Study on Intensive Beekeeping Practices in Romania

Constanta Laura Augustin (Zugravu)[1], Ionica Soare[2], Maria Magdalena Turek Rahoveanu[3], Camelia Costela Fasola (Lungeanu)[4], Ciprian Petrisor Plenovici[5], Cristian Muntenita[6], Gheorghe Adrian Zugravu[7]
[1,2,3,4,5,6,7]*University "Dunarea de Jos" of Galati, Galati, Romania*

Abstract- The aims of this paper are to analysis the favorable climatic conditions for the South-East Development Region, as compared to many other development regions of Romania. intensive beekeeping practices. The practice of beekeeping, provide increased opportunities for the development and modernization of apiculture and related sectors, in the development of agriculture and the rural area in general.
Keywords – Intensive Beekeeping, Sustainable

I. INTRODUCTION

Natural and semi-natural habitats are needed to support bees: the presence of high-quality natural and semi-natural habitats in farms and agricultural landscapes - such as wooded areas, hedges and edges of herbaceous fields, is essential for the survival of wild bees. Bees need this habitat for survival to provide nesting places and for pollen and nectar from wild flowers. Mint cultures of Lophantus Anisatus offer the advantage of a perennial culture with a vegetation period of 9 months per year of which 6 months is blooming. Scientific studies have shown that elevated areas of semi-natural habitat in farms and the agricultural landscape favor the diversity and abundance of native bees. In contrast, industrially managed intensive agricultural fields, which usually consist of monoculture on a large scale, with a small semi-natural habitat, have the lowest diversity and abundance of bees. This is of great concern - intensive industrial landscapes in agriculture do not support the wild bees or the pollination services they offer. Farming without synthetic chemical pesticides and organic pest control is possible: Organic farming does not use synthetic chemical pesticides. Instead, measures are being taken to increase the environmental control of pests. This includes encouraging natural enemies, such as birds, certain beetles, spiders and parasitoids, which are means of bio-control of pests in crops. Some scientific studies have shown that natural enemies can suppress insect pests on crops, thus providing a means of controlling natural pests. Intensive agriculture has become heavily dependent on managed hives to meet the needs of pollination services [1-4].

II. PROPOSED ALGORITHM

The drastic decline in wild and managed bee populations recorded in recent years in Europe and North America is worrying given our dependence on pollinating insects for biodiversity and global food security. Honey production has declined drastically, for example, by 25% in Europe between 1985 and 2015. This decline in bees has led to the concept of "pollination crisis" worldwide - a situation where bee pollination services are limited and this can cause damage to yield and crop quality.

Diversity of solitary bees fell by 52% in England, while specialized species may be considered to be most at risk. In Central Europe, between 25% and 68% of all wild bee species are endangered, with percentages varying between countries and regions. For honey bees, there was a 25% loss in Europe between 1985 and 2005. A contributing factor to this decline is the Varroa parasite, an invasive species in Asia. Most bee colonies in Europe and the United States have disappeared due to this parasite. Other pollinating insects also suffered dramatic drops. For example, a scientific report on butterflies' abundance in European countries has found that butterfly populations have fallen by almost 50% between 1990 and 2011. This is mainly due to the intensification of agriculture in the north-western regions, as natural grasslands rich in biodiversity is cultivated, resulting in almost "sterile" pastures, with few wild species of flowers remaining for butterflies. The recommendations, based on scientific studies to protect and restore bee populations in Europe, reveal that, using existing bio-practices, we do not need pesticides to deal with the pests that live on the crops we want to produce. Examples include organic pest control by enhancing natural insects on Spanish cotton farms and rose and pepper cultivars in the Netherlands. Other examples are crop coverage in the French vineyards and the use of flower bands around the Dutch potato fields, which attract enemy natural insects controlling aphids. This report clearly shows that agricultural solutions - to ensure the survival of native bee diversity in Europe and to save domesticated bees - are enshrined in the concept of 'organic farming'. Organic farming aims to preserve important ecosystems and their functions, supporting native bee populations and pollination services that they offer. Organic farming provides healthy food by protecting the soil, water and the climate. In addition, it promotes biodiversity and does not contaminate the environment with chemicals or

genetically modified organisms. Organic farming uses ecological methods to combat pests and natural means of soil fertilization. The path uses crop rotation and crop rotation, the use of resistant crop varieties and mixed crops, and promotes the continued development of scientific knowledge.

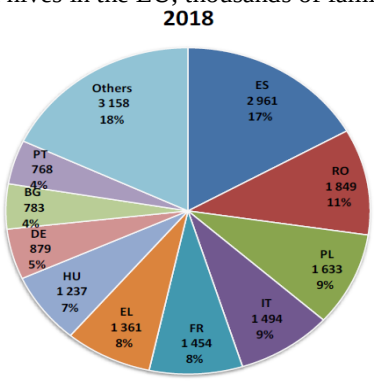
There are several known factors that cause the decline of wild bees, including: loss of habitats and lack of wild flowers on farms due to industrial cultivation methods; the use of synthetic chemical pesticides in industrially managed farms that kill or harm bees; diseases and parasites; the impact of change. The solutions for the first two issues include the implementation of organic farming and, in this respect, the conservation and restoration of semi-natural habitat in farms and the agricultural landscape. Organic farming, which includes some organic farming methods, is based on ecological pest control and is based on modern science for plant breeding techniques, such as growing assisted reproduction for seed development. This includes functional agro-biodiversity. An example of this is the scientific development of mixtures of wild flower seeds that are specifically tailored to meet the requirements of bees and species that help control pests. All these "solutions" under the auspices of organic farming are applicable to agriculture in Europe. The recent increase in organic farming practices demonstrates that pesticide-free agriculture is fully feasible, economically viable and environmentally safe. Organic farming now accounts for 5.4% of all European agricultural land use, including arable crops and orchards. Solutions for reducing and diminishing bee decline and increasing biodiversity are the integration of intensive apiculture into aquaponic systems.

III. EXPERIMENT AND RESULT

In turn, this has potentially harmful effects on bees because they need an optimal nutritional balance to support their growth and reproduction [6-12]. Flowering crops, such as rapeseed, can offer alternative foods for some wild bees' species that can effectively harvest flower crops, but not for more specialized species. Integrating intensive apiculture with aquaponic provides an efficient production model that frees space for wild bees. Acclimatization and introduction into culture of asian mint species Lophantus Anisatus offer thus a permanent feed source for bees from the beginning of spring to the time of freezing.

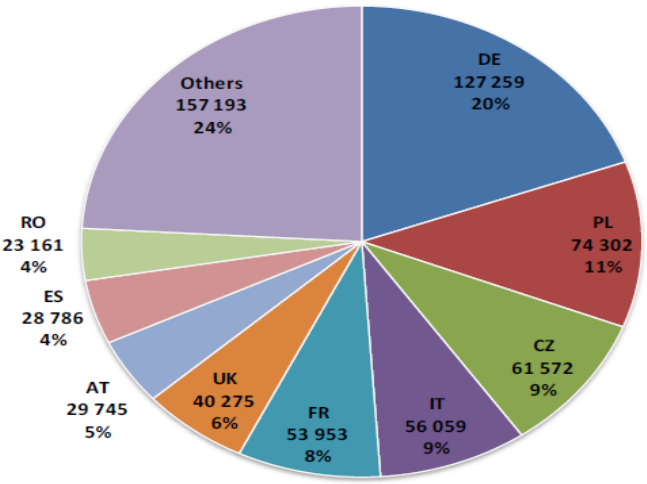
Scientific research shows that a variety of wild bees is essential to ensure sustainable plant production. Thus, we cannot rely on a bee species for pollination. A variety of wild bees is also essential to ensure that food is delivered daily to our tables. Recent scientific studies have shown that chemicals for intensifying industrial agriculture are involved in the decline of bees and pollinating services they provide to wild crops and flowers. The application of fertilizers, herbicides and insecticides has a negative impact on the health of bees [3, 9] and on the loss of natural and semi-natural habitat on the field at farm level and are major factors in decreasing populations bees. In addition, the modern industrial farming model also causes problems of pest and weed resistance, soil fertility and water retention, groundwater contamination, high energy and CO2 emissions as well as reduced resistance and vulnerability increased to climate change. In addition, within this paradigm, farmers are becoming more and more dependent on seeds and chemicals from multinational companies. These are just a few examples of the negative impact resulting from current practices of industrial chemical-intensive agriculture. Alternatively, a model based on modern organic farming methods could ensure food production and avoid the negative effects outlined above. Scientific studies show that the implementation of organic farming is feasible and, in fact, the only solution to the growing problems associated with intensive chemical industrial agriculture. Organic farming, which includes several organic farming methods, promotes biodiversity on farmland and supports the restoration of semi-natural habitat on farms as ecological compensation areas for bees and other wildlife. Organic farming is not based on the use of synthetic chemical pesticides and herbicides and therefore protects bees from the toxic effects of these agrochemicals.

Figure 1: Number of hives in the EU, thousands of families (Eurostat, 2018);



Romania is one of the privileged countries on the European continent whose territory overlaps over 5 of Europe's 11 bio-geographical regions (alpine, continental, panonic, steppe, and pontic) and is at the junction between the pale-arctic floral sub-zones: Mediterranean, Pontic and Eurasian ones.
Romania ranks second in the European Union, after Spain, as the number of bee families and the first place in honey production (Figure 1 and 2, Eurostat, 2018).
In Romania, apiculture is one of the branches of agriculture with the oldest traditions, knowing that the ancestors of the Romanian people, Dacians and Thracians, were growing bees for honey and wax. In Romania there were and there are natural conditions favorable to beekeeping due to significant honey resources.
This explains the richness and diversity of resources as elements of a valuable melliferous patrimony. The south-eastern part of Romania belonging to the South East Development Region (including the counties: Vrancea, Buzău, Galati, Brăila, Tulcea and Constanța) 8 development regions of Romania (set up by Law No. 151, 1998), possesses a series of characteristics, which is why it developed a transhumance for many producers in the country:
- a high degree of biodiversity of the elements of the spontaneous and cultivated flora, as a result of the eco- climatic conditions, comparable, almost to some categories of honey plants with the one registered at the country level, ensuring at the same time:
- the succession of blooms and the practice of beekeeping from the 3rd to the 10th of the year, about 8 months/year due to climatic conditions;
- concentration in a variety of floral elements for honey;
- the possibility of obtaining a high yield on certain honey categories, compared to other areas of the development regions (eg acacia honey, lime honey, sunflower honey, rape honey);
- extending the succession of the same flowering for species recognized and sought by beekeepers (acacia etc.) on the basis of eco-climatic differentiations in the vast expanse between the Carpathians of the Curvature and the Black Sea, which ensures the increase of the production time on the honey type and the triggering of the pastoral phenomenon; for example the onset of the pastoral phenomenon with acacia flowering in the Sub-Carpathians due to the presence of neons that ensure a temperature increase and its ending with the phenophase as well as the flowering of the acacia in the littoral area because the presence of the Black Sea causes a backwardness of the area thermal point of view;
- the huge potential reflected in the production of honey and apiculture products and felt but not statistically recorded in other parts of the country, outside the South-East Development Region, by the producers practicing the pastoral form (also expressed by the very high number of applications demanding, hard to quantify for the location of the apiary on the territory of the administrative units in the area of the region in question);
- conditions favorable to the practice of beekeeping due to the high duration of sunshine, which has led to the increase of the sunflower areas (registered among the development regions) and the production of sunflower honey, and by the relief with generally low altitudes stretches (which, due to the geographic position relative to the general dynamics of the air masses) do not introduce rapid changes in the baric (thermal) regime, (positively influencing the bee flight) unlike other areas of the country.

Figure 2: Number of beekeepers in the EU, 2019 (Eurostat).



Recognized for its curative values and diversity, Romanian honey has won many international medals in the international competition. On average, Romania produces 20,000 tonnes of honey annually, which ranks our country in third place in Europe after Spain and Germany, and the herds reached about 1.47 million bee families. Nearly 40,000 beekeepers are registered nationwide, and more than 60% of them are members of the Bee Farmers Association with a staff of 900,000 bee families. According to the Ministry of Agriculture and Rural Development, the largest honey production comes from the counties of Braila, Caras Severin, Mures, Sibiu and Valcea.

The apicultural potential of a geographic space (country / region, etc.) is given as a whole of the natural components (the relief by its forms, altitude and its pondering, bio-climatic factors), demographic, socio-economic and cultural and expressing opportunities for capitalizing on apiculture.

The components of the natural or semi-natural environment (bee-grass beeswax) play an important role, imparting a number of characteristics of honey and apicultural products through their quantitative and qualitative value, such as color and honey flavors. For example, on a larger scale, the identity of the space through the flavor / assortment (home country) has said its word: apple (extreme tonic and refreshing, yellow color – United Kingdom, orange (it has an open color, a strong citrus taste) - Spain / Mexico.

The need to highlight the relationship between the diversity of honey categories given by the entomophilous plant and land/area categories makes the "Apiculture National Program in Romania for 2017-2019" focus on determining the geographical area of origin (on a smaller scale) and the authenticity of honey, as well as the development of the organic apiculture sector. This is necessary because new guidelines in apiculture target honey bee therapeutic products with the unique ability to provide, for therapeutic and prophylactic purposes, the synergy of the presence and action of an impressive number of substances, constituting the biomedicine support of the future. In addition to the multitude of studies carried out by various institutions / organizations since 1989 about honey therapy in Romania. At the same time, different colored honeys with a mark in its value for marketing and the determination of its final use is based on space, that is, botanical origin, age and storage conditions, although transparency or clarity depends on the amount of suspended particles, such as pollen. Thus, new practitioners come to support the proposed guidelines to further contribute to the development and upgrading of beekeeping and related sectors as well as to the growth of trade, of the number of honeybees certified in organic farming system such as and increased production of certified organic honey.

Regarding the ecological structure of natural capital in south-eastern Romania, it is worth mentioning that the current configuration (composition, pondering of the ecosystems categories, spatial distribution) still has natural and semi-natural ecosystems overlapping on protected natural areas and maintaining in large part the multifunctional character with a wide range of honey resources in support of the apiculture sector, especially for organic beekeeping. About 80% of organic certified honey production is delivered to Europe's largest consumer markets, namely Germany, France, Italy, Austria, but also to third countries such as Japan, Canada and China.

IV. CONCLUSION

Beekeeping generally maintains and maintains, at no cost to other economic activities, a rational, long-term balance between economic development and the environment, as well as practicing in understandable and readily accepted forms, implicitly at the level of the Southern Development Region -East, by members of the space communities as beekeepers to improve the quality of their lives, the sustainable development of rural space and the diversification of economic activities.

V. REFERENCES

[1] Abrol DP. Pollination Biology: Biodiversity Conservation and Agricultural Production. Springer Dordrecht Heidelberg London New York, ISBN 978-94-007-1941-5, 2012.

[2] Breeze TD, Roberts SPM & Potts SG. The Decline of England's Bees. Policy review and recommendations. University of Reading and Friends of the Earth 2012.

[3] Garibaldi LA, Aizen MA, Klein AM, Cunningham SA & Harder LD. Global growth and stability of agricultural yield decrease with pollinator dependence. Proceedings of the National Academy of Sciences, 108: 5909-5914, 2011.

[4] Klein AM, Vaissiére BE, Cane JH, Steffan-Dewenter I, Cunningham SA, Kremen C, Tscharntke T. Importance of pollinators in changing landscapes for world crops. Proceedings of the Royal Society B: Biological Sciences. 274: 303-313, 2007.

[5] Kremen C, Williams NM, Bugg RL, Fay JP & Thorp RW. The area requirements of an ecosystem service: crop pollination by native bee communities in California. Ecology Letters 7, 2004, pp. 1109-1119. (Cited in Gibson et al. 2007).

[6] Pfiffner L & Müller A. Wild bees and pollination. Factsheet FiBL: 1-8. Editor: Research Institute of Organic Agriculture, Frick, Switzerland, 2014.

[7] Rollin O, Bretagnolle V, Decourtye A, Aptel J, Michel N, Vaissière BE & Henry M. Differences of floral resource use between honey bees and wild bees in an intensive farming system. Agriculture, Ecosystems and Environment 179, 2013, pp. 78-86.

[8] Tirado R, Simon G & Johnston P. Bees in decline: A review of factors that put pollinators and agriculture in Europe at risk. Greenpeace Research Laboratories Technical Report (Review) 01-2013, publ. Greenpeace International, 2013, 48 pp.

[9] Vanbergen AJ & The Insect Pollinators Initiative. Threats to an ecosystem service: pressures on pollinators. Frontiers in Ecology and the Environment 11, 2013, pp. 251–259.
[10] Veromann E, Mänd M & Karise R (2012). Pollination – the indispensible ecosystem service in agriculture. In ELN-FAB. European Learning Network on Functional Agrobiodiversity . Functional agrobiodiversity: Nature serving Europe's farmers. – Tilburg, the Netherlands: ECNC-European Centre for Nature Conservation, 2012.
[11] Williams GR, Tarpy DR, van Engelsdorp D, Chauzat M-P, Cox-Foster DL, Delaplane KS, Neumann P, Pettis JS, Rogers REL & Shutler D. Colony Collapse Disorder in context. BioEssays, 32: 845-846, 2010.
[12] Winfree R, Williams NM, Gaines H, Ascher JS & Kremen C. Wild bee pollinators provide the majority of crop visitation across land-use gradients in New Jersey and Pennsylvania. Journal of Applied Ecology 45 (3): 793-802, 2008 (Cited in Breeze et al. 2011).