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THE SIGNIFICANCE OF BEES (*APIS MELLIFERA* L.) IN PRESERVING THE NATURAL ENVIRONMENT

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Abstract. Bees are a good indicator to assess the natural environment. Today, the demand for natural living conditions and natural products is increasing more and more. The aim of the study is to analyze the role of bees in the preservation of the natural environment. Research object: plant pollinators - Western honey bees (*Apis mellifera* L.). In Latvia, bees are used more and more to pollinate plants in cities.

Keywords: *Apis mellifera* L., Latvia, enviroment, pesticides

In today's world, when the demand for natural living conditions and natural products is increasing, the interest in beekeeping is also increasing. Bees are in the closest contact with the surrounding living environment. The history of using bees is very old. As early as 50,000 BC, hominids were able to collect honey by tearing open the nests of wild bees with a stick, thus stealing the honey (Kritsky, 2017). The local honey bee of Latvia (*Apis mellifera mellifera* L.) or European (Western European) dark bee appeared 8000 years ago (Liepniece, Trops, 2017).

Forest beekeeping flourished in the forests of Eastern Europe in the Middle Ages, especially in the territory of present-day Poland, Ukraine, Russia, Latvia, Estonia, Lithuania and Germany (Kritsky, 2017), where honey hunting took place, searching for wild nests in natural tree hollows.

Ukrainian scientists claim that honey bees (*Apis mellifera* L.) are the most valuable bioindicator species in the conditions of the Kherson region (Лавренко С.О. & amp., 2022).

Nowadays, interest in beekeeping has increased in Latvia in recent years. In addition, beekeeping opens up wide opportunities to work, which contributes to employment, entrepreneurship and the development of the national economy in general. The aim of the study is to analyze the role of bees in the preservation of the natural environment.

Research object: plant pollinators - Western honey bees (*Apis mellifera* L.).

The general scientific research method is used (scientific induction method, graphical method, monographic or descriptive method).

Bee colonies of various subspecies of the Western honey bee (*Apis mellifera* L.) are used in beekeeping in Latvia (LR ZM, 2021). Bee honey contains antioxidants, which are higher in bee honey than in bumble bee honey (Dimiņš, Cinkmanis, Augšpole, Ķeķe, 2022), because in the northern regions, including in Latvia, during the short flowering period of nectar plants, the nectar is released more concentrated and richer in biologically active substances than in the southern regions (LR ZM, 2021). The products produced in beekeeping are honey, pollen, bee bread, propolis, beeswax and queen bee brood milk, bee queens and bee colonies. In Latvia, beekeepers collect honey of various flowers, linden honey, buckwheat honey, rapeseed honey, heather and other types of honey from bee colonies (Ritmanis, 1992; LR ZM, 2023).

The geographical position of Latvia is favorable for obtaining high-quality honey. The forests of mixed trees of the temperate climate zone, interspersed with wide river banks, natural and floodplain meadows, scrubs, marshes and heaths, are an excellent habitat for nectar plants (LR ZM, 2023). The variety of nectar plants and its quality is the main prerequisite for the quality of collected honey. In addition, in the northern regions, including in Latvia, during the short flowering period of nectar plants, the nectar is more concentrated and richer in biologically active substances than in the southern regions (LR ZM, 2023).

Most crops grown in urban environments require bees for pollination (Rahimi, Barghjelveh, Dong, 2022). Cities also have plants that bloom. And if these plants have not been sprayed with pesticides, then the nectar of these plants is suitable for bees, because around 2,000 bee colonies use the nectar of linden flowers in Riga every year (LETA, 2022). Due to global pollinator decline, honey bees are used in crop production, however, it has been proven that *A. mellifora* complements rather than replaces wild insect pollinators (Valido, Rodríguez, Pedro, 2019).

It is easier for bees to avoid pesticides in cities than in rural areas with intensive agriculture (LETA, 2022). Transformations of the plant cover, not its depletion, by switching to a monoculture, treatment with pesticides, leveling of slopes, clearing and reclamation of bushes, plowing meadows and floodplains, expanding cities have a strong impact on the life of bees, changing the conditions of their existence (Ritmanis, 1992). The honey bee becomes a central hub in pollination networks, visiting both generalist and specialist plant species (Valido, Rodríguez, Pedro, 2019). Research is being conducted in Latvia on the presence of various residues in beekeeping products. In the EFSA (European Commission, 2021) report on pesticides in food, the most detected pesticides in honey are pesticides of agricultural origin - thiacloprid, acetamiprid, bimoxystrobin, glyphosate, chlorpyrifos, fosetyl, flonicamide, boscalid and chlorfluazuron. Since pesticides are present in the environment and bees collect pesticide residues, bees are a good indicator of environmental cleanliness.

Bees play an important role in the conservation of the natural environment because they respond to the effects of pesticides. The local bee of Latvia plays an

important role in pollination of plants both in the rural environment and in cities. In Latvia, nectar is more concentrated during the short flowering period of nectar plants.

References:

1. Dimiņš, F, Cinkmanis, I, Augšpole, I., Ķeķe A., (2022) Dažādu fenolu savienojumu saturs kameņu un bišu medū. *Zinātniski praktiskā konference "Līdzsvarota lauksaimniecība 2022",* 24.-25.02.2022., LLU, Jelgava, Latvija, 103-107. (Content of different phenolic compounds in bumblebee and bee honey).
2. European Commission, (2021) The 2019 European Union report on pesticide residues in food, https://doi.org/10.2903/j.efsa.2021.6491.
3. Kritsky, G., (2017) Beekeeping from Antiquity Through the Middle Ages. Annual Review of Entomology, 62, 249-264. https://www.annualreviews.org/doi/10.1146/annurev-ento-031616-035115.
4. LETA, (2022) Apbišotās pilsētas. https://www.saimnieks.lv/raksts/apbisotas-pilsetas. (Bees in cities).
5. Liepniece, M., Trops J., (2017) Latvijas vietējās medus bites saglabāšanas darbs. Rakstu krājums: Ražas svētki „Vecauce – 2017": *Lauksaimniecības zinātne Latvijas simtgades gaidās. Jelgava*, 2017, 45-48. (Conservation of Latvian Local Honey Bee).
6. LR ZM, (2021) Latvijas lauksaimniecība 2020. https://www.zm.gov.lv/lv/lauksaimniecibas-gada-zinojumi sk.29.01.2024. [Accessed May 8, 2024]. (Latvian agriculture 2020).
7. LR ZM, (2023) Latvijas lauksaimniecība 2022. https://www.zm.gov.lv/lv/lauksaimniecibas-gada-zinojumi [Accessed January 24, 2024]. (Latvian agriculture, 2022).
8. Rahimi, E., Barghjelveh S., Dong P., (2022) A review of diversity of bees, the attractiveness of host plants and the effects of landscape variables on bees in urban gardens. *Agriculture & Food Security*, 11:6, 1-11, https://doi.org/10.1186/s40066-021-00353-2.
9. Ritmanis, Z., (1992) Bišu ceļi. Rīga: Zvaigzne, 400. (The bee's roads).
10. Valido, A., Rodríguez-Rodríguez, M.C., Pedro, J., (2019) Honeybees Disrupt the Structure and Functionality of Plant-Pollinator Networks. *Scientific Reports* 9: 4711. 2019,1-12. https://doi.org/10.1038/s41598-019-41271-5.
11. Лавренко С.О., Соболь О.М., Корбич Н.М., Кривий В.В., (2022). Напрями та перспективи використання комах-запилювачів для біоіндикації стану екосистем та змін клімату в умовах півдня України. *Вісник Сумського національного аграрного університету. Серія «Агрономія і біологія», випуск 1 (47).* https://doi.org/10.32845/agrobio.2022.1.11

Анотація: Хорошим індикатором для оцінки природного середовища є бджоли. Сьогодні все більше зростає попит на природні умови проживання та натуральні продукти. Метою дослідження є аналіз ролі бджіл у збереженні природного середовища. Об'єкт дослідження: запилювачі рослин – західна медоносна бджола (*Apis mellifera* L.). У Латвії бджоли все частіше використовують для запилення рослин у містах.

Ключові слова: *Apis mellifera* L., Латвія, навколишнє середовище, пестициди.