

## THE STATE OF BEEKEEPING IN CROATIA STANJE PČELARSTVA U REPUBLICI HRVATSKOJ

Lidija Svečnjak<sup>1</sup>, Gordana Hegić<sup>1</sup>, Janja Kezić<sup>1</sup>, Martin Turšić<sup>1</sup>, Maja Marica Dražić<sup>2</sup>, Dragan Bubalo<sup>1</sup>, Nikola Kezić<sup>1</sup>

<sup>1</sup>Faculty of Agriculture, University of Zagreb, Svetošimunska 25, 10000. Zagreb, Croatia, e-mail: [jcea@agr.hr](mailto:jcea@agr.hr)

<sup>2</sup>Croatian Livestock Center, Ilica 101, 10000 Zagreb, Croatia

Manuscript received: September 1, 2008; Reviewed: October 6, 2008; Accepted for publication: November 8, 2008

### ABSTRACT

In this paper analysis of beekeeping conditions, number and distribution of beekeepers and honeybee colonies, annual colony losses as well as honey production, export, import and consumption are given.

Beekeeping in Croatia has a long tradition. In comparison to pasture potential and necessity for pollination of cultivated and wild plants, present beekeeping is inadequately developed and distributed in different regions.

According to data of the Croatian Livestock Center (2008) there are 313 978 honeybee colonies registered in the 2007 in Croatia on professional and sideline apiaries. The majority of honeybee colonies is placed in Pannonian region with 238 300 (76%), second in representation is in Mediterranean region with 59 763 (19%) and less represented is in Mountain region with 15 915 (5%) honeybee colonies. Yearly honey production is approximately 5 000 t and 2 000 t of national honey consumption (0.4 kg per capita) gives possibility for honey export. Croatia exported 1 051 in 2003, but 274 t of honey in 2007, which indicates on significant export decreasing trend.

Normal 10 % of winter colony losses till 2007 increased in 2007/2008 on 55 615 (41.71 %) in Pannonian region, 13 892 (37.46 %) in Mediterranean and 5 359 (32.71 %) in Mountain region.

There is a need to make beekeeping much more flexible to fit into an integrated agricultural system, as well as more oriented to the consumers' demands, to be able to increase competitiveness.

Key words: beekeeping, honeybee colonies, honey production, honey export, colony losses

### SAŽETAK

U ovom je radu prikazana analiza stanja pčelarstva u Republici Hrvatskoj, broj i raspodjela pčelara i pčelinjih zajednica, godišnji gubitci pčelinjih zajednica, kao i analiza proizvodnje i potrošnje meda, te uvoza i izvoza meda.

Pčelarstvo u Hrvatskoj ima dugu tradiciju. U odnosu na pašne potencijale i potrebu za oprašivanjem kultiviranog i samoniklog bilja, sadašnje je pčelarstvo nedekvatno razvijeno i raspodjeljeno u različitim regijama.

Prema podacima Hrvatskog stočarskog centra (2008.), u Hrvatskoj je 2007. godine registrirano 313.978 pčelinjih zajednica [2]. Većina pčelinjih zajednica, odnosno 238.300 (76 %) smješteno je u panonskoj regiji. Druga po zastupljenosti je mediteranska regija sa 59.763 pčelinjih zajednica (19 %), a najmanji broj zajednica, odnosno 15.915 (5 %) nalazi se u gorskoj regiji.

U Hrvatskoj se godišnje proizvede približno 5.000 tona meda [8], a potroši tek 2.000 t. Potrošnja meda u Hrvatskoj je vrlo niska, samo 0,4 kg po stanovniku godišnje. Takav omjer proizvodnje i potrošnje meda pruža mogućnost za izvoz. Hrvatska je u 2003. godini izvezla 1.051 t meda, a u 2007. godini 274 t, što ukazuje na značajan opadajući trend izvoza meda.

Normalnih 10 % zimskih gubitaka pčelinjih zajednica u Hrvatskoj do 2007. godine, poraslo je u razdoblju 2007./2008. na 55.615 (41,71 %) u panonskoj regiji, 13.892 (37,46 %) u mediteranskoj i 5.359 (32,71 %) u gorskoj regiji.

Pčelarstvo bi u Hrvatskoj trebalo biti fleksibilnije kako bi se uklopilo u integrirani poljoprivredni sektor, te usmjerenije zadovoljavanju potreba potrošača sa ciljem postizanja bolje konkurentnosti.

Ključne riječi: pčelarstvo, pčelinje zajednice, proizvodnja meda, izvoz meda, gubitci pčelinjih zajednica

## DETALJNI SAŽETAK

Hrvatska ima povoljne uvjete i dugu tradiciju u pčelarstvu, za proizvodnju meda i drugih pčelinjih proizvoda. U odnosu na pašne potencijale i potrebu za oprašivanjem kultiviranog i samoniklog bilja, sadašnje je pčelarstvo nedekvatno razvijeno i raspodjeljeno u različitim regijama.

Siva pčela (*Apis mellifera carnica* Pollman, 1879.), kranjska pčela, kranjica ili sivka, autohtona je pasmina na području Hrvatske. Druge se pasmine zakonski ne smiju uzgajati i držati, kako bi se održala izvornost pasmine. Poznata su tri morfološki, gospodarski i biološki prepoznatljiva ekotipa sive pčele: panonski, gorski i mediteranski ekotip. Ti su ekotipovi vezani uz istoimene regije naše zemlje. Klima, biljni pokrov i reljef naših prostora uvjetovali su njihovu bioraznolikost.

U ukupnoj strukturi stočarske proizvodnje pčelarstvo sudjeluje sa 0,1% [6]. Proizvodnja u pčelarstvu je gotovo sva vezana na obiteljska gospodarstva [7].

Prema podacima Hrvatskog stočarskog centra (2008.), u Hrvatskoj je u 2007. godini registrirano 313 978 pčelinjih zajednica [2]. Većina pčelinjih zajednica, odnosno 238 300 (76 %) smješteno je u panonskoj regiji. Druga po zastupljenosti je mediteranska regija sa 59 763 pčelinjih zajednica (19 %), a najmanji broj zajednica, odnosno 15 915 (5 %) nalazi se u gorskoj regiji.

Od košnica sa pokretnim saćem, u Hrvatskoj prevladava uporaba tradicionalnih Albert - Žnideršić (49 %) i standardnih Langstroth - Root (45 %) košnica. Udio drugih tipova košnica (Farrar, Dadant - Blat, pološka, itd.) je samo 6 %. U Hrvatskoj prevladava stacionarno pčelarenje (62%) u odnosu na selidbeni način pčelarenja (38%) [4]. U posljednje vrijeme uporaba Langstroth - Root košnica konstantno raste. Pčelari kontinentalne regije podjednako koriste LR i AŽ košnice (48% i 44%), u mediteranskom području dominiraju LR košnice (70%), dok su u gorskom području najzastupljenije AŽ košnice (71%). Značajan dio pčelara su osobe starije dobi, odnosno umirovljenici.

U Hrvatskoj se godišnje proizvede približno 5.000 tona meda [8], a potroši tek 2.000 t. Potrošnja meda u Hrvatskoj je vrlo niska, samo 0,4 kg po stanovniku godišnje. Takav omjer proizvodnje i potrošnje meda pruža mogućnost za izvoz. Obujam proizvodnje meda u RH u kontinuiranom je porastu posljednjih pet godina. U Hrvatskoj je u 2003. godini proizvedeno 1.616 t, a u 2007. godini 2.638 t meda. Frick i sur. navode kako registrirana proizvodnja meda pokriva samo 30 - 40 % ukupne trgovine medom u RH [5]. Problem neregistrirane proizvodnje ističe i Bračić prema kojem registrirana proizvodnja meda zauzima 50%, sivo tržište 40 %, a u crnom tržištu sudjeluje 10% proizvedene količine meda [1].

Suficit u proizvodnji meda treba plasirati na europsko tržište, no upravo je tržište i najveći problem za pčelarstvo. Osim toga, proizvodni asortiman meda je uzak i pčelari proizvode samo oko 10 vrsta meda u većim količinama [13]. Usprkos povoljnim uvjetima za izvoz, Hrvatska je u 2003. godini izvezla 1.051 t meda, a u 2007. godini 274 t, što ukazuje na značajan opadajući trend izvoza meda.

Normalnih 10 % zimskih gubitaka pčelinjih zajednica u Hrvatskoj do 2007. godine, poraslo je u razdoblju 2007./2008. na 55.615 (41,71 %) u panonskoj regiji, 13.892 (37,46 %) u mediteranskoj i 5.359 (32,71 %) u gorskoj regiji. Prema podacima Hrvatskog pčelarskog saveza, tijekom zime 2007./2008. izgubljeno je 75 000 pčelinjih zajednica, a neposredna šteta za pčelare iznosi oko 10 milijuna €. No, posredna šteta od gubitaka pčela, kao glavnih oprašivača poljoprivrednih kultura u RH, mnogo je veća. Tijekom zime 2005./2006. utvrđeno je 18 % zimskih gubitaka, što je u razini njemačkih, nizozemskih i švicarskih podataka. Podataka za zimu 2006./2007. nema, no možemo pretpostaviti da se radilo o manjim gubitcima zbog blage zime [11]. Pčelinje bolesti, osobito varooza i nozemoza, glavni su faktori koji utječu na velike gubitke pčelinjih zajednica.

Pčelarstvo bi u Hrvatskoj trebalo biti fleksibilnije kako bi se uklopilo u integrirani poljoprivredni sektor, te usmjerenije zadovoljavanju potreba potrošača sa ciljem postizanja bolje konkurentnosti.

## INTRODUCTION

Croatia extends from the foothills of the Julian Alps in the north-west and the Pannonian Plain in the east, over the Dinaric mountain range in its central region, to the Adriatic coast in the south. Area of Croatia is 56 542 km<sup>2</sup>. Geographical position of Croatia is specific and the territory spreads over three different regions: Pannonian, Mountain and Mediterranean region. Each region has specific climate, relief and vegetation. Northern Croatia has a continental climate; Central Croatia has a semi-highland and highland climate, while the Croatian coast has a Mediterranean climate.

Croatia has favorable conditions and long tradition in apiculture, for honey production, as well as other bee products. Another important role of beekeeping is contribution in pollination of cultivated and wild plants. Beekeeping in Croatia has a long history going back to 1288 when the first document "Law of Vinodolski" describing honey production, was written. In comparison to pasture potential and necessity for pollination of cultivated and wild plants, present beekeeping is inadequately developed. Beekeeping in Croatia nowadays has to solve many problems to increase competitiveness

[10]. There is a need to make beekeeping much more expanded and to fit into an integrated agricultural system [9].

The proportion of beekeeping in total Croatian livestock production is 0.1% [6]. Production in Croatian beekeeping is almost completely related to household farming [7]. Carniolan bee (*Apis mellifera carnica* Pollmann, 1879) is autochthonous breed in Croatia and it is prohibited by the law to breed or to keep any other race in order to preserve native bees. There are three distinguishing ecotypes of Carniolan bee inhabited in Croatia - Pannonian, mountain (subalpine) and Mediterranean, developed in distinctive regions, where ecological conditions have caused their biodiversity. Carniolan bee is well-known and appreciated across the world due to its high graded distinctive features, prior for its honey production.

#### Analysis of production parameters in Croatian beekeeping

According to the data of Croatian Livestock Center (2008) there are 3 390 beekeepers and 313 978 honeybee colonies registered in the 2007 in Croatia [2].

The majority of honeybee colonies, 238 300 (76 %) respectively, are placed in Pannonian region, 59 763 (19 %) in Mediterranean and 15 915 (5 %) in Mountain region.

The predominant types of hives with movable frames used by Croatian beekeepers are traditional Albert - Žnideršić (49 %) and standard Langstroth (45 %) hives. The share of other types (Farrar, Dadant hives, etc) is only 6 %. An equal distribution between two dominant types of hives, Langstroth and Alberti - Žnideršić (48% and 44% respectively) is present in the Pannonian region. Beekeepers from Mediterranean region mostly use Langstroth hives (70 %), while those from Mountain region prefer the Albert - Žnideršić hives (71 %). Furthermore, stationary way of beekeeping is prevailing (62 %) in comparison with migratory beekeeping (38 %) [4]. The use of Langstroth hives is increasing in Croatia in the last few years and the number of traditional hives decreases constantly.

Beekeepers in Croatia present very heterogeneous group. There are three main subgroups: hobbyists, part-time

Table 1. The number of beekeepers in period from 2003 to 2007 per region  
Tablica 1. Broj pčelara u razdoblju od 2003. do 2007. godine po regijama

Region / Regija	2003	2004	2005	2006	2007
Pannonian / Panonska	1 320	1 937	1 859	1 873	2 430
Mediterranean / Mediteranska	453	636	640	630	751
Mountain / Gorska	111	176	159	161	209
Total / Ukupno	1 884	2 749	2 658	2 664	3 390

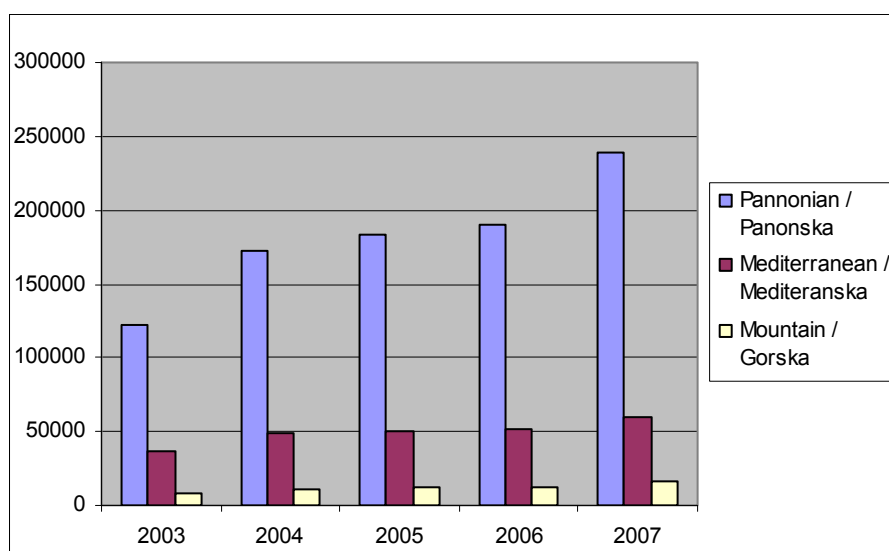


Figure 1. The number of honeybee colonies in period from 2003 to 2007 per region  
Graf 1. Broj pčelinjih zajednica u razdoblju od 2003 do 2007. godine po regijama

or side-line beekeepers and full-time or professional beekeepers. Hobby beekeepers treat beekeeping as free-time activity and they are mostly from non-agricultural households (88.5 %). They present an older age group – 35 % are 60+ and 42 % are 40 to 60 years old. The majority of full-time beekeepers are also from non-agricultural households (88.2 %) and they are in similar age group as hobbyists (40 % are 60+ and 40 % are 40 to 60 years old). Part-time beekeepers represent 45 % of the total number of beekeepers in Croatia. They are in a younger age group in comparison with the previous two groups [4]. More than two-thirds of full-time beekeepers move their hives regularly and intensively. Transport of the apiaries up to the four main pastures is a reason for honey yield increase in groups of professional and semiprofessional beekeepers.

The number of beekeepers, as well as the number of honeybee colonies is increasing within the period from 2003 to 2007 (Table 1, Figure 1).

### Honey production

Honey is the most important product for the majority of beekeepers in Croatia.

Honey production in Croatia is approximately 5 000 t per year [8]. The consumption of honey is very low, 0.4 kg per capita per year. 2 638 t of honey production was registered in 2007 [3].

Frick et al.' reports that registered honey production covers only 30-40% of total honey market [5]. The same problem was accentuated by Bračić and according to his analysis, registered honey production takes 50 % of total honey production in Croatia, grey market covers

40 % and black market 10 % of total honey production [1]. Honey production in Croatia is increasing (Figure 2). 1 616 t in 2003 and 2 638 t in 2007 was registered. Approximately one-third of the total honey production is marketed through legal distribution and the rest is sold to the consumers directly or consumed by the beekeepers.

The average annual honey production per hive depends on the level of beekeepers' specialization. Thus, the full-time beekeepers produce  $41.1 \pm 13.5$  kg per hive annually, the average annual honey yield for part-time beekeepers is 28.2 kg per hive and  $18.2 \pm 7.8$  kg of honey per hive for hobby beekeepers [10].

Honey production surplus should be placed on international market, but the market presents one of the largest problems in Croatian apiculture, due to inadequate international market experience. Besides that, assortment in honey production is narrow and beekeepers produce only 10 honey sorts in higher quantities [13].

The problem regarding bulk price of honey is also a major issue in domestic market. The biggest Croatian honey processing companies create honey bulk prices. Consequently, price for honey in barrels presents one-third of retail price which is low and hardly covers production costs.

### Honey export and import

Since Croatia is small market for current honey production, together with low consumption per capita, it is necessary to develop export-oriented beekeeping [10]. Croatia exported 1 051 in 2003, but only 274 t of honey in 2007, which indicates significant export decreasing trend (Figure 3). The lowest quantity of honey, i.e. only

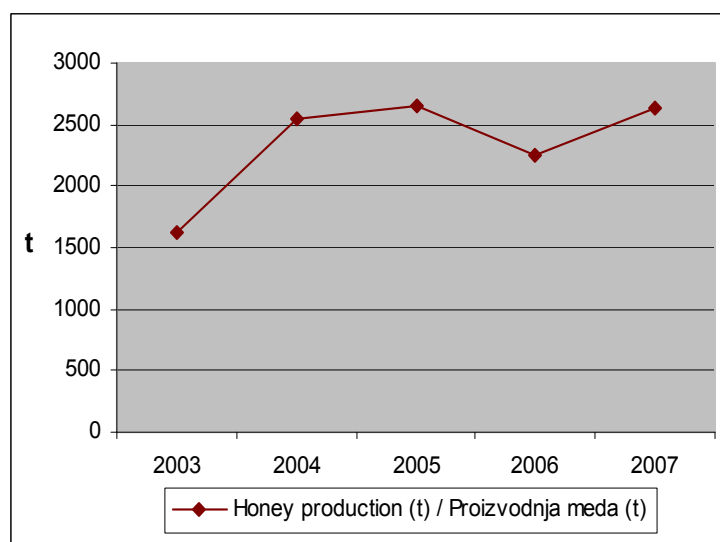


Figure 2. Registered honey production in Croatia in the period from 2003 to 2007  
Graf 2. Registrirana proizvodnja meda u Hrvatskoj u razdoblju od 2003. do 2007. godine

185 t has been exported in 2005 and the largest honey import was registered in respective year (Figure 5).

Croatia's main three export partners within the period from 2003 to 2007 were Germany, Bosnia and Herzegovina and Italy, with share of 77.76 % of total export quota (Figure 4), while its main four import partners were Hungary, Macedonia and Argentina and Germany, as third placed countries with equal share. These countries cover 75.62 % of total import quota in Croatia (Figure 6). Within above mentioned period, total value of exported honey was 5 091 973 €.

Decreasing trend in export is a consequence of numerous factors, such as unsynchronized dealers and problems in finding the most rational combinations of export costs and honey distribution on market. Furthermore, there is a

need to develop recognizable and distinguishing market brand of Croatian honey in order to accomplish better position and higher prices of it on international market. Honey producers in Croatia are affronted with difficulties linked with the lack of production balance.

**Colony losses**

During the winter 2007/2008 results presented by Croatian Beekeepers Association showed that 75 000 of honeybee colonies were lost and the beekeepers in Croatia have been directly damaged for about 10 millions €. However, the indirect damage of honeybee colony losses for Croatia, as one of the main pollination insect is more severe. Losses in winter 2005/2006 in Croatia were about 18% which is similar with German, Dutch and Swiss data. There were no data for the winter

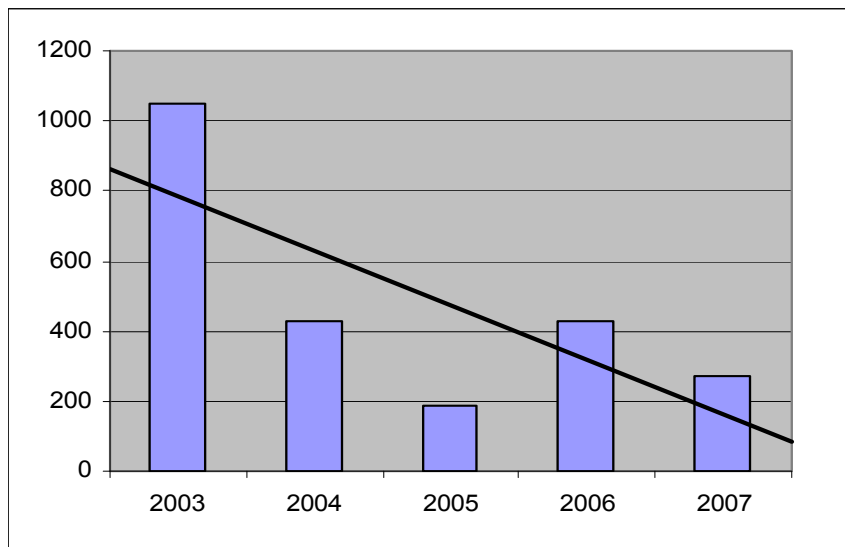


Figure 3. Honey export in the period from 2003 to 2007 (t)  
 Graf 3. Izvoz meda u razdoblju od 2003. do 2007. godine (t)

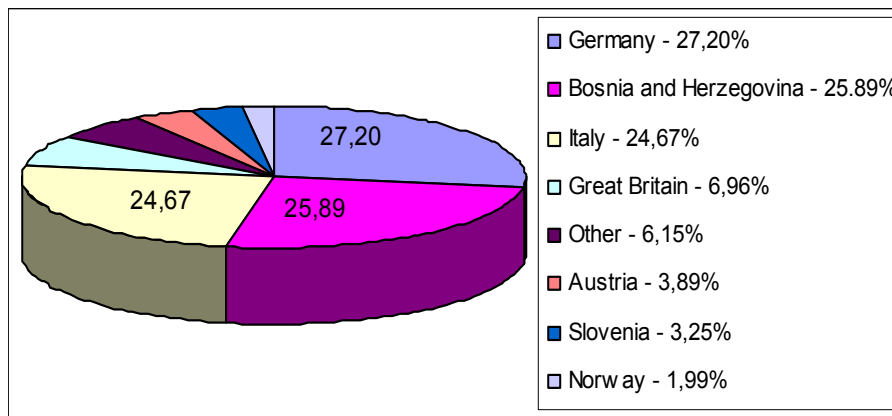


Figure 4. Honey export - percentage distribution per country  
 Graf 4. Izvoz meda - postotna raspodjela po državama

2006/2007, but we can assume the losses were lower due to mild winter. One of the possible reasons for colony losses in autumn/winter 2007 in Croatia was drought in the summer of 2007 which has additionally weakened the colonies [11].

A working group of 106 scientists from Europe (including Croatia), China, Canada, Egypt and USA gathered on the 2<sup>nd</sup> COLOSS (Prevention of honeybee Colony Losses) meeting held on 02.-04. April 2008 in Athens, Greece to discuss standardized monitoring and determination of minor and major factors that affect bee mortality.

In Croatia, normal 10 % of winter colony losses till 2007 increased in 2007/2008 on 55 615 (41.71 %) in Pannonian region, 13 892 (37.46 %) in Mediterranean

and 5 359 (32.71 %) in Mountain region (Figure 7).

Beekeepers have to give attention to honeybee diseases. The main problem is control of varoatosis and noseosis. During 2007 in samples of bees from Croatia presence of Nosema cerane was confirmed. In some apiaries Nosema cerane is causing severe losses. Efficient drugs for varroa control are not available on the market. According to the questionnaire carried out by Croatian Beekeepers Association in 2006, 70% of Croatian beekeepers are using amitraz for Varroa treatment. Recent researches conducted by Portugal scientists have shown that effectiveness of amitraz against Varroa is only 60%, so we can assume that the use of such medicament could also be one of the possible reasons for higher colony

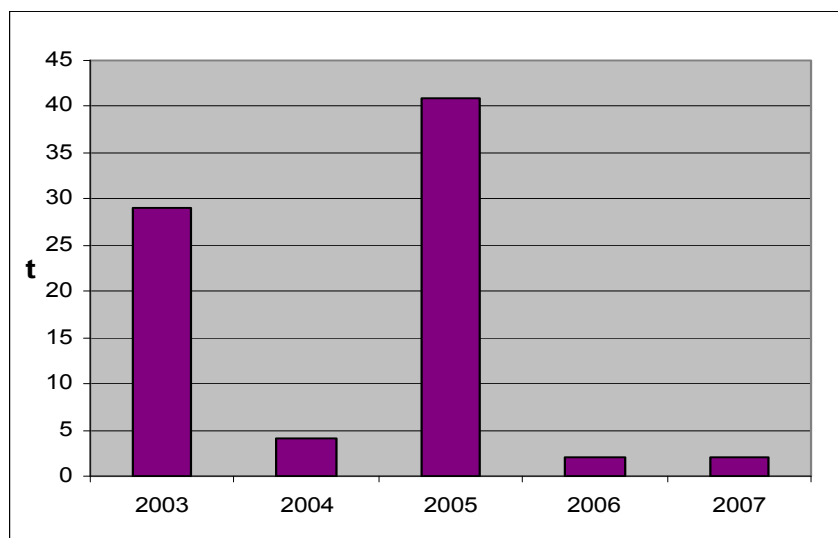


Figure 5. Honey import in the period from 2003 to 2007 (t)  
Graf 5. Uvoz meda u razdoblju od 2003. do 2007. godine (t)

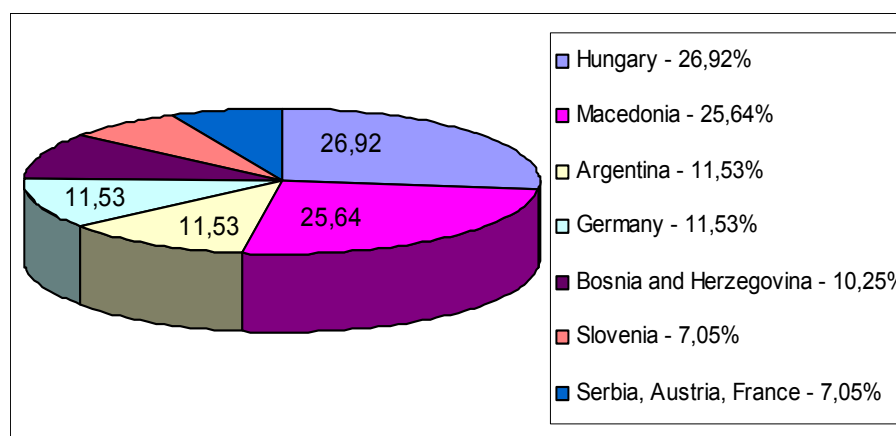


Figure 6. Honey import - percentage distribution per country  
Graf 6. Uvoz meda - postotna raspodjela po državama

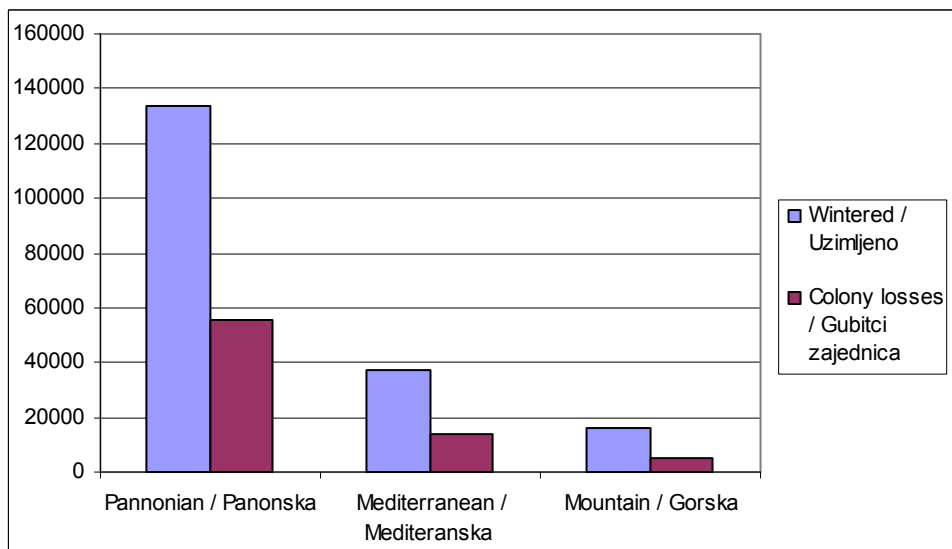


Figure 7. Registered colony losses in the period 2007/2008 per region

Graf 7. Registrirani gubitci pčelinjih zajednica u razdoblju od 2003. do 2007 godine po regijama

losses in Croatia [11].

## CONCLUSIONS

Presented data indicates that beekeeping in Croatia has to solve many problems to increase competitiveness.

Croatia has a high potential which should be taken as an advantage because of its richness with natural resources for honey production. In comparison to pasture potential and necessity for pollination of cultivated and wild plants, present beekeeping is inadequately developed and distributed in different regions.

In countries where beekeeping is highly developed the main role of bees is the pollination of plants. Economical effects of the bees in pollination are far greater than those achieved in classic production of honeybee products. In Croatia a problem concerning pollination of agricultural crops by bees is still present and Croatia has to make considerable efforts to bring in this agro-technical measure. One of the most important issues that Croatia has to work on is to attract young people to modernize technology, and to invest in development of domestic and international market approach.

It is necessary to point out the significance and advantages of honey products to potential consumers. One of the goals of honey product promotion is education of potential honey consumers with new honey flavours and sorts, as well as the better awareness about use of honeybee products.

There is a need to make beekeeping much more flexible to fit into an integrated agricultural system, as well as

more oriented to the consumers' demands, to be able to increase competitiveness.

## REFERENCES

- [1] Bračić I., Poduzetništvo u pčelarstvu, Power point prezentacija. Dani meda, Croatia, 2004, pp.12.
- [2] Croatian Livestock Center, 2008 <http://www.hssc.hr/Publikacije/2007/pcele%20u%202007%20godini.pdf>
- [3] Crostat - Croatian Bureau of Statistics, 2008, [http://www.dzs.hr/default\\_e.htm](http://www.dzs.hr/default_e.htm)
- [4] Dražić M., Bubalo D., Kezić N., Types of beehives and beekeeping in the Republic of Croatia, 36. Znanstveni skup hrvatskih agronoma s međunarodnim sudjelovanjem, Zbornik sažetaka, Opatija, Hrvatska, 2000, 122 p.
- [5] Frick M., Grgić Z., Franić R., Štefanić I., Kezić N., Cooperative business potential for beekeepers in Croatia, Journal of Apicultural Research (2006) 4: 223-229.
- [6] Grahovac P., Ekonomika poljoprivrede. Golden marketing, Tehnička knjiga, Zagreb, 2005, 199 p.
- [7] Grgić Z., Žalac M., Tehničko – tehnološki i gospodarski preduvjeti suvremenog pčelarstva, Hrvatska pčela (2003) 11: 219-221.
- [8] [http://www.poduzetnistvo.org/novosti.php?subaction=showfull&id=1161335879&archive=1160145810&start\\_from=&ucat=&select=novosti&ar=1](http://www.poduzetnistvo.org/novosti.php?subaction=showfull&id=1161335879&archive=1160145810&start_from=&ucat=&select=novosti&ar=1)
- [9] Kezić N., Apiculture, Croatian agriculture at the crossroads, Ministry of Agriculture and Forestry of

Croatia, Zagreb, 1996, pp. 62-63.

[10] Štefanić I., Štefanić E., Puškadija Z., Kezić N., Grgić Z., Beekeeping in the Republic of Croatia, *Bee world*, 85 (2004), 1: 19-21

[11] Tomljanović Z., Razlozi uginuća pčelinjih zajednica u SAD-u, Europi i Hrvatskoj - uzroci, povodi,

riješenja, *Hrvatska pčela* (2008) 5: 464-465.

[12] Tomljanović Z., Apimondia u Australiji II, *Hrvatska pčela* (2007) 11: 269-270.

[13] Zmaić K., Proizvodnja meda u funkciji razvoja seoskog poduzetništva i multifunkcionalnosti agrara, 4: *Pčelarski dani*, Vinkovci, 2007, pp. 85-89.