	120.64	299.487	37435.88	1.620.456	85.51
1975	1.054.656	96.32	918.628	114828.50	1.973.284	104.13
1985	645.142	58.92	1.940.161	242520.13	2.585.303	136.43
1995	214.594	19.60	3.701.444	462680.50	3.916.038	206.65
1999	182.266	16.65	4.139.430	517428.75	4.321.696	228.06

Source: Statistical Indicators. State Statistical Institute of Turkey (DIE), Ankara, 2000.

Honeybee Races

Turkey has many different kinds of topographic and climatic characteristics. As a result of this heterogeneous ecological structure, the honeybee has spread widely throughout Anatolia and Thrace, where it has differentiated into several forms (Yıldız and Asal, 1996). It is evident that there is much greater honeybee diversity in Turkey than in most other countries (Çakmak, 1999).

There are different bee races and ecotypes in Turkey, i.e. *Apis mellifera caucasica* (North east Turkey), *Apis mellifera anatoliaca* (Central Anatolia) and their ecotypes such as Muğla, Gökçeada Island, Marmara and Karadeniz (Güler et al., 1999). Each honeybee race and ecotype reflects in its morphology and behaviour environmental characteristics of its endemic range (Çakmak, 1999).

The first important bee centre of Turkey is Central Anatolia where the *Apis mellifera anatoliaca* bees, and well known as the Anatolian honeybee. The honeybees of the Central Anatolia, with several subpopulations in the north, west and south, while *Apis mellifera caucasica* is considered as the honeybee of the mountain range bordering the northeast region of Anatolia. The most common ecotypes of *Apis mellifera anatoliaca* are the Muğla and the Central Anatolian bees (Kaftanoğlu, 2001).

The Anatolian bees (*Apis mellifera anatoliaca*) are the most common bees in Turkey. They are more aggressive than the Italian, Carniolan and Caucasian honeybees. They have many ecotypes adapted to different regions of Turkey and showing great variation in terms of body colour, productivity, and specific morphological, physiological characters (Kaftanoğlu, 2001).

Second important honeybee race of Turkey is *Apis mellifera caucasica*. The Caucasian bees are grey dark colored, gentle and productive bees with low swarming tendency and they are adapted to highlands and temperate climates. Therefore they collected much propolis, their spring development is slower then the other races but they build up strong colonies during the summer and produce

much honey. They tend to rob the weak colonies (Kaftanoğlu, 2001).

Local honeybee of South-Eastern Anatolia is possible to *Apis mellifera meda* or *Apis mellifera syriaca* by same apicultural scientists (Ruttner, 1988; Kaftanoğlu et al, 1993). General characters of honeybees in Southeastern Anatolian conditions are small colonies, relatively small quantity of honey storage, more aggressive than other honeybee races or ecotypes of Turkey, easily swarming. These characters are well fit to the fluctuating hot conditions to live, but no suitable for beekeeping sector (Kaftanoğlu et al, 1993).

Nowadays, there are some different ideas about identifing of Thracian honeybees in European part of Turkey. Some apicultural scientists describe Thracian bees as ecotypes of *Apis mellifera anatoliaca* or *Apis mellifera carnica* (Brother, 1977; Ruttner, 1988; Smith 2002).

All these races and ecotypes are the raw material for breeding studies (Güler et al., 1999). This genetic diversity represents the key element for Turkish scientist to lead the world in the development of crop-specific and task-specific vector for the future (Çakmak, 1999).

Bee Flora

We receive flower honey mainly from cultivated plants, such as oranges (Muğla, İzmir, Antalya, Mersin, Adana, Hatay), cotton (Mardin, Diyarbakır, Şanlıurfa, Gaziantep, Adana, Aydın, Nazilli, İzmir), sunflower (İstanbul, Tekirdağ, Kırklareli, Edirne, Balıkesir, Çanakkale, Samsun, Aksaray, Yozgat, Adana), heather (Çanakkale, Tekirdağ, Kırklareli, İstanbul, Mersin, Tarsus), chestnut (Trabzon, Giresun, Samsun, Rize, Sinop, Kastamonu, Bolu, Bursa, Çanakkale, Balıkesir), linden trees (Tekirdağ, Kırklareli, İstanbul), as well as from different orchards. Nectar yielding wild plants in the all regions of Turkey is clovers, acacia, raspberries, strawberry, bee balm etc (Ekim, 1987; Sorkun and Doğan, 1994).

Pollen yielding plants are abundant in our country. Of special importance are almond trees (*Amigdalus*), *Castanea sativa*, *Castanea vulgaris*, *Salix alba*, *Robinia pseudoacacia* and *Erica*. The plant mentioned last is strongly reputed by some honey lovers to be causing beaming health (Isfandites, 1990). Colonies foraging on forest plants, especially on *Pinus* trees (the Germans call the resulting honey "Waldhonig"), yield about 20 % of our honey production (Kumova, 2000). In this particular case, honey is being produced from honeydew of the insect *Marchalina hellenica* = *Monophlebus hellenicus*. Bee colonies are transported from all parts of the Turkish country to the lavish pine forests, found mainly on the Marmara's islands (Büyükada and Heybeliada), on the peninsula of Aegean (Muğla, Fethiye, Denizli, İzmir, Edremit) and in Mediterranean region (Antalya). September and October are the most plentiful months (Genç, 1993).

Significant amounts of honeydew honey are derived from the *Papaver*, *Carduus*, *Rosa*, *Tilia*, *Salix*, *Quercus*, *Castenea*, *Populus*, *Betula*, *Tamarix*, *Ulmus*, *Picea*, *Prunus*, *Pyrus and Malus* (Genç, 1993).

Evident amounts of honeydew are derived from the *Abies* trees in Marmara region and on the Uludag mountains situated about 500 km north east of Ankara and 300 km south of Istanbul. This honey is being produced from honeydew of the insect *lachnus ssp* (Başak, 1991).

Our world famous thyme honey, its renown being due to its excellent flavour and richness in enzymes, constitutes a rather limited percentage of the annual honey production in Turkey (Infandites, 1990). It comes from the Central Anatolia, Aegean, Black Sea and Marmara regions (Ekim, 1987; Sorkun and Doğan, 1994).

The most popular and most precious variety of honey we have in Black Sea region is that one made of high plateau plants of Anzer. This product is more expensive than other honey in all districts of Turkey. It has specific colour, is tasteful and has a strong and elegant smell of Anzer high plateau plants. These plants only flowers at the end of May and beginning of August. So these bees have to make haste this being their unique opportunity to collect nectar (Şekerden et al, 1992; Gökçe, 2001).

In addition, toxic honey (the Turks call the resulting honey "Deli bal=Crazy honey", production derived in September and October from the *Rhododendron ponticum* in Turkey takes place in the northern

mountains areas (Kayral and Kayral, 1989; Genç, 1993). This area stretches from east to west parallel to the Black Sea and is limited to the east by the Central Anatolia.

Migratory Beekeeping

Migratory beekeeping style is very common and predominates in Turkey. This means that the hives have to be moved from one place to other in search for ultimate good quality honey in reasonable quantities (Gökçe, 2001). Migratory beekeeping, in which beekeepers move from north to south and from east to west following the blooming of honey plants, is not so popular at present because of several reasons, such as the aging of beekeepers and decreasing honey plants and large scale beekeepers (Genç, 1993). The honey bee colonies are transferred in the country generally: In spring to the citrus groves and thyme areas, in June to the fir forests, in summer to the cotton, clover and sunflowers plants and in August, September and October to the vast pine forests (Santas, 1990).

Professional beekeepers have about 100-400 bee colonies, sometimes up to 1000. They transport their hives extensively during the year; up to distances of 2000-4000 km (Isfandites, 1990). Eighty percentages of total migratory beekeepers of Turkey are from Ordu, which is located in Eastern Black Sea region (Gökçe, 2001).

As a consequence, the migratory beekeeping is technique improve. But, the genetic structure of the Turkish bee population is becoming homogenized and the genetic variation is getting lost (Darendelioğlu and Kence, 1992; Smith 2002).

Honeybee Products

Although the main crop is honey, beeswax pollen, propolis, royal jelly, bee venom, queen and package bees can also be produced from beekeeping activities (Kaftanoğlu, 1998). Beekeeping and their all products has important role in history of Turkish society and traditional life. Thus almost all of bee products are useful to humans. Honey is the most important product of the beekeeping sector of Turkey. Seventy percentages of total honey production of Turkey is sold as comb and 30 percentages as extracted, respectively (Gökçe, 2001).

According to the statistics of the State Statistical Institute of Turkey (DIE), honey production was 67.259 tons in 1999 (Anonymous, 2000). Although the honey yield increase every year steadily, this increase is not satisfactory (Table 2). Turkey has only 5.7 % of world honey product. One of the main reasons for the low honey yield is the insufficient queen bee production in the country (Güler et al., 1999).

The annual honey production is estimated to be around 15.6 kg per colony, although values of about 35-40 kg per colony are usual for professional beekeepers (Güler et al, 1999). Eighty percent of total honey of Turkey is produced by migratory beekeepers (Genç, 1993).

Table 2. Honey production in Turkey

Years	Honey production(tons)	Index 1935=100	Average production kg / hive	Index 1935=100
1935	4.338	100.00	2.29	100.00
1945	3.671	84.62	3.57	155.90
1955	7.111	163.92	5.55	242.36
1965	10.320	237.90	6.37	278.17
1975	21.250	489.86	10.77	470.31
1985	35.840	826.19	13.86	605.24
1995	68.620	1.581.83	17.52	756.07
1999	67.259	1.550.46	15.56	679.48

Source: Statistical Indicators. State Statistical Institute of Turkey (DIE), Ankara, 2000.

While product quality usually differs from producer to producer, there is a general tendency that the products from the same areas are regarded as having the same quality. Generally, the marketability of products is mostly limited to the retail, domestic market and on the international trade tends to be restricted of honey. Prices of all honeybee products are far the most important factor in competition; but capital investment is not so active in the beekeeping sector (Nakamura, 1999).

Not all honey is alike in Turkey. Usually, comb honey- honey still in its natural combs command higher prices, and some beekeepers try to keep comb honeys producing from primitive beehives. Comb honey requires little specialized equipment, so it is a good way for a new beekeeper to get started in Turkey (Delaplane, 1999).

Turkey's pine honey production is very famous in the world. Especially, the pine honey is produced only in Turkey and Greece. More than 85 % of domestic production of pine honey was sold via exports, mostly those to European and Middle East countries every year (Kumova, 2000). Exportation of honey of Turkey is nearly 5.000 tons during last years. This brought approximately $10 million gain as most important trade factor to our country. The value of honey export is variable every year (Table 3).

The domestic output of beeswax is about 4.073 tons. According to the statistics of the State Statistical Institute of Turkey (DIE), the wax production of the different years is given in table 4.

The DIE statistics show that about 4.073 tons of wax produced in Turkey and it can be supposed that almost all of the raw materials are sold on the market or used for the production of honey comb (Anonymous 2000).

Other bee products of Turkey (pollen, royal jelly, bee venom and propolis) have important role on our beekeeping industry. Trading amount of honeybee colonies of Turkey are nearly 40.000-50.000 units annually (Gökçe, 2001).

According to the annually statistics of the ministry of Agriculture of Turkey, the value of honey production was $150 million, producing queens and bees for sale to other beekeepers were $36 million and other bee products (pollen, propolis and royal jelly) were $2.9 million in 1999 (Gökçe, 2001).

Moreover bees pollinate the flowering plants while collecting nectar and pollen and increase the quality and quantity of cultivated crop plants enables the wild flowers and many plants survive (Kaftanoğlu, 1998).

In Turkey, the added value to agriculture from honeybee pollination is over $ 2.3 billion annually, however beekeepers do not earn extra income from transport of their colonies for pollination (Gökçe, 2001).

Table 3. Honey Export of Turkey

Years	Honey Export (tons)	Index 1963=100	Export Values (1000 $)	Index 1963=100
1963	4	100.00	3	100.00
1965	2	50.00	1	33.33
1975	54	1350.00	69	2300.00
1985	2.176	54400.00	4.050	135000.00
1995	2.934	73350.00	6.759	225300.00
1999	5.306	132650.00	9.996	333200.00

Source: Honey Export of Turkey. www. FAO. org.

Honeybee Management

Honeybee management is scheduled around natural nectar flows in Turkey. Our beekeepers want their colonies to reach maximum strength before the nectar flows begin. Nectar flows are very different between north and south or east and west Turkey (Delaplane, 1999).

By mid February, the hives are ready for detailed inspection. Queens resume laying eggs in February after which brood production accelerates rapidly to provide the spring work force. Colonies store may fall dangerously low in late winter when brood production has started but plants are not yet producing nectar or pollen. Some colonies need supplemental feeding or sugar syrup (Delaplane, 1999).

Government controls sugar prices in general, and the price of sugar is lower than that of honey. Because of this, beekeepers can feed enough sugar syrup to their bees, which is not liable to cause robbing. This situation may not result in the spread of diseases and harmful mites. Keeping bees requires the feeding of sugar syrup to bees to promote the building up of colonies or to keep them healthy during the season when resources are scarce (Nakamura, 1999).

Bees in central, northern and eastern areas spend five to six winter months without hibernation and so need large quantity of honey. The amount of honey stored by Turkish bees differs according to the size of their colonies but should be at least 5 to 15 kg at the time of winter preparation (Sasaki, 1999).

Diseases and Pests

Some well-known diseases and pests, such as the Varroa mite and chalk brood as well as the abundant use of pesticides in agriculture and frequent fires in the woods, cause serious problems to our beekeepers (Infandites, 1990).

The Varroa mite was first recorded in Turkey in 1976, close to the Bulgarian and Greek Borders in Thrace, and from Russian border to the Northeastern Anatolia in 1980. Shortly afterwards, late that same year, the dangerous mite was found in some other areas like Marmara, Central Anatolia, Eastern Anatolia, Black Sea, Aegean and Mediterranean regions (Santas, 1990; Genç, 1993; Gülpınar, 2000).

There is a slight decline in the infection rate of chalk brood (*Ascosphaera apis*) but it can be endemic again anytime like happened in other countries (Kaftanoğlu, 1998). The chalk brood disease is the other important problem of Turkish beekeeping, too. This disease was first recorded in 1986 in Turkey. Nowadays the diseases and pests can be found in beehives all over the country. Because of this, it is hard to increase the number of beehives (Genç, 1993).

Table 4. Wax production in Turkey

Years	Wax production (tons)	Index 1936=100	Average production kg / hive	Index 1936=100
1936	602	100.00	0.32	100.00
1945	412	68.44	0.40	125.00
1955	844	140.20	0.66	206.25
1965	1.144	190.03	0.71	221.88
1975	1.712	284.39	0.87	271.88
1985	2.196	364.78	0.85	265.63
1995	3.735	620.43	0.95	296.88
1999	4.073	675.58	0.94	293.75

Source: Statistical Indicators. State Statistical Institute of Turkey (DIE), Ankara, 2000.

Transfer of the beehives to other places accompanied the parasites and gave serious damage in the new area, after 1980 in Turkey. In addition, migratory beekeeping practise can be considered as having been the main course of the present dramatic Varroa mite and chalk brood situation in Turkey (Santas, 1990). We have no accurate official data on the losses of colonies, but during 1978-1988 years. According to the Turkish beekeepers estimates 20-30 % of the colonies were severely damaged or totally destroyed by the Varroa and chalk brood (Santas, 1990; Gülpınar, 2000).

Similarly the spread of American foulbrood (*Paenibacillus larvae*) and nosematosis (*Nosema apis*) are increasing countrywide (Kaftanoğlu, 1998). Other important diseases and pests of Turkey are foulbrood, wax moths, and wasps (Genç, 1993). All these diseases lower the population growth of the bees, weaken the colonies and decrease the production of honey and other bee products (Kaftanoğlu, 1998). Beekeepers have been using many chemicals (Kaftanoğlu, 1998). Acaricides are used agaist Varroa. Active ingredients of this effective acaricides are Caumaphos, Asuntal, Flumethrin, Amitraz, Malathion, Bromopropylat, Cymiazol, Fluvalinate, Formic Acid and others (Genç, 1993; Kaftanoğlu, 1998). However the effectiveness of these chemicals decreased, resistant mites have been developed in the colonies and residue became a major concern due to inappropriate or misuses of these chemicals. Moreover the bees became more susceptible to the bacterial viral and fungal diseases due to Varroa infections (Kaftanoğlu, 1998).

Application of some chemicals (antibiotics, pesticides etc.) sometimes causes the residue problems that affect the quality of some hive products negatively. The extension education of beekeeping to the beekeeper is poor about the application of the chemicals. For this reason it cannot be controlled in general.

Main Problems of Beekeeping in Turkey

Turkish beekeeping face the same problems as anywhere else in the world (Spartinos, 1990). Our beekeeping has a variety of problems to be dealt with. Among them are the biological problems of bees themselves, climate and other natural features, relations to environmental factors, beekeeping techniques, the quality of products and problems in marketing and trading (Nakamura, 1999).

There are several problems such as existence of honeybee diseases and pests, keeping old and unproductive queens in colonies, apicultural equipments and supplies, education of beekeepers, nutrition and management, disease and pests, lack of knowledge of beekeepers in many aspects of beekeeping and lack of organisation among the beekeepers (Şahinler and Şahinler, 1996). **The most important problem in Turkish beekeeping is that beekeepers have to pay some fees to the farmers or landowners instead of being paid for pollination services they provide for crops just contrary to world pollination practices. Moreover, beekeepers can not enter to some regions as a rule that can not be explained by scientific reasons. The pollination services of honey bees are underestimated or ignored in Turkey.**

In order to solve these problems, a queen bee production centre should be established, beekeepers should be trained on the diagnosis and treatment of honeybee diseases and technical beekeeping and they should be encouraged to have beekeeping organisations such as Associations or Unions. As a result, some measures should be taken to promote this re-education of beekeepers (Şahinler and Şahinler, 1996).

Bee products that collected, stored and marketed in unproper methods may be out of usage. However, some tricks are used specially on honey, royal jelly and pollen. Retraining beekeepers is important for improvement in product quality and better distribution and will contribute to the development of better beekeeping technology (Tolon, 1999).

The factors such as insufficient governmental support for the beekeeping, the unpredictable status of exporters and beekeepers, tricks on some bee products, improper standardization for bee products, technical and educational disorders cause difficulties in export of bee products (Tolon and Altan, 1999).

CONCLUSION

As a conclusion, Turkey has great beekeeping potential having very rich flora and suitable ecology however this potential is not utilised properly. Total honey production, honey yield and productions of other bee products are rather low and it is possible to increase them 2 or 3 folds. Some of the reasons for low yield are the widespread of bee diseases and parasites, insufficient queen production, educational level and knowledge of beekeepers, lack of beekeeping organisations (Kaftanoğlu, 1998).

It is essential to harvest process and marketing of bee products such as honey, bee wax, pollen, royal jelly, propolis, and bee venom (Tolon and Altan, 1999). In our country conditions, the bee product standards should be obeyed in order to market these products in a safe condition. Especially for exportation, these standards should be taken more strictly, because foreign countries select bee products more carefully for importing (Tolon, 1999).

"It is hoped that these goals can be taken into consideration to improve grower's productivity and thereby increase the contribution of agriculture to Turkey's gross national products" (Çakmak, 1999).

REFERENCES

Akbay, R., Arı ve İpekböceği Yetiştirme. Ankara Üniv. Zir. Fak. Yay. No: 956, Ders Kitabı: 276. Ankara. 308

Anonymous, (2000). Statistical Indicators. State Statistical Institute of Turkey (DIE), Ankara, 2000.

Başak, M., (1991). Haşeratın Arıcılıktaki Rolü. *Teknik Arıcılık.* Sayı 31. Ankara. 28-29.

Brother, A., (1977). In Search of the Best Strains of Bees: Supplementary Journey to Asia Minor, 1973. *Bee World*. 58: 57-66.

Çakmak, I., (1999). Honeybees and Agriculture. *May Agro-Tek*. Bursa. 3 (7): 7-9.

Darendelioglu, Y., Kence, A., (1992). Morphometric Study on Population Structure of Middle Anatolia Honey Bee (*Apis mellifera* L.) (*Hymenoptera, Apidae*). *The Second Turkish National Congress of Entomolgy*. Adana. 387-396.

Delaplane, K. S., (1999). Honey Bees and Beekeeping. The University of Georgia, College of Agricultural and Environmental Sciences. Athens, Georgia.

Ekim, T., (1987). Arıcılıkta Önem Taşıyan Bitkiler ve Bunların Yurdumuzdaki Durumu. *Türkiye 1. Arıcılık Kongresi* (22-24 Ocak 1980). Tarım ve Köyişleri Bak. Yay. No: 154. Ankara. 53-64.

Genç, F., (1993). Arıcılığın Temel Esasları. *Atatürk Üniversitesi Ziraat Fakültesi* Yayın No 149. Erzurum. 138–185.

Gökçe, M., (2001). Arıcılığın Genel Durumu Sorunları ve Çözüm Önerileri. Arıcılık Paneli (16 Ekim 2001). Ordu.

Güler, A., Korkmaz, A., Kaftanoğlu, O., (1999). Reproductive Characteristics of Turkish Honeybee (*Apis mellifera* L.) Genotypes. Hayvansal Uretim. Izmir. 39-40: 113-119.

Gülpınar, V., (2000). Türkiye'de Arıcılık Sorunlar ve Çözüm Önerileri. *Teknik Arıcılık*. Sayı 69. Ankara. 17-20.

Infandites, M., (1990). Beekeeping in Greece. Bienenstich. No 17. Ciba-Geigy AG, Basel.

Kaftanoğlu, O., Kumova, U., Yeninar, H., Kale, N., (1993). GAP Bölgesinde Arıcılığın Genel Durumu ve Geliştirme Olanakları. *Güneydoğu Anadolu Bölgesi 1. Hayvancılık Kongresi.* Şanlıurfa. 340-351.

Kaftanoğlu, O., (1998). National Beekeeping Development Project. Cukurova University, Agricultural Faculty, Department of Animal Sciences. Adana.

Kaftanoğlu, O., (2001). The Consept of Honey Bee Races and Race Preference. *Uludag Bee Journal*. Bursa. 1 (3): 11-20.

Kayral, N., Kayral, G., (1983). Son Sistem Arıcılık. Arı İş Yayın No: 1. İstanbul. 160 p.

Kayral, N., Kayral, G., (1989). Yeni Teknik Arıcılık. İnkılap Kitapevi. İstanbul. 722 p.

Kumova, U., (2000). Ülke Arıcılığını Çağdaşlaştırma Konusunda Öneriler. *Teknik Arıcılık*. Sayı 70. Ankara. 5-10.

Nakamura, J., (1999). Problems of Beekeeping in Asia. *Farming* Japan. Vol. 33-3, 15-17.

Ruttner, F. (1988). Biogeography and Taxonomy of Honey Bees. Springer-Verlag, Berlin. 283 p.

Santas, L. A., (1990). The dangerous mite plagues Grecien bees, Varroa spread rapidly. *Bienenstich*. No 17. Ciba-Geigy AG, Basel.

Smith, D. 2002. Genetic diversity in Turkish honey bees. *Uludag Bee Journal* 2:10-17.

Sasaki, M., (1999). Ecological Characteristics of Asiatic Hive Bee and its possibility as Apicultural Species. *Farming* Japan. Vol. 33-3, 18-22.

Sorkun, K., Doğan, C., (1994). Nektarlı Bitkilerin Çiçeklenme Dönemleri ve Yayılış Alanları Üzerine Bir Çalışma. *Teknik Arıcılık*. Sayı 44. Ankara. 2-11.

Spartinos, D., (1990). Honey and Pollen for the Old Greecian Gods on Mount Olympus. *Bienenstich*. No 17. Ciba-Geigy AG, Basel.

Şahinler, N., Şahinler, S., (1996). A Study on the Present Situation and Problems of Apiculture and Some Recommendation in Hatay Province. *Journal of Agricultural Faculty of Mustafa Kemal Univesity*. 1 (1): 17-28.

Şekerden, Ö., Kılıç, M., Kaplan, Ö. M., (1992). Türkiye'de Anzer Balı Üretim Bölgesinin Florası, Coğrafik ve İklimsel Özellikleri ile Bu Şartlarda Arıcılığın Yapılma Şekli. *Doğu Anadolu Bölgesi 1. Hayvancılık Semineri* (3-4 Haziran 1992). Erzurum. 17-29.

Şenocak, K., (1988). Modern Arıcılık – Arı Sırrının Çözümü. Remzi Kitabevi. İstanbul. 222 p.

Tolon, B., (1999). Bee Product Standardization for Production and Export. *Uluslararası Hayvancılık '99 Kongresi* (21-24 Eylül 1999). İzmir. 519-524.

Tolon, B., Altan, Ö., (1999). Difficulties in İmport and Export of Bee Products and Proper Suggestions. *Uluslararası Hayvancılık '99 Kongresi (*21-24 Eylül 1999). İzmir. 596-602

Yıldız, M. A., Asal, S., (1996). General Protein (P-3) Polymorphism in Honey Bee (*Apis mellifera*) From Central Anatolia. *Tr. J. of Veterinary and Animal Sciences*. 20: 379-381.

www. FAO. org. Honey Export of Turkey.

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