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SOCIO-ECONOMIC ASPECTS OF BEEKEEPING IN ROMANIA[1]

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Abstract: *The evaluation of the beekeeping activity from the perspective of social sciences needs the integration of specialist information from various knowledge fields. Biology, economy, agricultural sciences, as well as some border line disciplines, such as climatology or environmental sciences, contribute to the process of presenting and explaining nature and the changes which are associated with the activity of beekeeping. Although the importance of apis mellifera is emphasized in natural sciences, the potential impact of their extinction, and the analyses which include the social dimension generated by the production and the economic exploitation of beekeeping products, are limited. In this article we shall proceed towards the critical evaluations of the approaches to beekeeping, trying to identify the limitations and the internal consistency, and evaluating the level of empirical support sustaining the theory, in order to draft a holistic approach. This procedure is necessary in order to understand the way this activity, which has a long tradition in Romania, can adapt and develop in the context of modernity and its challenges, of climate changes, and of the standards imposed by national and international organizations.*

Keywords: *apiculture, socio-economic analyses, honey*

Introduction

Melliferous beekeeping is a traditional, historically-documented activity in Romania since the very distant past, and it has an important economic, cultural and spiritual impact, maintained until the present day. From the scientific point of view, beekeeping has been a research topic in various domains, such as agriculture, nutrition science, medicine, industrial activities, art, geography, environmental sciences, etc. As a main or alternative economic activity, being at the border between rural and urban environment, beekeeping has an important development potential, including on a community level, and a significant role in sustaining a lifestyle which is in line with modern

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environmental challenges. Also, as it only needs small capital investments and a small work volume (in relation to the number of families) and as it is compatible with alternative activities, and having the potential to involve the entire household in its exploitation, beekeeping is seen as a solution to reduce poverty in vulnerable areas. At the same time, the profit that can be registered following a modern exploitation is significant, as several Romanian apiaries make considerable profit through commercializing beekeeping products on an international level. However, the economic effects only represent a part of the role that melliferous bees have within the interaction between humans and environment, as the role that they have in protecting or restoring the honey producing potential in the unbalanced and ecologically damaged areas is equally important, as is the role of bees in increasing the productivity of agricultural harvests.

After 1990, Romania saw important changes in the methods of use of agricultural areas, and major changes were registered in all regions of the country. Therefore, a fragmentation of the areas which were cultivated with melliferous plants was registered, as well as a decrease of the number of orchards, deforestations and the abandonment of land developments which also involved plantations of acacia and linden. The environmental changes were accompanied by social changes, mainly the right to manage private activities and the right to free association. The passage from a state-governed beekeeping system within large hives, during the communist times, to the independent and multi-level development of beekeeping defines an active and well-developed domain on the Romanian territory. On the regional level, the activity is coordinated by the European Union through National Apiculture Programmes, development frameworks which follow the support of the activity through computing systems, purchasing biological materials and apicultural inventories, phytosanitary control, as well as physical and chemical analyses which confirm the quality of the honey. The national legal framework is completed by the Law of Apiculture no. 383/2013, which establishes the way in which the activity of apiculture is regulated.

The foundations of beekeeping in Romania

The first historical reference related to bees on Romania's current territory can be found in Herodotus's writings, stating that „*the country beyond the Ister is possessed by bees, on account of which it is impossible to penetrate farther*" (Herodotus, 440 B.C.E., p. 4). Also, in „Anabasis", Xenofon (430-355 î. Hr.) affirms that „*The food of the Getae consisted mainly in honey, vegetables, milk, simple or prepared, and very little meat, as their faith in Zamolxes stopped them*" (apud Giogia, 2001). The systematic and profit-oriented beekeeping activity proved itself to be placed in some favourable geographical areas. Initially, this has kept itself basic and inefficient for a long time, the extraction of honey meaning, in most cases, the destruction of the colonies through suffocation. An innovation in beekeeping management is presented by Dimitrie Cantemir in „Descriptio Moldaviae" (*Chapter VII – About wild and domesticated animals*): „*the law of the land stops one from having more hives than the neighbour so that one's increased number of bees should not bring damages to the neighbour*". Moreover, the first technological innovations and the way there are brought to fruition are described: „*when beekeepers catch a new swarm with its queen, before bringing it into the hive, they cut holes and small openings into it. Before starting anything else, bees fill in the holes*

and cuts with the black wax […]. Beekeepers take this wax together with the honey in due time: because it smells like amber and holds sunlight, they sell it at a deer price". After all, honey and wax were amongst the first products which consisted the tribute paid by the Romanian Countries to the Ottoman Empire (showing a remarkable stability in time, the top counties for honey tax in 1700 were Prahova, Gorj, Romanati and Mehedinti), or represented an important export category when economic trades were regulated through international treaties. The development of the beekeeping sector is mentioned by most travellers across the Romanian Countries, Del Chiaro writing *„Plenty of hives can be found throughout the entire Romanian country"* and *„from the Romanian Country, Venice draws its supply of wax and meat, as well as the Sultan's kitchen with butter and honey in large quantities"* (apud Ungureanu, 2005, p. 15).

The necessity to have the families of bees localized in order to extract the apicultural products led to the improvisation of primitive hives. Those were made of locally-available materials (straw, unbaked clay, wood, twigs etc.) They also had different shapes adapted to the local climate: clay pot, used in Afghanistan, gourd hive, one of the oldest ones being discovered in Vehnemoor, near Oldengurg, skeps or baskets made of rods, mobile rods and poles, metal and wooden barrels, etc. The first systematic hives with mobile frames were elaborated in Ukraine in 1814 by Petro Prokopovych, and the correct definition of the distance between frames eventually imposed the Langstroth hives. At present, in Romania, models of hives deriving from this design are being used, most apiaries abandoning traditional models, which are considered inefficient and difficult to maintain.

The classification of *Apis mellifera* belongs to the *Insecta* class, order *Hymnoptera*, extended family *Apoidea*, family *Apidae*, type *Apis*, species *Apis mellifera* (Honey Bee). The classification of bees' subspecies takes into consideration the morphometric measurements suggested by DuPraw in 1964, completing the differences in size and colour promoted by Ruttner. The subspecies are gathered in three evolutionary branches based on morphometric measurements: European honeybees (M), African (A), North Mediterranean (C) (Mărghitas et al., 2008, p. 309). The purpose of this material is not to exhaustively present the biological characteristics of the subspecies of melliferous bees. However, we shall review a few selective characteristics of the subspecies which influence the beekeeping activity on a regional level, because their ecology represents an important debate point in the community of Romanian beekeepers and an important topic in policy making:

- *Apis mellifera carnica*: Carniolan Honey bees are native to colder regions of Eastern Europe. Used in the United States, excellent in areas which tend to have rapid changes in pollen and nectar supplies, able to quickly adapt to changing conditions. For the apiarist, the rapid build-up of bees will also result in rapid swarming. The Carniolan honey bee is native to Slovenia, southern Austria, and parts of Croatia, Bosnia and Herzegovina, Serbia, Hungary, Romania, and Bulgaria (Michel, 2014).

- *Apis mellifera caucasica*: the Caucasian honey bee originates from the high valleys of the Central Caucasus. Georgia is the „central homeland" for the species, although the bees also can be found in eastern Turkey, Armenia and Azerbaijan. At an

average length of 7.1 millimetres, over half a millimetre longer than that of other honeybees, the Caucasus bee's proboscis can reach nectar that its competitors cannot; imported in USA for „*ability to produce large amounts of honey despite cold weather and bad conditions*" (Corso, 2013).

- *Apis mellifera ligustica*: The Italian honey bee is thought to originate from the continental part of Italy, south of the Alps, and north of Sicily. Italian bees, having been conditioned to the warmer climate of the central Mediterranean, are less able to cope with the „hard" winters and cool, wet springs of more northern latitudes. They do not form such tight winter clusters. More food has to be consumed to compensate for the greater heat loss from the loose cluster (EOL, 2014).

- *Apis mellifera carpatica*: subspecies which originates from the Carpathian area of Romania and neighbouring areas, such as the Serbian Banat, the Bulgarian shore of the Danube, Bessarabia, Sub Carpathian Ukraine and Hungarian Puszta. The National Agency for Improvement and Reproduction in Zootechnics „Prof. dr. G. K. Constantinescu" approved the homologation of the Romanian bee with the Certificate of homologation no. 1, released on 28.10.2009, according to the Zootechnics Law no. 72/2002 and with the Ministry Ordinance no. 383/2009, awarded to the Apiculture Research and Development Institute S.A. (Institutul de Cercetare-Dezvoltare pentru Apicultură S.A., 2009). According to the beekeepers its characteristics are a gentle nature, a quiet behaviour and a low swarming instinct.

The evolution of bees since Eocene-Oligocene (the historical period from which fossils have been identified in the European space) until the present day, was co-dependent with flower plants, including their ability to nurture themselves of nectar and pollen. The bees' capacity to pollinate certain types of plants is completed by the adaptation of the development cycle in synchronicity with the local flora, the formation of the winter brood in low temperature areas during the cold season, or migratory swarming towards warm geographical areas. These characteristics emphasize the importance which must be given to the ecology of commercial beekeeping, because the impact on the biodiversity and the stability of ecosystems is sometimes neglected, as a result of the desire to maximize profit. It is important to mention that the *apis mellifera* species is a native of Romania's geographic area, and its spreading on other continents was the effect of actions which preceded the understanding of the ways in which ecosystems are affected by invading species. At present, various protection measures are employed in certain areas in order to protect the health of honeybees and to protect the local activity of beekeeping (Australia imposed quarantine, the United States have imposed border control through Honeybee Act, which regulates the importation of honeybees to prevent the entry of honeybee diseases and parasites, as well as undesirable subspecies of honeybees). The efforts to define a biosecurity strategy at EU level are drafted according to Council Regulation (EC) No 1234/2007 of 22 October 2007, establishing a common organization of agricultural markets and on specific provisions for certain agricultural products (Single CMO Regulation).

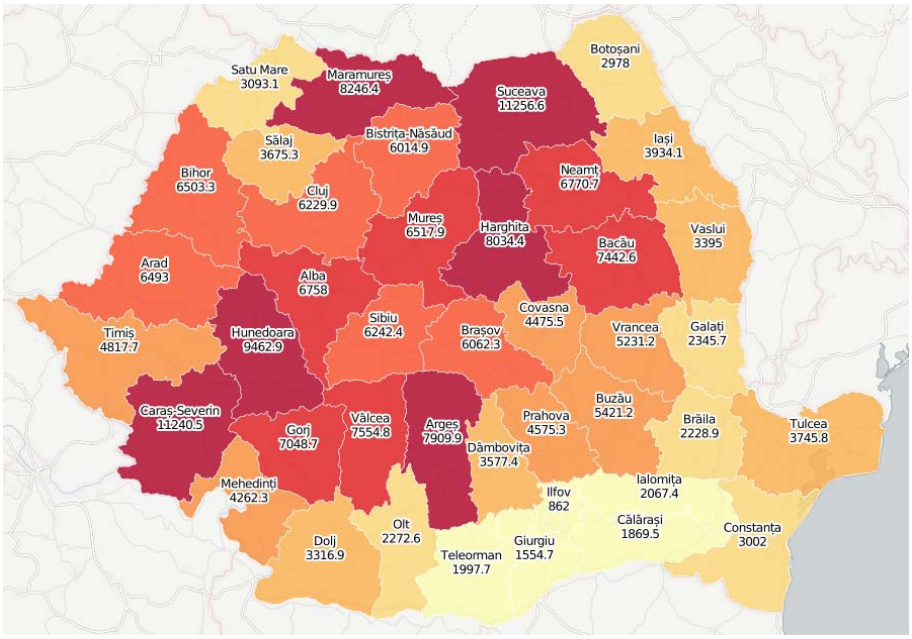
The adaptation of the subspecies of bees to various climate areas, as well as the synchronicity between their stages of growth and stagnation with the flourishing of the

local species of melliferous plants makes the introduction of other types of bees problematic in the context of Romanian characteristics. We say that because there are no comprehensive studies examining all the implications for the local flora, for the diversity of species and the relationships to other ecosystems. Probably, the best known popular example is the Africanization of the European bee, as a result of the hybridization between *Apis mellifera scutellata* and different European species in Brazil. Characterized by an increased aggressiveness, including against humans, the spreading of the Africanized bee implies great risks for public health (Schumacher & Egen, 1995), and makes it difficult to estimate the impact they would have in the areas they invade. The potential adverse effects are not to be placed exclusively on the environmental level, but they also affect the actual beekeeping activity, Adgaba and his colleagues reporting that „*approximately 82% of imported hybrid bees die after one honey-harvesting season for reasons that are not yet certain*" (Adgaba et al., 2014, p. 6). Taking into consideration the potential risks which the unverified import of genetic material could have, it is important for Romania to protect the *Apis mellifera carpatica* species, a species which is both adapted to the local environment conditions and economically efficient.

The development of beekeeping on the Romanian territory is facilitated by adequate land surfaces, which are favourable for extracting nectar by pollinating bees, medium temperatures and right quantities of precipitations. It is estimated that, out of a total of over five million hectares worth of cultivated and spontaneously-grown plants, an approximate three million could be used for apicultural production (Băloi, Csösz, Cristina, & Bogluţ, 2013, p. 242). The seasons' order, the environmental characteristics and the types of melliferous plants define six Bio-bee areas on the national level:

1. *Romanian Plain and Dobrudja* – continental climate and precipitations between 400-600 mm, steppe flora and forests, acacia and linden plantations, sunflowers; in the Danube Delta and floodable plains, forest vegetation includes mint, white clover, vetch, oaks, thyme, sage etc.)
2. *Moldavian plateau* – continental climate and precipitations between 500-600 mm, extended linden surfaces (over 22.000 Ha), acacia in the south and sunflowers in the north.
3. *Western Plains* – average yearly temperatures between 8 and 11° C, melliferous characteristics similar to the ones of the Romanian Plain.
4. *Transylvania* – precipitations between 500-600 mm, is a mixed area, cereal, fruit and pasture and meadow. The production is moderate, yet continuous. For this reason, it is a suitable area for stationary beekeeping, raising queen bees or development.
5. *Mountain side* – represented by the Carpathian Mountains and the Subcarpathian Hills, average yearly temperatures of between 4 and 8° C, precipitations between 700-1100 mm, multifarious flora consists of fruit plantations, and the flying raspberries. Two main pickings manifests themselves most strongly, i.e. raspberry, flying and manna. It is currently the area less used for beekeeping purposes.
6. *Carpathian slopes* - trees, pasture and meadow (Băloi et al., 2013, pp. 242-243).

Further on, each of these Eco typical areas determines different morphological characters for pollinating insects, including honeybees: physical size, trunk length, length of the tars and tibia, length of the anterior wings and cubital index. In the section presenting the species of melliferous bees, we shall examine the importance of this aspect more in depth, as it is directly linked to the biological protection of the local species (*apis mellifera carpatica*), as well as the pressures of commercial exploitation, which can generate unbalance due to the unfiltered import of unverified biologic material (on the EU level, regulations regarding bee importing from outside the Union already exist).



Map 1 Romania stub potential *(counties level). Map creator CartoDB[1], data source (Băloi et al., 2013, p. 244)*

The areas with melliferous potential for subsistence and apicultural production comprise spontaneously-grown, as well as cultivated plants. Determining the potential on the Romanian territory takes into consideration the areas which are populated with species of a major importance for nectar collecting, and is dependent on cultivated plants (especially sunflowers and vegetables), as well as on climatic conditions throughout the year (Băloi et al., 2013, p. 244). A statistical study for the year 2005 can offer a county-level image of the geographical distribution of melliferous potential of apicultural production, which exists on the national territory. In Map 1 we can see the distribution of the areas which include a large concentration of surfaces with

[1] https://cartodb.com

melliferous plants, and it can be easily figured out the importance of mountain and intra Carpathian areas.

Beekeeping nowadays

The financing of the activities associated with beekeeping is ensured by the European Union through a support scheme elaborated on a three year' time frame, which takes into account the number of bee families existing in each member state, and through which 50% of the expenses are being covered. Because honeybees are essential for pollinating several important agricultural harvests, the capacity to maintain food production at an optimal level is one of the main concerns of National and International institutions. For example, international evaluations cannot estimate pollinating services on a general level, but, in the European Union, 80% of the production of 264 cultivated species depends directly on insects' pollination, the yearly monetary value on the international level being estimated at 153 billion Euros (Chauzat et al., p. 1). Direct and indirect benefits, as well as the risks associated with the beekeeping sector are approached by the European Union in an integrated manner. The use of pesticides is regulated through European Food Safety Authority (EFSA), recognizing the risks for the bees, associated especially with the new class of Neonictinoide Pesticides, and environment related issues are approached through the LIFE+ programme. For the development and support of apiculture, the Common Agricultural Policy (CAP) financing mechanisms for National Apiculture Programmes are employed, with a value of € 33, 100.000 per year between 2014 and 2016. Their top priority measures are:

- *Technical assistance to beekeepers and groupings of beekeepers*: technical assistance is designed to enhance the efficiency of production and marketing by introducing better techniques.
- *Control of varroasis*: the aim of varroasis prevention is to reduce expenditure incurred in treating hives or to ensure that part of the cost is met.
- *Rationalisation of transhumance*: intended to assist with managing the movement of hives in the Community and with providing locations for the strong concentration of beekeepers during the flowering season.
- *Measures to support laboratories carrying out analyses of the physico-chemical properties of honey*: financing of analyses of the properties of honey according to its botanical origin provides beekeepers with precise knowledge of the quality of the honey harvested, and enables them to get a higher price for their product.
- *Measures to support the restocking of hives in the Community*: to compensate for losses of bees, and therefore of production, by funding activities to promote queen production or purchasing of bee colonies.
- *Cooperation with specialised bodies for the implementation of applied research programmes in the field of beekeeping and apiculture products*: specific applied research projects for improving honey quality in the honey programmes, and dissemination of the

results of such projects, can help to increase producer incomes in particular regions.

The recent days have been characterized by a worldwide increase in the concerns regarding the negative evolutions in the beekeeping sector. Therefore, significant decreases in the numbers of bee families have been registered, a phenomenon which is known in academic literature under the name of Colony Collapse Disorder, the mortality being still only partially explained. An intervention mechanism was launched at the EU level, structuring the efforts in the following directions:

- *veterinarian measures*: prohibiting the import of bee colonies, European and national reference laboratories, trainings for the social actors involved in policy drafting, eliminating parasites;
- *pesticides*: new schemes of risk evaluation, reinforcing the approval process, restrictions of use and integrated management;
- *beekeeping*: technical assistance, applied research, eliminating the Varoa acaridae and other invaders, re-increasing the number of bee families;
- *environment*: the protection and restoration of bee habitats. European Red List of bees (a review of the status of European species according to IUCN regional Red Listing guidelines) (Nieto et al., 2014), Life Programme (the EU's financial instrument supporting environmental, nature conservation and climate action projects throughout the EU);
- *agriculture*: ecologic, climatic, environmental, and rural development measures.

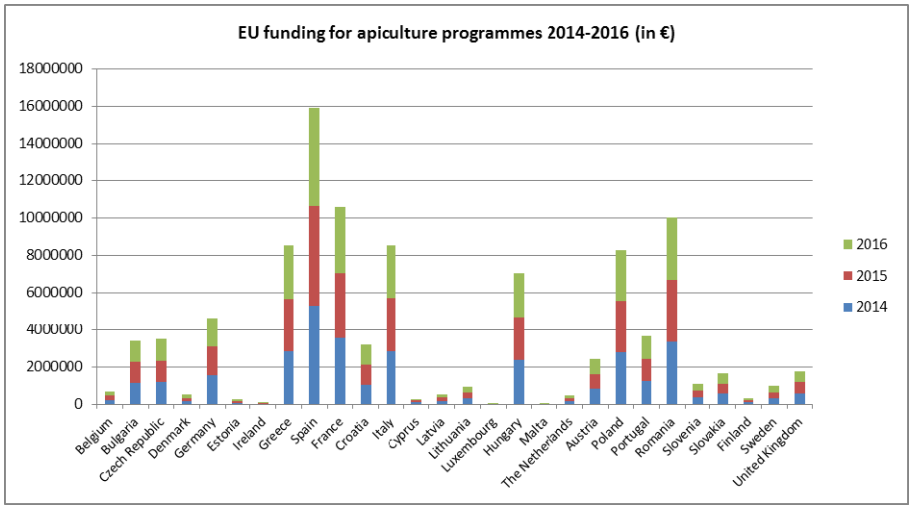
An example of the way applied research can contribute to solving some complex issues regarding the use of honey-contaminating substances is the elimination of the Varroa acaridae (Varroa destructor and Varroa jacobsoni). The treatment includes, as an alternative to the classical pharmacological approach, the use of heat tolerance in order to eliminate them. Therefore, a new technology recommends warming the frame with brood until having reached a temperature of 43.3^{o} C, as the parasites' larvae do not resist these temperatures, whilst the bees' larvae can, and this procedure eliminates the contamination. One of the projects using this approach is MiteNot, developed by Eltopia[1], a project which involves „*compostable circuit board that senses the stages of the bee broods reproductive cycle and applies heat at a specific temperature and time to sterilize the mites*" (Eltopia, 2014). Currently being in the process of research, development and testing, the technology might represent a simple and non-toxic alternative for the elimination of the Varroa acaridae.

The budget breakdown of the Apicultural National Programmes between 2011-2013 was as follows: in 2010 and 2011, the greatest beneficiaries (Spain (93%, 84%), Greece (97%, 92%), France (90%, 88%), Italy (96%, 92%), and Romania (100%, 85%) was very effective in their use of the budgets. This was also the case in 2012 (Greece (97%), France (92%), Italy (93%), and Romania (98%) with the exception of Spain where only

[1] http://www.eltopia.com/mitenot/

69% of budget was used. It is worth noticing that Romania did not use the funds for technical assistance measures, and only used the funds for applied research and honey analysis to a small extent, as the main categories of expenses consisted of rationalisation of transhumance and hive restocking measures (European Comission, 2013, pp. 7-8). The National Programmes are part of the instruments and concrete measures (Cace, 2008, p. 30) through which the European Union tries to reach its objectives regarding the growth of the number and of the quality of jobs, aswell as those aimed at increased flexibility in the context of climate change.

Figure 1. *National Apiculture Programmes for 2014-2016 in all 28 Member States, co-funded by the EU*



Source: European Commission[1]

As we can see, in the European context, Romania is one of the countries with a developed apicultural sector, in 2010 the number of bee families reaching 963, 342 (7% of the total number). This number of bee families has a corresponding number of 41, 794 beekeepers (6.8% of the total number), which defines an average number of 23.1 bee families making up a stub. The relation between the number of bee families and beekeepers, in the context in which Romania occupies the fifth position in Europe regarding families' stock, defines a very diverse profile, where this activity does not represent a dominant category. The beekeepers' activity, combined with the number of bee families, defines a few profiles such as: professional, non-professional, part-time and hobby (Chauzat et al., p. 4) or commercial, sideliner, and hobbyists (Kleinman & Suryanarayanan, 2012, p. 493). As a consequence of the developed system of beekeeping, a large number of professional/commercial beekeepers can be found in

[1] http://ec.europa.eu/agriculture/newsroom/121_en.htm

Romania, but also numerous beekeepers of the hobby range, which confirms the interest for this activity and for the opportunities it offers.

Table 1. Livestock (honeybee colonies), number of beekeepers, distribution and density of honeybee colonies in the European Union in 2010

	No colonies (percentage of total)	No beekeepers (percentage of total)	Mean no colonies/beekeeper	Mean no colonies/km^2
Austria	367 583 (2.7%)	24 453 (4.0%)	15.0	4.4
Belgium	110 000 (0.8%)	10 000 (1.6%)	11.0	3.6
Bulgaria	613 262 (4.4%)	27 477 (4.4%)	22.3	5.5
Cyprus	40 066 (0.3%)	**552 (0.1%)**	72.6	4.3
Czech Republic	517 300 (3.7%)	46 600 (7.5%)	11.1	6.6
Denmark	170 000 (1.2%)	5 000 (0.8%)	34.0	3.9
Estonia	42 000 (0.3%)	3 080 (0.5%)	13.6	1.0
Finland	37 500 (0.3%)	2 500 (0.4%)	15.0	0.1
France	1 346 575 (9.7%)	69 237 (11.2%)	19.5	2.5
Germany	680 000 (4.9%)	89 000 (14.4%)	7.6	1.9
Greece	1 500 000 (10.8%)	20 000 (3.2%)	75.0	**11.4**
Hungary	995 812 (7.2%)	17 556 (2.8%)	56.7	10.7
Ireland	**24 000 (0.2%)**	2 200 (0.4%)	10.9	0.3
Italy	1 127 000 (8.1%)	**70 000 (11.3%)**	16.1	3.7
Kosovo	70 664 (0.5%)	6 453 (1.0%)	11.0	6.5
Latvia	64 133 (0.5%)	3 500 (0.6%)	18.3	1.0
Lithuania	117 977 (0.9%)	4 565 (0.7%)	25.8	1.8
Netherlands	80 000 (0.6%)	8 000 (1.3%)	10.0	1.9
Norway	50 000 (0.4%)	3 000 (0.5%)	16.7	**0.1**
Poland	1 122 396 (8.1%)	44 951 (7.3%)	25.0	3.6
Portugal	580 065 (4.2%)	17 291 (2.8%)	33.6	6.3
Romania	963 342 (7.0%)	41 794 (6.8%)	23.1	4.0
Slovakia	246 214 (1.8%)	15 709 (2.5%)	15.7	5.0
Slovenia	156 178 (1.1%)	9 100 (1.5%)	17.2	7.7
Spain	**2 498 003 (18.0%)**	24 251 (3.9%)	**103.0**	4.9
Sweden	125 000 (0.9%)	12 000 (1.9%)	10.4	0.3
United Kingdom	200 000 (1.4%)	40 000 (6.5%)	**5.0**	1.3
Europe	13 845 070	618 269 (100%)	22.4	4.2

The minimum and the maximum are reported in bold in each column.
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Source: Chauzat et al., p. 3.

According to the National Apiculture Programme 2011-2013, the costs for one bee family are approximately 68 Euros, the main category which favours beekeeping being that of work-related costs. The production of one kilogram of honey (for a number of 60 families owned) amounts to approximately 2.72 Euro, while the income amounts to

1.76 Euro/Kg (Capri & Marchis, 2013, p. 47). This is why it is absolutely necessary to cover the difference through an offer diversification and decreasing the work costs, the main solution being a household-integrated work regime, assigning the work to family members (proper employment in the field being limited only for specific or intensive activities, such as the transport of hives in transhumance). Financing and European standards shape the beekeeping activity in a particular way sometimes very different from other geographical areas. During a 2012 questionnaire-based research, Adgaba and his colleagues register the production systems, the socio-economic profiles of beekeepers, the number of bee colonies, the type of bee that is used, the production of honey, the types of hives and the reasons behind their choice, the profit, the household income, the main risks associated with beekeeping, bee diseases, the marketing activities carried out, as well as management practices (Adgaba et al., 2014, p. 4). The purpose of the research is finding out the determinant factors influencing the employment of these technologies in Saudi Arabia where institutional pressure for innovation and standardization is reduced.

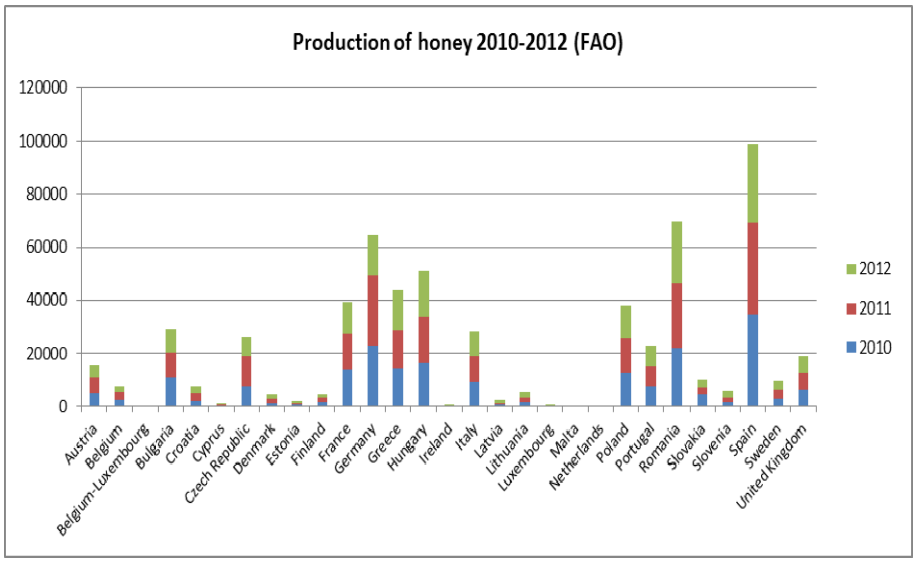
Apicultural products: technologies and standards

Apicultural products are used in various domains, such as medicine or nutrition, industry, technology or art, and consisting of honey, bees wax, royal jelly, bee venom, bee glue and pollen. Apicultural products are testified in the Bible, the Koran and the Talmud, representing a sign of hard-work and order in the Orient, and the oldest coin in the world (Efes, Sec. IV BCE) has a bee as its symbol. The oldest testimonials of the usage of bees and derivate products include the preservation of fruit in honey in Egypt, healing the ill in India (1.400 BCE), where eight types of honey are known and used. Aristotle in „The Description of Animals" suggests the use of honey and bee glue as remedies against concussions and wounds, and Plinius in „Natural History" mentions that wax and bee glue are efficient as medicines. Other methods of use include making wax boards used in writing, with the aid of a stylus (for example, the Roman boards present at the „Timotei Cipariu" Library in Blaj, Alba, existing since 133 and 142), home illumination and the production of magic figurines, as well as extended use during Christian rituals, wax being used for the production of candles.

Honey is the main product of honeybees, having in its composition a wide range of sugars, which vary according to the nectar sources, as well as other substances such as minerals, vitamins, proteins and amino acids. The quality of honey is the object of national and international regulations and standards, its classification being also a matter of prestige for producers and distributors. The selling price of honey is influenced by its type, quality and the used channels of commerce. Consumption honey, which represents approximately 85% of the honey sold in the European Union, is more expensive, whilst industrial honey is sold at smaller prices; at the same time, single-flower honey is more appreciated, and implicitly its prices are higher. Distribution networks influence the final prices, beekeepers obtaining higher prices when they sell directly to consumers, medium prices in the case of retailers, and small prices in the case of packers and distributors.

The production of EU member states covers 61.6% of internal consumption. As we can see in Figure 2, the main producer states are Spain (29, 735 tonnes in 2012), Romania (23, 062 tonnes) and Hungary (17, 000 tonnes). During the time interval 2010-2012 we can notice a relative stability, however, we can also remark a drastic decrease of the production in Germany in 2012, generated by the loss of bee families, as well as an increase in Latvia, facilitated by the investments in the field. Taking as a reference the interval 2004-2006, the costs of honey production for 2012 have a higher variation on the global scale (FAO Producer Prices - Annual[1]), Belarus (432.19) and Ukraine (240.83) having the biggest increases, whilst Germany (95.85) and Slovakia (84.85) the smaller ones. From this point of view, in Romania (159.1) we notice a medium increase. The consumption of honey in Romania is relatively low, at 0.42 kg per capita in 2007, compared with the EU average of 0.63 kg (CBI Market Survey, 2009, p. 5). The consumption variation is influenced by several factors, such as the trade price or cuisine traditions, the economic crisis only having limited effects, the request levels remaining high.

Figure 2. *Honey production in European Union*



Source: Food and Agriculture Organization

The characteristics of biotype systems are continuously changing, and the evolution of honeybees depends on the plants where they extract the necessary substances in order to feed themselves. The local flora consists of over 300 melliferous species, both cultivated and spontaneously-grown. The bees' request for proteins, minerals, lipids and

[1] http://faostat3.fao.org/download/P/PI/E

vitamins are concentrated in pollen. This is extracted from certain plants, the most productive being: pledge (*salix cinerea*), willow (*salix caprea*), cherry (*prunus avium*), apple (*malus domestica*), autumn rapeseed (*brasica napus*), dandelions, the local maple, white mustard, rapeseed, sainfoin, raspberries (*rubus idaeus*), corn, pumpkin, sorghum (Băloi et al., 2013, p. 243). The current honey production in Romania is concentrated on a few species of plants: acacia - *Robinia pseudocacia* L., linden - *Tilia tomentosa* Moench.; *Tilia cordata* Mill.; *Tilia platyphyllos* Scop., rapeseed - *Brassica napus* L. ssp. *oleifera* Metzg., and sunflower - *Helianthus annuus* L. (Ion et al., 2011, p. 2). During the past few years, the production of rapeseed honey has been developing, especially thanks to the spreading of the land surfaces allocated to this plant, which is used in the production of biological combustibles.

The transhumance of bee families represents an important aspect of management practices, both for the process of initiation and for honey production. Temperature variations and rain are key factors influencing beekeeping in Saudi Arabia, migratory activity being more profitable compared to the stationery one (Adgaba et al., 2014, p. 9). This is also true for Romania, particularly as there are geographic areas where the nectar extraction from specific plants can be done at various and predictable moments of the year.

The obtained types of honey depend on the flourishing period, accessibility, the technologies applied to plants' growth, and the specific environmental conditions (temperature, humidity, and atmospheric precipitations), which can influence the nectar quantity. Standards differ on national level, whereas the European Union establishes criteria related to the inclusion in certain quality groups, as well as to the eligibility for sale on the member states' territories.

In Romania, a special attention must be given to those technologies and species of plants which produce wood tars used by honeybees for secondary products, such as bee glue, poison-extracting technologies, or royal jelly harvest. During the communist period, the local pharmaceutical industry registered significant progress regarding medical research using apicultural products, such as Apilarnil (natural apicultural product, obtained from larvae of drones) or medicaments based on the bee glue.

Researching beekeeping as social enterprise

Beekeeping is not an easily-labelled activity, as it involves the interaction of different elements, which take into account environmental factors, natural resources, specific knowledge, etc. Besides, beekeeping has a strong social character, as the capacity to build and maintain a social network with relevant social actors is compulsory in order to obtain information, financial support, production, etc. Having had a long history and different methods of approach, beekeeping is adapted to the exploitation areas, and is situated on different levels of technological development. The size of the family, the age of the beekeeper, and the level of education are identified as socio-demographic predictors for the usage of systematic hives in Saudi Arabia (Adgaba et al., 2014, p. 7). Using a sample of logistic regression, the authors claim that the employment of new technologies also depends on the degree of adequacy to local conditions and the local particularities of honeybee species. This is why it is necessary to identify the technologic

and biologic factors which can turn beekeeping into a profitable and environmental-safe activity.

The education level is important in relation to technology employment, as the level of knowledge and access to information increases, making the usage mechanisms comprehensible. Analysing the beekeeping activity from an entrepreneurial perspective, (Popa, Mărghitaş, & Pocol, 2011, p. 289) introduce four variables in the questionnaire-based analysis: experience, motivation, knowledge and social capital, in order to examine the intention to be economically active in this field, by setting up a business. The entrepreneur's profile is defined by the type of activity where the expected results influence decisions (hobby or profit-oriented activity). The authors make an in-depth analysis trying to identify the motivations leading a beekeeper to get involved in entrepreneurship: „*passion for apiculture, commercialization, tradition from family, taking advantage of the financial support, need for achievement and the need for independence*" (Popa et al., 2011, p. 290). Knowledge in the field is a variable which influence the decision of entrepreneurial involvement, advanced experience acting as deterrent. This approach is highly debatable, because it makes no distinction between the amount of knowledge possessed when entering the market, and the knowledge acquired through participation (Croitoru, 2013, p. 105). However, the simplicity of the followed analysis model also raises other questions, social capital being made operational through only one question, concerning the presence of collaboration with other beekeepers (Popa et al., 2011, p. 292). The interaction suggested by the authors can hardly be classified as *bonding* social capital, as it is not clear whether the intention to collaborate is dictated by circumstances, or whether the individuals trust each other, causing some sort of linking social capital, an efficient strategy in difficult times (Neguț, 2013, p. 4). The development of an entrepreneurial culture within the contemporary Romanian rural space is perceived as „top-down" due to the legislative framework and local administrative support (Pricina, 2012, p. 219). The need for a beekeeper to possess the motivation, knowledge and social capital in order to carry out beekeeping activities successfully defines an entrepreneurial profile different from the one described in strict correlation with the rural space. These characteristics are similar to those encountered in social economy analysis (Nicolăescu, Cace, & Cace, 2012), leading to a strong need to develop a theoretical framework capable of shedding light on its the traits, as well as bring forward instruments necessary for development.

A strong extension and research supports to enhance the development of the subsector like: consideration of local conditions in technology selection and adoption; conservation and rehabilitation of vegetation with integration of beekeeping; organizing of beekeepers for efficient marketing of bee products; establishing of colony multiplication centre and multiplying, distributing and conserving of the indigenous honeybee race would be very important (Adgaba et al., 2014, p. 14). Amongst the most important aspects influencing beekeeping in a negative way could be „*absence of rain, shortage of bee forage and bee enemies*" (Adgaba et al., 2014, p. 13). Moreover, poor bee product marketing, pesticides and lack of training are also being mentioned.

Turkey is one of the important honey producing countries on a global scale, the beekeeping sector being favoured by environmental conditions (the Anatolian Bridge

being the source of numerous species of melliferous plants). In a research carried out in the province of Bursa, evaluating the characteristics of beekeepers (Vural & Karaman, 2009) honey production, organization and marketing problems are examined. The average age of the interviewed beekeepers was of 43 years old, the level of education of 6.5 years, and the experience in apiculture of 14 years. Just like in other geographical areas, Romania included, the selling price of apicultural products is higher when the beekeeper sells directly to the consumer. In Turkey, honey producers are not required to respect certain production standards, and there are no quality-imposing economic conventions. This is why, although the country plays an important part on the international level, the selling price is smaller, compared to the honey produced in the European Union, for example. Hence, a model which explains the influence of the type of hive being used has a limited explaining power.

Conclusions

The beekeeping activity in Romania is regulated by the Law of Apiculture no. 383/2013, published in the Official Monitor no. 14/09.01.2014. This establishes the fact that the regulation of apicultural activity is done with the purpose of the protection of bees, and that the activity has a traditional character. This fact is worth emphasizing because it introduces a specific dimension for Romania in the European context. Therefore, we notice a professionalization of beekeeping (main activity, large stubs focused on production and export), which is in accordance to the degree of development of this field on the National level. On the other hand, the traditional character of the activity has its own ways of problem solving, and can respond in a limited way to the challenges generated by the use of pesticides, climate changes, or the introduction of genetically modified organisms.

The beekeeping sector in Romania is well-developed, the main advantages consisting of the favourable natural conditions, the large number of stubs with a diversified production, scientific research facilities, active associative forms, as well as specialist apiculture courses for beginners and experts. The upward trend, also found in the production of eco-honey (Pîrvuțoiu & Popescu, 2011, p. 503), is proof that beekeeping in Romania can successfully face the EU quality regulations and has the natural and social resources for development. The link between the number of bee families and the number of beekeepers must be taken into consideration during a sociologic analysis of this domain. The main reason is given by the large area of socio-demographic and regional profiles, which can be constructed using variables such as residency, age, gender, level of education, number of bee families, production, type of apicultural products brought to fruition, distribution network, etc.

The particularity of apiculture makes this economic activity a necessity, both in natural resources preservation areas, and within programmes of environmental rehabilitation (for example, the fruition of wild mint in the Danube's floodable areas, or recreating the habitats in coalmine affected areas). Planning pastoral activities on the local and national level is legally regulated, the implementation of measures being, however, ineffective. The centralization through IT systems is supported and funded by the National Apiculture Programme, and has its legal foundation in the Law of Apiculture,

through the responsibility of the Local Councils to provide information regarding the melliferous potential. An integrated information system meant to facilitate beekeeping activities in pastoral transhumance is projected by (Ion et al., 2011, p. 2) on the following coordinates: (a) administrative and geographic information about acacia and lime forests, sunflower and rapeseed crops; (b) average multiannual climatic data; (c) local melliferous potential for each acacia and lime forest, as well as for each homogenous zone with sunflower and rapeseed crops; (d) number of beekeepers and beehives in each county. Finally, the databases with this consolidated information should be made available to the local and central administration, to the beekeepers' organizations and their members, as well as to researchers and other interested social actors, in order to ensure an efficient planning of the beekeeping activity on the territory.

Amongst the fundamental problems in the activity of beekeeping there are also the approach methods for the elimination of parasites and the cure of diseases. The classic solution involves the use of medicines which contain active and passive pharmacological substances, which could contaminate apicultural products. This way, one of the main characteristics of the image of honey is being denied, that of a natural biological product. In this context, it is important to emphasize that on the EU level an average of three medicines are authorized per member state, whilst this number rises to 426 for pigs, and 592 for dogs. The solutions that include alternative strategies, also presented in this material, should be accompanied by research projects in order to understand the complex way in which beekeeping influences natural ecosystems, but also in order to broaden the strictly economical perspective on the practice of beekeeping.

One of the particular traits of beekeeping is the extent to which human intervention altered the natural evolution of bees. The use of artificial methods for domestic species beekeeping, for productive purposes, is measured on three dimensions: shelter, food and the perpetuation of species. As far as shelter is concerned, the mobile-frame hive is a relatively recent discovery, the gofer being naturally elaborated by the bees, the organization and stocking of honey and pollen, as well as the growth of the brood can be marginally manipulated by the beekeeper.

Currently, the incoherence of agricultural policies in Romania after 1989 led to large land surfaces remaining uncultivated, and we can notice a discrepancy between the official discourse and policies, and the possibility of exploitation of these lands as melliferous surfaces for beehives. A characteristic of the natural local habitat is its diversity and its capacity to offer areas of spontaneously-grown flora and trees, favourable for extracting nectar and/or pollen. A similar conclusion is reached by (Băloi et al., 2013, p. 245) who estimate that 11 million hectares in agricultural and forest areas are covered by diverse flowers, having a potential for producing 200 thousand tons of honey. This is why Romania's position is important, in the context in which apiculture is not taken into consideration when decisions are making regarding of the genetically modified organisms and pesticides on the national territory, as the risks concerning the beekeeping activity are not quantified.

Destructive natural events such as drought, disease, flood, prolonged frost, or man-made destructive actions such as robbery, inadequate public policies, over taxation, unsubstantiated legislation can create, at community level, a context unsuitable for the development of beekeeping as asocial and economic practice. Therefore, it is imperative that these vulnerabilities be understood and approached in an integrated manner, no just top-down through regional programmes and national legislation, but also through mobilizing and organizing communities in order to create a framework suitable for financial development, the use of apiary products in medicine, for the integration of beekeeping in tourism and the use of honey as food.

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