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ASPECTS RELATED TO THE HONEY MARKET AND THE ETHICS OF THE BEEKEEPING ENVIRONMENT IN ROMANIA

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Abstract

The paper presents the main trends of the Romanian honey market, in the period 2018-2022. In order to better highlight the evolution of this market, it was necessary to analyze specific indicators such as: total production of honey and the number of bee families both nationally and regionally; the price for honey at national level; consumption of honey per capita - average annual; quantitative exports and imports of honey from Romania. Complementary to the economic part, due to the fact that the honey bees are not only honey producers, but also vital natural pollinators, the paper also mentions and analyzes aspects related to the ethics of the beekeeping environment in Romania and EU, especially the use of neonicotinoids, in the context of global transformations.

Key words**:** *bee families, honey production, ethics of the beekeeping environment, bioeconomy*

INTRODUCTION

Honey is known and used by people both as food and medicine since ancient times - a fact attested by numerous archaeological discoveries in North Africa, Europe, the Near East, among peoples such as the Greeks, Romans, Assyrians and others - the analysis of ceramic vessels indicating that the bee products had a significant millennial impact for the human species, including in the treatment of ailments for which there were no other remedies [11].

Hippocrates, who is considered the "father of medicine", supported the idea that propolis and bee honey are the dearest medicines.

A basic element that attests to the significance of honey throughout the evolution of human society, is represented by the cave paintings, which were discovered in Spain at Arana. These paintings date back to 7000 BC. Other documents that were discovered in Australia, highlighted the fact that the aborigines knew and collected bee honey a long time ago [14].

In Romania, beekeeping is a millenary activity and the coats of arms of three autochthonous counties still formally attest the connection with the roots of our nation – a nation gifted with numerous and important natural resources and enterprising in their valorization (Figure 1).

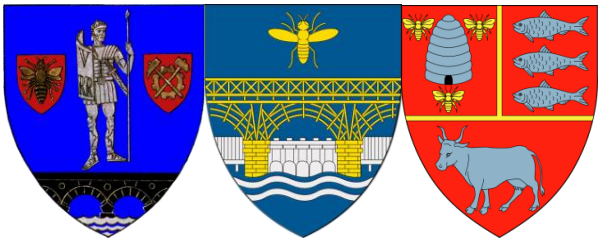

Fig. 1. Coats of arms of Caraş-Severin, Mehedinți and Vaslui counties
Source: own processing of photos from Public Domains [1], [2], [3].

Fundamentally, the crucial importance of honeybees emerges from the products of the hive (honey, wax, honeycomb, pollen, royal jelly, bee bread, apilarnil, propolis, venom) and their role of pollinators; it is estimated that "a third of every mouthful of food we ingest exists because of bees" [25]. Fruit trees (the self-sterile varieties of apple tree, pear tree, cherry tree, plum tree, peach tree, apricot tree, almond tree, chestnut tree), fruit bushes (raspberry, blueberry, but also the self-fertile gooseberry and strawberry that do not require cross pollination) get harmonious development following the visits of the insects that carry pollen; garden plants (peas,

beans, tomatoes, cucumbers, melons, peppers), forage legumes (alfalfa, clover, sweet hay, fingers-and-thumbs etc.) and many species in large crops depend on the input of bees – oleaginous and proteinaceous (rapeseed, sunflower, turnip, bean, soybean, buckwheat,); the influence of pollinating insects even on the vine under certain conditions is mentioned with an effect on the production of grapes and flax by increasing the yield of seeds. Even tropical crops like cotton, citrus, coffee, avocado etc. requires pollination. And let's add the need of seed growers who must constantly pay close attention to aspects related to pollination [12].
Therefore, due to the autochthon beekeeping tradition and the importance of honey bees, this paper has a main goal consisting in an economic analysis of Romanian honey production and honey market during 2018-2022 and, as complementary objectives, to show the honey bee as a life form (so intrinsic valuable and vulnerable, with fascinating complexity at both individual and social level – the life of the bee colony), as well as to report and problematize certain issues related to the ethics of the bee breeding environment in Romania, especially the use of neonicotinoids.

MATERIALS AND METHODS

This research presents a series of aspects for the period 2018-2022 related to the Romanian honey market. The most important indicators for this sector were analyzed and presented, such as: honey production and the number of bee families - the national and regional level, the average annual price, the average annual consumption and the place occupied by Romania in the top of the main importers and exporters of honey worldwide. These data were provided by prestigious statistical institutes: National Institute of Statistics/INS, Eurostat, International Trade Centre/ITC.
In order to achieve the objectives complementary to the economic analysis, we methodologically resorted to the reading of multiple reference works, analysis, synthesis, comparison of contents.

And because we, the Europeans, are not only talking about but in fact experiencing a paradigm shift (economy - bioeconomy conversion), the first direction we turned our attention to was the specifics of this life form called the honey bee, namely those endogenous anatomical-physiological (Figure 2) and social characteristics that make this insect to be a vital producer and pollinator in the benefit of the humans and the environment: tripartite body (head, thorax, abdomen), endocrine system (respectively multiple endocrine systems, some for individual use, others for the benefit of the community - the optimal development of the glands being conditioned by sufficient nutrition and high nutritional value during growth), tracheal system very complex, nervous system and sense organs (brain in the cephalic capsule with which it coordinates especially the sensory perceptions and ganglion chain that crosses the whole body; tactile, olfactory, visual sense - sounds seem to be perceived tactilely in the form of vibrations), open circulatory system (the colorless hemolymph fills the entire body, bathing all organs and tissues; a single blood vessel, extending from the abdominal heart to the head, produces unidirectional circulation to the brain, pumping hemolymph captured from the body by the heart valves), digestive system (oral cavity, esophagus, goiter, ventricle, stomach, small intestine, rectal pouch), adipose body (especially here it stores its energy reserves and also here the toxins in its body are processed; the tolerance of pesticides is conditioned by the proper functioning of the adipose body), sexual organs (specific for the queen/drone/worker bee), immune system (in the intestine it secretes substances with an action against viruses; food for larvae contains antimicrobial substances; hemolymph contains macrophages and substances with antibacterial action) according to [22].

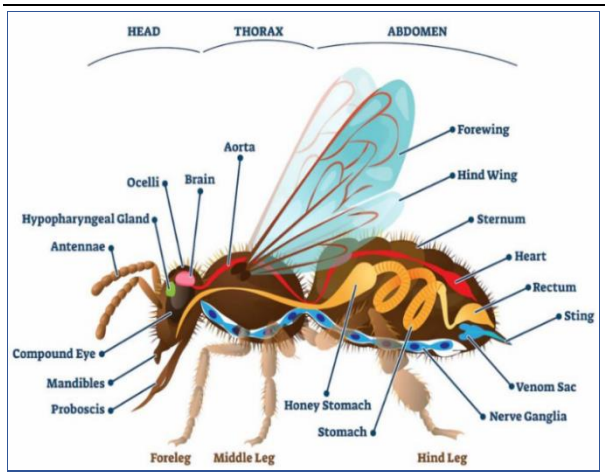

Fig. 2. Bee 's anatomy
Source: [4].

And the complexity of the individual honey bee correlates with the complexity of communication, organization and activity of the bee colony as the super-organism which is the functional unit and equally, in case of disease, the epidemiological unit – see the law of colony development on the vertical and horizontal axes, the matrix as an informational program under which the colony begins its life in natural conditions without human influence/intervention and the vital force as an immaterial force that maintains all endogenous biological and physico-chemical processes, ensuring the harmonious functioning of the organism [16].

RESULTS AND DISCUSSIONS

In Romania, bee honey has been produced for over 2000 years due to the existence of the diversity of the honeybee flora, which is found throughout the country. Along with honey, other bee products are also obtained, such as: pollen, pasture, royal jelly etc. These products are known and appreciated both by domestic and foreign consumers [6], [19], [20].

The bee families had an upward trend in Romania during 2018-2022, with an increase of 14.62%, as shown in Figure 3. Among them, 99.97% belongs to the private sector, with an increase of 14.63%.

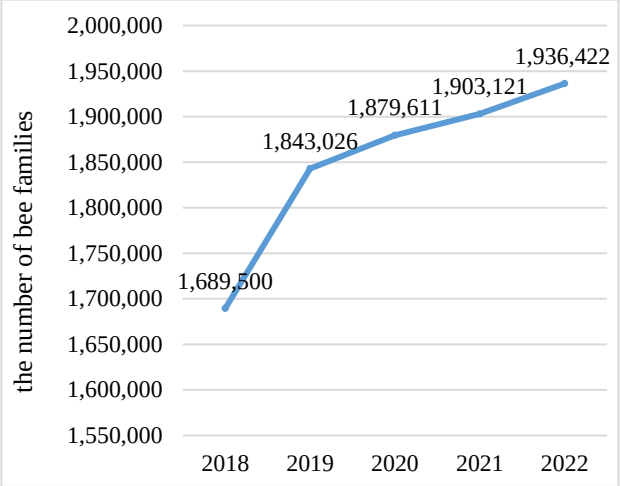

Fig. 3. The number of bee families in Romania, in the period 2018-2022
Source: [8].

Overall, in all regions, the number of bee families multiplied, with two exceptions, the Bucharest-Ilfov region and South-West Oltenia. Here the reductions are 24.21% and 2.16% respectively - Table 1. The highest percentage reductions in bee colonies were found in areas closer to the capital, possibly due to a reduction in agricultural activity that harmed the city's expansion and services related to the metropolitan area.

Table 1. The number of bee families in the period 2018- 2022, in Romania's development regions

Specification	2018	2019	2020	2021	2022	2022/2018 %
North-West Region	230,616	294,620	308,674	312,590	298,311	129.35
Central Region	211,229	223,199	225,822	226,464	237,155	112.27
North-East Region	219,341	238,612	248,639	252,183	249,680	113.83
South-East Region	282,384	323,671	333,218	337,770	343,317	121.58
South-Muntenia Region	228,880	249,359	265,044	263,419	264,334	115.49
Bucharest - Ilfov Region	16,598	16,018	15,943	11,827	12,579	75.79
South-West Oltenia Region	324,392	311,516	290,283	291,876	317,369	97.84
West Region	176,060	186,031	191,988	206,992	213,677	121.37

Source: [8].

The North-West (129.35%), South-East (121.58%) and West (121.37%) regions had the highest increases in bee families during the analyzed period.
The counties that recorded increases above the average for the regions were:
- Bihor (139.72%), Maramureș (163.39%), Cluj - 169.90% (the highest increase in the country) - North-West Region,
- Sibiu (127.03%), Alba (153.44%) - Central Region,
- Bacău (123.18%), Suceava (133.26%) - North-East Region,
- Vrancea (136.53%), Galați (138.04%), Constanța (154.64%) - South-East Region,
-Hunedoara (125.35%), Timiș (156.29%) - West Region,
- Călărași (117.24%), Argeș (143.91%) - South-Muntenia Region,
- Vâlcea (114.05%), Gorj (121.41%) - South-West Oltenia Region.
In 2022, the North-West Region - 15%, the South-West Oltenia Region - 16% and the South-East Region - 18% obtained the highest percentages of the number of bee families in the country (Figure 4).

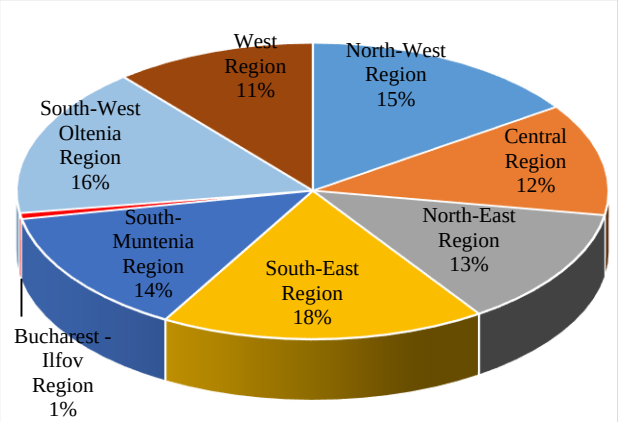

Fig. 4. Distribution of bee families at the Romanian regional level, in 2022 (%)
Source: [8].

32,277 beekeepers were registered in 2022, in Romania, out of the total of 710,825 in the EU, 39.4% more compared to 2019 [5].

The average in the EU for the average number of hives that a beekeeper owned in 2022 was 29, and for Romanian beekeepers it was 73 [5].
Figure 5 shows the dynamics of the production of honey extracted in Romania between 2018-2022, a period in which an increase of 2.05% was recorded. The year in which the highest production was achieved was 2021 – 30,831 tons, and the decrease in the year 2022, compared to 2021, was of 3.47%.

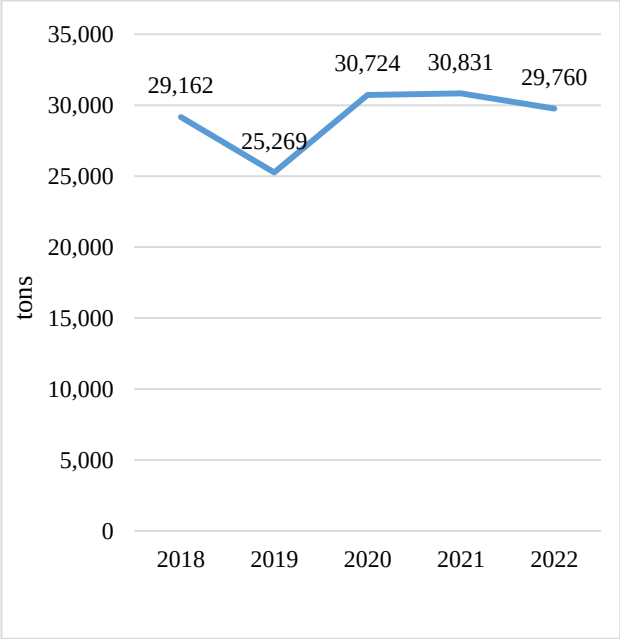

Fig. 5. The total production of extracted honey in the period 2018-2020, in Romania (tons)
Source: [8].

Honey production varied from one year to another due to climate changes that manifested through drought, hail, torrential rains, strong wind that had a negative impact on bee activity [15].
The analysis of production by the development regions of Romania indicated that there were increases in the North-West Region (105.67%), the West Region (106.59%), the Central Region (109.74%) and the North-East Region (109.74%) - Table 2. Apart from the Bucharest - Ilfov Region (34.30%), the South-West Oltenia Region recorded the highest percentage of decrease - 10.62%.

Table 2. Total production of honey extracted in the period 2018-2020, in Romania's development regions (tons)

Specification	2018	2019	2020	2021	2022	2022/2018 %
North-West Region	4,249	3,263	4,345	4,710	4,490	105.67
Central Region	3,493	3,408	3,877	3,839	4,101	117.41
North-East Region	3,880	3,691	4,342	4,589	4,258	109.74
South-East Region	4,724	4,333	5,652	5,134	4,677	99.01
South-Muntenia Region	3,962	3,078	3,556	3,858	3,862	97.48
Bucharest - Ilfov Region	344	314	328	238	226	65.70
South-West Oltenia Region	5,387	4,712	5,278	5,488	4,815	89.38
West Region	3,124	2,470	3,346	2,975	3,330	106.59

Source: own calculation after [8].

The counties that recorded increases above the average for the Regions were:
- Bihor (130.01%), Cluj (140.47%), Satu Mare (155.46%) - North-West Region,
- Covasna (135.67%), Alba (162.82%) - Central Region,
- Neamț (126.54%), Suceava (144.96%) - North-East Region,
- Vrancea (102.83%), Brăila (102.88%), Buzău (103.01%), Galați (148.67%), Constanța (148.88%) - South-East Region,
- Dâmbovița (115.47%), Ialomița (121.19%), Călărași (161.60%) - South-Muntenia Region,
- Vâlcea (113.16%), Olt – 204.66% (the highest increase in the country) - South-West Oltenia Region,
- Caraș Severin (122.06%), Timiș (145.64%) - West Region.

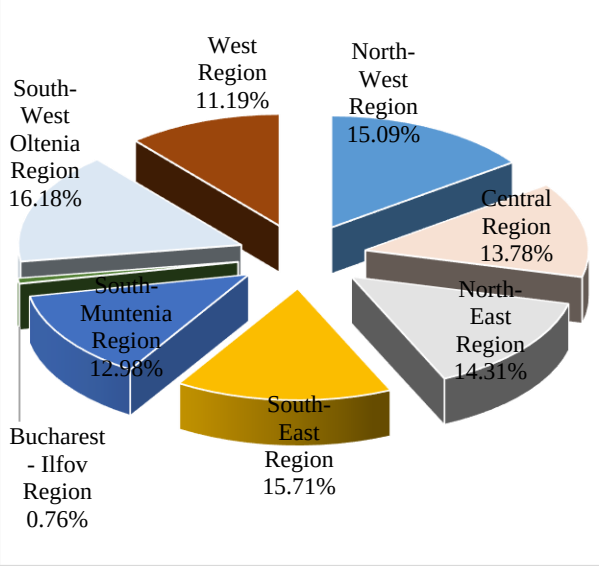

Fig. 6. The distribution of honey production in 2022, in the Development Regions of Romania (%)
Source: [8].

The share held by the honey production obtained in the regions from the total honey production extracted in Romania in 2022 is presented in Figure 6. In 2022, the Regions South-West Oltenia (16.18%), South-East (15.71%) and North-West – 15.09% had the highest percentage of the total honey production.
The amount of honey extracted in 2022 placed Romania on the 3rd place in the European Union, after Germany (34,100 tons) and France (31,400 tons). In 2022, the EU had a production of 286 thousand tons of honey, being the 2nd producer worldwide, after China [5].
Worldwide, there has been a tendency to increase honey production. This increase was due, above all, to the productions made in China and India, where average honey production increases of over 10,000 tonnes per year have been recorded [18], [21]. China was the world leader with a share of more than 25% of the world-wide production [21].

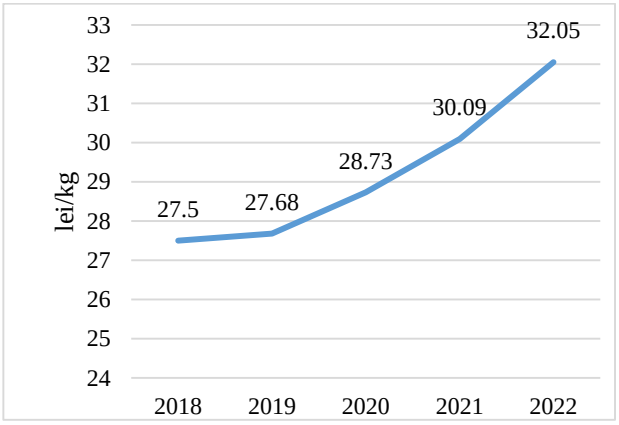

Fig. 7. The average annual price of honey sold in the agro-food/honey markets (lei/kg)
Source: [9].

The average annual **price of honey** sold in Romania showed an upward trend during the study period, the increase being of 116.55% (Figure 7).

Despite the price increase, the average monthly **consumption of honey** (kg/capita) in the period under analysis also increased by 10.47%, as it can be seen in Figure 8.

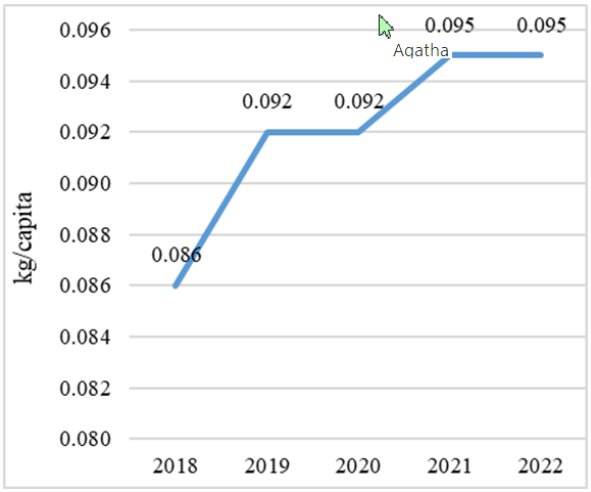

Fig. 8. Average monthly consumption of honey/person (kg/capita) in Romania
Source: [7].

Honey is a natural product, obtained by bees from the nectar of flowers, which represents a beneficial alternative to ordinary sugar. Currently, due to numerous scientific researches, it has been concluded that honey is an important food with a special nutritional value. In this sense, we must remember the composition of honey: carbohydrates (80-85%); water (15-17%); proteins (0.3%); ash (0.2%); amino acids; vitamins; minerals; antioxidants; enzymes; bioflavonoids [6], [20], [24].

Regarding **honey trade**, it can be seen that Romania was on the 21st place in the top of the main honey importers worldwide, from a quantitative point of view (Table 3). The first places were occupied by USA, Germany and UK.

The countries from which Romania imported honey were: China (2,613 tons), Ukraine (536 tons), Republic of Moldova (504 tons), Germany (450 tons) and Bulgaria (320 tons). The previously mentioned quantities are valid for the year 2022.

Table 3. Romania's place in the top of the main honey importers worldwide, in the period 2019-2022 (tons)

Position	Importers	2019	2020	2021	2022	2022/2019 %
1	USA	178,948	196,531	220,538	205,156	114.65
2	Germany	82,202	90,136	78,701	75,091	91.35
3	UK	48,830	52,654	45,852	51,912	106.31
4	Japan	44,788	49,348	47,132	47,381	105.79
5	Belgium	24,818	28,147	31,745	39,756	160.19
6	French	32,819	34,869	29,295	35,506	108.19
7	Poland	29,637	37,344	37,594	31,769	107.19
8	Italy	23,580	21,041	23,586	26,517	112.46
9	Saudi Arabia	17,918	23,525	21,187	21,433	119.62
10	Netherlands	14,785	13,582	17,396	17,423	117.84
...						
21	Romania	2,633	6,468	5,777	5,319	202.01

Source: [10].

Romania's quantitative honey **imports** have doubled in the period 2019-2022, starting from 2,633 tons in 2019 to 5,319 tons in 2022 - the increase being of 202.01%.

Regarding **exports**, Romania occupied the 14th place in the world top, with China, India and Argentina on the first places (Table 4). Romania's honey export partners in 2022 were: Germany (4,544 tons), Italy (2,240 tons), Poland (843 tons), Japan (718 tons) and Spain (663 tons).

Table 4. Romania's place in the top of the main honey exporters worldwide, in the period 2019-2022 (tons)

Position	Exporters	2019	2020	2021	2022	2022/2019 %
1	China	120,845	132,469	145,886	156,002	129.09
2	India	65,351	54,834	70,514	86,183	131.88
3	Argentine	63,522	68,985	63,934	67,380	106.07
4	Ukraine	55,683	80,775	57,528	48,372	86.87
5	Brazil	29,812	45,728	47,190	36,886	123.73
6	Belgium	17,654	22,353	25,740	32,021	181.38
7	Spain	22,471	28,263	28,442	27,869	124.02
8	Germany	25,320	29,740	29,758	27,151	107.23
9	Türkiye	5,548	6,038	9,994	17,248	310.89
10	Hungary	-	-	18,329	15,920	-
...						
14	Romania	11,495	13,743	12,679	12,183	105.99

Source: [10].

Unlike imports, Romania's exports increased during the analysed period by only 105.99%. The year that recorded the largest amount of honey exported and at the same time imported was 2020: 13,743 tons of honey exported and 6,468 tons of honey imported.

At the European level, according to official data, Romania was in second place in the ranking of honey exporters, which shows the interest of external consumers for this Romanian product characterized by quality, aroma and consistency [17].

The new Common Agricultural Policy will support through the Strategic Plan 2023-2027 (PS PAC 2023-2027) the beekeeping sector by allocating through beekeeping interventions the sum of 60,816,300 euros (12,163,260 euros annual allocation), of which 50% will represent the contribution of the European Union and 50% the contribution of Romania.

At the same time, through intervention IS-A-07 - *Acțiuni de sprijinire a laboratoarelor de analiză a produselor apicole, a pierderilor de albine sau a scăderii productivității, precum și a substanțelor cu potențial toxic pentru albine* / *Actions to support laboratories for the analysis of bee products, bee losses or decreased productivity, as well as potentially toxic substances for bees*, it will be possible to settle the physico-chemical and residue analyzes to certify the quality of the honey, with a view to a better exploitation of it on the market, the identification of fakes and their elimination from the market.

This intervention was a natural response of beekeeping associations to honey imports. They asked the Ministry of Agriculture and Rural Development/MADR to include it as a measure to support and protect local beekeepers, which can contribute to the sustainable development of the local economy through the sale of bee products [15].

Regarding the evolution of the world honey market, in the next period, an increase of 5.72% is expected, thus reaching 15.4 billion dollars in 2030 [23]. This increase is based on several factors: the increase in the income of the population, the health benefits, the long term of validity, accessibility etc.

Even if the values of the indicators in our study and the above-mentioned political measures argue in favor of a successful Romanian beekeeping framework, we cannot end the analysis without mentioning, especially for the last decade, the massive disappearances of honeybee populations in Europe and in other parts of the world, through the weakening of their immune system leading to CCD (Collapse Colony Disorder) consequences. The analysis of the causes of this phenomenon reveals:

- the use of pesticides in agriculture (dramatic reduction in the amount of suitable food for pollinators);
- electromagnetic pollution;
- diseases, but also the use of synthetic drugs for the treatment of the colony;
- the inhibition, possibly even the annihilation of fundamental instincts of bees, such as the **swarming instinct** (which man tried to

control/deviate in a direction favorable to the picking instinct to increase honey production, respectively financial gain), **the mating instinct** (today the artificial mating of the queen is also practiced, also for the reason of human financial gain), the **instinct of building honeycombs** (for the same financial motivation – honey production decreases considerably when the bees in the colony produce wax only from their own body) - Secoșan apud Manke [13], to which are also associated the consequences of the transition since the 19th century to the **cuboidal beehive** in the context of the large-scale transition from holistic/organic forms to additive-cumulative forms specific to materialist thinking [13], with impact (including in the form of adaptive stress) on life forms.

From the multitude of factors that lead to illness - even the collapse of honey bees, we will briefly focus on **intoxications**. Ritter [22] distinguishes between intoxications**: by picking/ with pesticides/ by industrial emissions** (from naturopathic perspective intoxication grows slowly even from the cumulative effects over time of an allopathic treatment which stops the effects of an illness instead of its root cause, for bees included). Humans are directly responsible for the intoxication of bees, and in this sense, regulations have also been made on human initiative and measures have been taken to remedy the situation (for example, filters to reduce pollution in the case of industrial emissions, notifying beekeepers when insecticides and acaricides are applied for the protection of those crops visited by honey bees so that they close the hives until the contact substance dries on the plant or move their hive, severe restrictions on the use of neonicotinoids), however the economic stakes and the complexity of the associated problems make the negative effects of poisoning to still exist on a large scale. Humans are prisoners of the vicious circle they have created: materialism-industrialization-tech-digitalization-comfort-creating pseudo-needs and satisfying them through material abundance of dubious and distorted quality, even removed from the natural womb, with secular syncope already in the field of the holistic approach to Life in its multiple forms and levels and with effects that can be generically characterized by the phrase "diseases of civilization".

The case of neonicotinoids (abbreviated neonics or NNIs,) is illustrative in this sense: to increase agricultural production we created GMOs, and then we created a plethora of treatments/chemical substances that we poured into Nature so that we could support functional productive a denatured creation with which, paradoxically, we feed ourselves currently. NNIs are systemic pesticides (as a result the plant is completely impregnated with them, from the root to the pollen and nectar collected by the bees) very effective as insecticides attacking the nervous system of insects with consequent paralysis and death - working both in the case of insects that attack crops, of fleas and ticks (so they also have veterinary use - protective collars for pets are impregnated with NNIs, for example) ... as well as in the case of bees.

Almost 2 decades have passed since the first neonic was approved in the EU (in 2005). In 2013, five of them were approved to be used in plant protection products, although, in the same year, the use of three of them (*clothianidin, imidacloprid, thiamethoxam*) was severely restricted by the Commission for the protection of honey bees (EU Regulation No.485/2013), based on the risk assessment carried out by EFSA in 2012, and thus the use of the three substances in crops/gatherings attractive to bees (especially sunflower, rapeseed, corn) was prohibited, remaining to be used indoor such as in greenhouses or in treatments carried out after flowering or in harvests in seasons when bees are no longer active in picking.

New data have been accumulated to support the initial evaluation of EFSA and on this basis the dialogue between the Commission and the member states was carried out, which resulted in a series of Regulations between 2018-2020 in the above-mentioned direction.

However, the "colossus with feet of clay" of intensive/GMO-based agriculture and the inertia of the system have necessarily claimed repeated emergency authorizations to return to

the use of NNIs from several member states, including Romania, with inherent conflicts of interest between the large owners of agricultural land and producers (a numerical minority that owns a territorial majority), respectively their association, supported by the state, on the one hand, and the associations of beekeepers, etc. environmental protection associations on the other side. And when environmental protection is brought up, let's not forget: human consumers themselves are part of the living environment, of the ecosystem, and pay the bill for pollution and an exhausting, artificial, degenerative way of life and nutrition. So, we all stay confronted with the big moral pragmatic challenge *how do we recover as an ecosystem?* not only regarding (theoretic) policies, but also when it comes to transpose them into practice.

CONCLUSIONS

Romania has a long tradition in beekeeping. And currently, our country is an important producer of honey in the European Union, respectively the 3rd place in the ranking, with a production of 29,760 tons in 2022. The largest amount was extracted from the South-West Oltenia Region - 4,815 tons, and Romania's honey production registered an upward trend in the period 2018-2022.

Also, the number of bee families increased by 14.62% during the analyzed period. The South-East Region was the leader with 343,317 bee families.

In parallel with the price increase, the consumption of honey has also increased, because it can be a healthy substitute for sugar. One of the possible causes could be the change in consumers' food preferences.

At the same time, bee honey is an important product in Romania's international trade. Thus, Romania's quantitative honey imports doubled in the period 2019-2022, but it was found that exports registered an increase of only 105.99%.

The support given to beekeepers through interventions within the PS PAC 2023-2027 will contribute to increasing the production and consumption of good quality local honey.

To the above, it is necessary to add that, since with the wave of digitization and the migration/transfer of bees/diseases/parasites by humans from a geographical area of origin to other areas (for increased beekeeping from financial profit reasons), it seems that honeybees need, more than ever, the humans to respect and protect them.

Let us relate to honeybees in such a way as to deepen and optimize the connection of our species with theirs for mutual benefits, turning the economy into a ***bio***economy and words into deeds by increasing the sustainability of consumption patterns, among other necessary measures, including through the *EU Common Agricultural Policy 2023-2027, EU Biodiversity Strategy for 2030, Green Deal (pioneering proposals to restore Europe's nature by 2050 and halve pesticides use by 2030).*

In achieving this goal, the specialized contribution of beekeepers is worth noting, with the example of G. Mancke (German sculptor and beekeeper from Wiessenseifen), who, based on many years of observation of the nature of the bee as an individual and the nature of the colony as a functional unit, also years of experimentation, created an *entirely dedicated to the bee* hive, nicknamed *the beehive of the sun*, in direct connection with the natural elements indispensable to the life of the colony (sunlight, heat, adequate ventilation) and tailored in a form that supports the efforts of the honey bees to maintain the integrity of the brood nest and, generically, the harmony of the colony, from untreated natural materials/unaltered with synthetic chemicals (wood, rye straw, cow dung), at a significant height above ground level.

We also have a remarkable Romanian contribution, the *Maximus hive* proposed, made, tested and put to work by the beekeeper D.C. Negru, which proves that it is possible and desirable to return to organic beekeeping without artificial honeycombs and synthetic chemicals.

The humans know enough and through this paper we said enough so that every reader be(come) aware that is a collective responsibility, *our* collective responsibility, to

protect the life and health of the honey bees because the option is clear: *pro* bee or not to be.

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