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тиімділікті арттырады және өнімділігі жоғары асыл тұқымды малдардың көбеюін бірнеше есе тездетеді [4, 5]. Бірақ қазіргі кезеңде мал шаруашылығы тәжірибесінде және Қазақстан ғылымында бұл әдістер іс жүзінде пысықталмаған, бұл оның сұраныссыздығын түсіндіреді, осыған байланысты бұл бағытты дамыту және кеңінен тарату маңызды. бүгін.

Зерттеулер нәтижелері бойынша сиырлардың фолликулярлық ооциттерін in vitro ұрықтандыру кезінде әртүрлі мәдени жүйелерде салыстырмалы аспектіде ұрықтандырудың және эмбриондардың одан әрі дамуының ең жоғары пайызы синтетикалық сиырларда байқалатыны анықталды. IVF-әмбебап орта, 64% қарсы 16,8% және 21,8% және эмбриондардың кеш сатысына дейін дамуы 35,3% құрады, ал басқа екі қоректік ортада бірде-бір эмбрион анықталған жоқ.

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РАЗНООБРАЗИЕ ЦВЕТА ФАСЕТОЧНЫХ И ДОРСАЛЬНЫХ ГЛАЗ У ТРУТНЕЙ *APIS MELLIFERA*

VARIATION IN COLOR OF COMPOUND AND DORSAL EYES IN *APIS MELLIFERA DRONES*

Аннотация

В период сбора нектара и пыльцы пчелы являются одной из первых наиболее уязвимых мишеней из компонентов биоценозов при поступлении в них ксенобиотиков (пестициды,

инсектициды и пр.). Систематическое применение искусственно создаваемых различных химических препаратов является одним из наиболее существенных факторов антропогенного воздействия на пчел, который способствует биологическим и морфологическим изменениям.

Объектом исследований явились трутни. Оценку наличия изменений цвета глаз проводили визуально, с помощью ручной лупы. Методика основана на сравнении исследуемых объектов с нормой. Норма условно выделенное состояние объекта, обладающее характеристиками, присущими большинству таких же объектов в сходных условиях, в данный момент времени. Морфологические аномалии – результаты отклонения от нормального развития, т.е. возникновения нетипичных строений и деятельностей органов или всего организма.

Проведенные исследования по оценке наличия трутней с различными цветами фасеточных и дорсальных глаз свидетельствуют о распространенности двух цветов: коричневые или гранатовые и белые. Мониторинг данных изменений во взаимосвязи с экологической нагрузкой в районах, является подтверждением биотоксичности среды, где содержатся экотоксиканты. Данный факт позволяет отметить возможные изменения экологической ситуации, вызывающие мутационные процессы. В целях сохранения чувашской популяции среднерусского подвида медоносной пчелы в дальнейшем необходимо полностью провести экологический мониторинг всех районов Чувашской Республики. Подобное мероприятие позволит выявить места с высоким содержанием экотоксикантов с дальнейшим введением запрета на содержания пчел в данных районах или на использование продуктов пчеловодства из данных точек.

ANNOTATION

During the period of collecting nectar and pollen, bees are one of the most vulnerable targets from the components of biocenoses when xenobiotics (pesticides, insecticides, etc.) enter them. The systematic use of various artificially created chemicals is one of the most significant factors of anthropogenic impact on bees, which contributes to biological and morphological changes.

Drones were the object of the research. The presence of changes in eye color was assessed visually using a hand magnifier. The technique is based on the comparison of the studied objects with the norm. A norm is a conditionally distinguished state of an object that has characteristics inherent in most of the same objects under similar conditions at a given time. Morphological anomalies are the results of deviations from normal development, i.e. the emergence of atypical structures and activities of organs or the whole organism.

Studies conducted to assess the presence of drones with different colors of compound and dorsal eyes indicate the prevalence of two colors: brown or garnet and white. Monitoring of these changes in relation to the environmental load in the areas is a confirmation of the biotoxicity of the environment containing ecotoxicants. This fact allows us to note possible changes in the ecological situation that cause mutational processes. To preserve the Chuvash population of the Central Russian subspecies of the honey bee, it is necessary to carry out full environmental monitoring of all regions of the Chuvash Republic in the future. Such an event will allow identifying places with a high content of ecotoxicants with the further introduction of a ban on keeping bees in these areas or on the use of beekeeping products from these points.

Ключевые слова: *медоносная пчела, трутень, глаза, цвет, экология.*
Key words: *honey bee, drone, eyes, color, ecology.*

Introduction. According to experts, bees (Apis*)* are one of the most prosperous groups of insects, numbering more than 16 thousand species, which belong to 425 genera and 7 families. Bees are found on land almost everywhere where there are entomophilous plants, i.e. up to the zone of perennial ice in the polar regions and to the snow line in the mountains. They are one of the few groups of insects known to have a true social life ("eusociality"). According to the type of trophic relationships, bees are divided into two main groups: polylectic species, the females of which collect

pollen from a wide range of plants (wide polylects) or from a few plant species belonging to different botanical families (narrow polylects) and oligolect species, the females of which collect pollen mainly or only one family of plants (wide oligolects). Bees are also of great importance for the agro-industrial complex (mainly for plant growing and animal husbandry), being the main pollinators of many cultivated entomophilous plants (Michener, 2000; Protalkin, 2005) [1, 2].

Honey bee (*Apis mellifer*), is a eurytopic organism, characterized by trophic relationships as a wide polylect, and this is due, of course, to the fact that they lead a eusocial lifestyle. At the same time, as experts note, the number of biotic factors affecting living organisms, incl. per honey bee far exceeds the number of abiotic bees. Among the biotic factors, there are many more primary factors that directly determine the possibility of the existence of a honey bee: the strength of families, which determines the ability of insects to withstand adverse effects, the presence of a sufficient number of pollen and nectar plants, and the state of the environment (Korzh and Kiryushin, 2013) [3].

Features of the biology of the honey bee make it the best pollinator of the entomophilous flora. During the period of collecting nectar and pollen, bees are one of the first most vulnerable targets from the components of biocenoses when xenobiotics (pesticides, insecticides, etc.) enter them. The systematic use of artificially created various chemicals is one of the most significant factors of anthropogenic impact on bees. Savinov A.B. wrote that an important aspect of the interaction of any organisms is mutualistic bonds. Naturally, the mutualistic connections of the honey bee with plants are of the greatest importance for ecosystems, and for the insect itself, this can fit into the characteristics of the quantity and quality of food (Savinov, 2011; Bissembayev et al., 2023) [4, 5].

However, as Korzh A.P. and Kiryushin E.V. one more mutualist must be remembered, which is man. In the modern world, he takes on the solution of many problematic issues in beekeeping, and they are, for the most part, aimed at maintaining the strength of families and their ability to withstand adverse environmental influences (Korzh and Kiryushin, 2013) [3].

In the works of a number of authors, it was noted that during the studies of the morphology of some groups of insects, certain deviations from the "norms" were revealed, due to various factors: solar radiation, low or high temperature conditions during the development period, ecotoxicants, etc. At the same time, to monitor morphological changes, the “Classification of morphological anomalies of insects” according to J was successfully applied. Balazuc (1948) and Yu.A. Prisny (2009).

The aim of the work was to study eye color anomalies in drones, using the classification of morphological anomalies according to J. Balazuc (Balazuc, 1948) [6] and Yu.A. Prisny (Prisny, 2008) [7].

Material and methods. Drones were the object of the research. The total number of drones studied was 21 000. The work was carried out in 2015-2017. The presence of changes in eye color was assessed visually, using a hand magnifier, according to the classification of morphological anomalies of insects according to J. Balazuc and Yu.A. Prisny (Balazuc, 1948; Prisny, 2008) [6, 7]. The technique is based on the comparison of the studied objects with the norm.

A norm is a conditionally distinguished state of an object that has characteristics inherent in most of the same objects under similar conditions at a given moment in time (Written, 1983) [8]. Morphological anomalies are the results of deviations from normal development, i.e. the emergence of atypical structures and activities of organs or the whole organism (Prisny, 2008) [7].

Monitoring of changes in the eye color of drones was carried out in conjunction with the ecological situation in the regions. According to the official report "On the environmental situation in the Chuvash Republic in 2014" two groups of districts were identified: Group 1 - with the maximum amount of ecotoxicants emitted from all stationary sources (Kanash, Kanashsky district (1.603 thousand tons); Krasnoarmeysky district (6.408 thousand tons) and Cheboksary district (13.096 thousand tons); Group 2 - with a minimum amount of ecotoxicants emitted from all stationary sources (Batyrevsky district (0.082 thousand tons); Krasnochetaisky district (0.041 thousand tons); Morgaushsky district (0.198 thousand tons) and Urmarsky district (0.052) (Fig. 1).

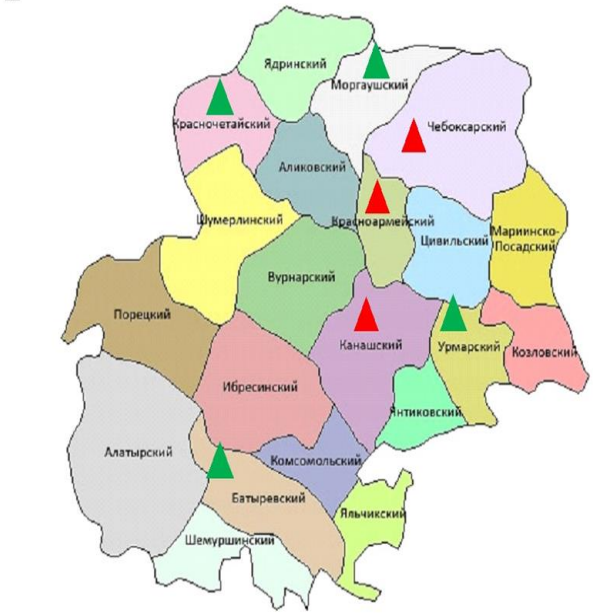

Figure 1 – Map of the Chuvash Republic (red marker - the area with the maximum amount of ecotoxicants emitted from all stationary sources; green marker - areas with the minimum amount of ecotoxicants emitted from all stationary sources)

Picture documentation was carried out using a Canon EOS550D, at max. led away. 281x289 dots. Biometric data processing was carried out in Microsoft Office Excel, 2007.

Results and discussion. According to the classification of insects by J. Balazuc [8] and Yu.A. Prisny (Prisny, 2008) [7], on the territory of the Chuvash Republic, two types of deviations from the "norm" were identified (Fig. 2-A) in the color of compound eyes and dorsal (simple) eyes in drones: brown or pomegranate (Fig. 2-B) and white (Fig. 2-C). The presented changes in eye color are classified in group 2 "Local deformities".

A **B** **IN**

Figure 2 – Variety of eye colors in drones: 1 - normal eyes; 2 - brown or garnet eyes; 3 - white eyes

Heterochromia or color diversity of compound eyes and simple ocelli was not observed in one drone; individuals had the same eye color: normal, brown (garnet) or white, respectively.

Data on the occurrence of identified eye colors in drones in 2015 are presented in Table 1.

As can be seen, in the first group of regions, where, according to official sources, the maximum release of ecotoxicants into the environment is observed, a high proportion of drones with brown or pomegranate eyes was observed - 16.33%.

In the second group, i.e. the release of the minimum amount of ecotoxicants, 12.23% of drones with changes in eye color were recorded from the total number of samples.

In general, in the republic, the number of drones that differ from the "norm" amounted to 12.23% or 856 individuals of the total sample (7000 inddividuals).

Data for 2016 are presented in Table 2. In the first group of districts, the number of drones with different eye colors was found more than in the second group, by 11.38%. At the same time, their number in group # 1 was 21.73% and in # 2 - 10.35%. The total number of drones with deviations from the "norm" in the Chuvash Republic amounted to 15.23% or 1066 individuals of the total sample. This number exceeded the figures for 2015 by 3.0%.

Table 1 – The occurrence of drones with different eye colors on the territory of the Chuvash Republic (Year 1)

No.	Area	Qty drones, pcs.	Eye color, pcs. /%		
			normal	brown or garnet	white
Group #1					
1	Kanashsky	1000	842/84.20	158/15.80	-
2	Krasnoarmeisky	1000	838/83.80	162/16.20	-
3	Cheboksary	1000	830/83.00	170/17.00	-
	Total	3000	2510/83.67	490/16.33	-
Group #2					
4	Batyrevsky	1000	902/90.20	98/9.8	-
5	Krasnochetaysky	1000	913/91.30	87/8.70	-
6	Morgaushsky	1000	912/91.20	88/8.80	-
7	Urmar	1000	907/90.70	93/9.30	-
	Total	4000	3634/90.85	366/9.15	-
General in the Republic		7000	6144/87.77	856/12.23	-

Table 2 – The occurrence of drones with different eye colors on the territory of the Chuvash Republic (Year 2)

No.	Area	Qty drones, pcs.	Eye color, pcs. /%		
			normal	brown or garnet	white
Group #1					
1	Kanashsky	1000	803/80.30	197/19.70	-
2	Krasnoarmeisky	1000	800/80.00	200/20.00	-
3	Cheboksary	1000	745/74.50	255/25.50	-
	Total	3000	2348/78.27	652/21.73	-
Group #2					
4	Batyrevsky	1000	900/90.00	100/10.00	-
5	Krasnochetaysky	1000	890/89.00	110/11.00	-
6	Morgaushsky	1000	901/90.10	99/9.90	-
7	Urmar	1000	895/89.50	105/10.50	-
	Total	4000	3586/89.65	414/10.35	-
General in the Republic		7000	5934/84.77	1066/15.23	-

Table 3 presents the results of studies on the occurrence of drones with different eye colors on the territory of the Chuvash Republic in 2017.

As can be seen from the obtained data, drones with eye anomalies in the group of areas with the maximum amount of ecotoxicants emitted from all stationary sources exceeded the second group in terms of numerical composition, namely: 22.07% (group No. 1) and 10.33% (group No. 2). In the Chuvash Republic, this figure was 15.30% or 1071 drones of the total sample. At the same time, in 2017, drones with white eyes were registered, which were found in one area - Cheboksary, where, judging by official sources, the highest amount of emitted ecotoxicants is observed - 13.096 thousand tons.

In general, as we can see, in group 1 (the maximum number of ecotoxicants) there is a dominant number of drones with changes in eye color: 2015 - 16.33%; 2016 - 21.73% (increase by 5.4%); 2017 - 22.07% (compared to 2015, an increase of 5.74% and to 2016 - by 0.34%) (Fig. 3).

Table 3 – The occurrence of drones with different eye colors on the territory of the Chuvash Republic (Year 3)

No.	Area	Qty drones, pcs.	Eye color, pcs. /%		
			normal	brown or garnet	white
Group #1					
1	Kanashsky	1000	800/80.00	200/20.00	-
2	Krasnoarmeisky	1000	788/78.80	212/21.20	-
3	Cheboksary	1000	740/74.00	260/26.00	10
	Total	3000	2328/77.60	662/22.07	10/0.33
Group #2					
4	Batyrevsky	1000	902/90.20	98/9.80	-
5	Krasnochetaysky	1000	899/89.90	96/9.60	5/0.50
6	Morgaushsky	1000	885/88.50	115/11.50	-
7	Urmar	1000	900/90.00	100/10.00	-
	Total	4000	3586/89.65	409/10.33	5/0.02
General in the Republic		7000	5914/84.49	1071/15.30	15/0.21

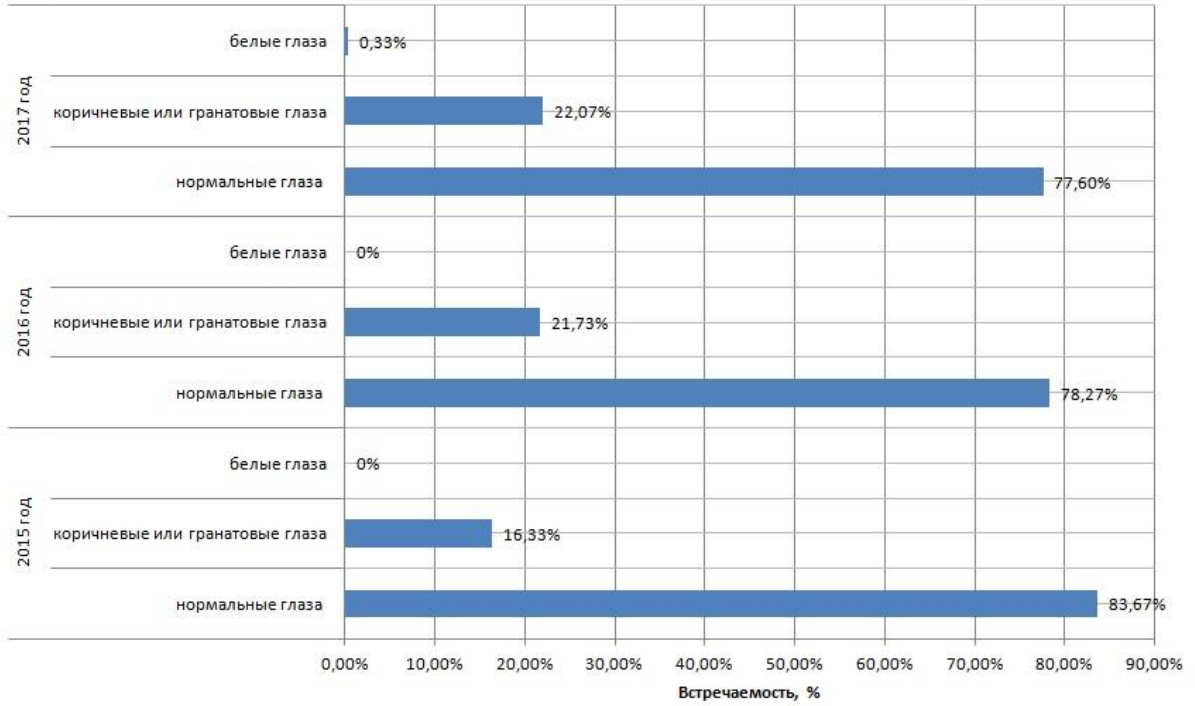

Figure 3 – The occurrence of drones with different eye colors in areas with the maximum number of ecotoxicants (2015-2017)
Note: white eyes – белые глаза translation into Rus; brown or garnet eyes – коричневые или гранатовые глаза; normal eyes – нормальные

In group No. 1 (exposure to the minimum amount of ecotoxicants), drones with eye color changes were also encountered, but their number was less: 2015 - 9.15%; 2016 - 10.35%; 2017 - 15.30% (Fig. 4).

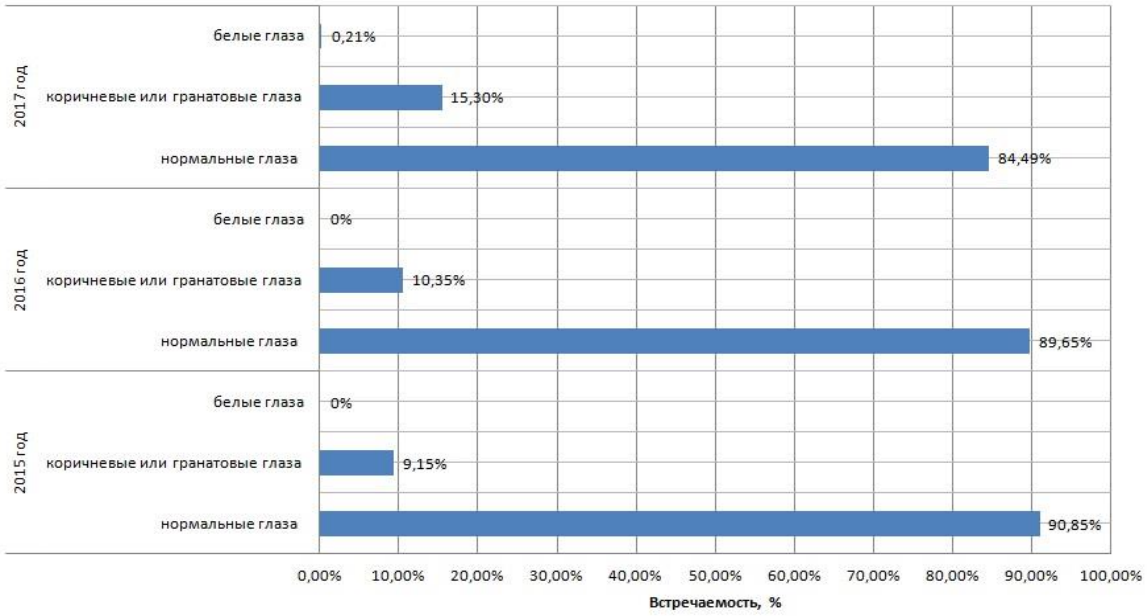

Figure 4 – The occurrence of drones with different eye colors in areas with a minimum amount of ecotoxicants (2015-2017)

Note: white eyes – белые глаза translation into Rus; brown or garnet eyes – коричневые или гранатовые глаза; normal eyes - нормальные

As can be seen, an annual increase in the number of drones with eye color changes was registered, namely: in 2016 the increase was 1.2%, in 2017 - 6.15%, compared with 2015 and 4.95% with 2016.

Conclusion. Studies conducted to assess the presence of drones with different colors of compound and dorsal eyes indicate the prevalence of two colors: brown or garnet and white. According to the "Classification of morphological anomalies of insects" by J. Balazuc (Balazuc, 1948) [6] and Yu.A. Prisny (Prisny, 2008) [7], the presented color changes are classified according to group No. II "Local deformities". Monitoring of these changes in relation to the environmental load in the areas is a confirmation of the biotoxicity of the environment containing ecotoxicants (Zakharov and Yablokov, 1985; Gribina et al, 2021) [9, 10]. This fact allows us to mention possible changes in the ecological situation that cause mutational processes. F. Ruttner noted that there are mutations that prevent the normal coloration of dotted and compound eyes, since the formation of pigments depends on many hereditary bases, the possibility of various eye mutations arises (Ruttner, 1982) [11]. To preserve the Chuvash population of the Central Russian subspecies of the honey bee, it is necessary to do full environmental monitoring of all regions of the Chuvash Republic in the future. Such an event will make it possible to identify places with a high content of ecotoxicants with the further introduction of a ban on keeping bees in these areas or on the use of bee products from these points (Mannapov A. G.et al., 2022; FAO, 2020; Jacques J. M. van Alphen and Bart J. F., 2020) [12, 13, 14].

The data obtained are consistent with previous studies, and at the same time allow us to adjust the selection work in breeding beekeeping [15, 16, 17, 18, 19, 20].

REFERENCES

1 Michener, Ch. D. The Bees of the World [Text] / Ch. D. Michener //Baltimore; London: John Hopkins Univ. Press. – 2000. - 953p.

2 Protalkin, M.Yu. (2005). Fauna of bees (Hymenoptera, Apoidea) of the South of the Far East of Russia Morphology of knowledgeable bees Apis mellifera L. and conservation strategy in the Republic of Bashkortostan [Text] / M.Yu. Protalkin // Abstract. dis. cand. biol. sciences. Vladivostok. -2005. - 22p.

3 Korzh, A. P. The value of biotic factors for knowledgeable bees / A. P. Korzh, V. Or. Kiryushin [Text] // Accounting. – 2013. - No. 2. - P. 15-17.

4 Savinov, A. B. Autocenosis and democenosis individual and population level ecological categories in terms of symbiogenesis and systems approach [Text] / A. B. Savinov // Russian Journal of Ecology. – 2011. - Vol. 42. - No. 3. - P. 179-185.

5 Bissembayev, A. T. Eidonomy of Apis mellifera Workers and Drones in Apiaries [Text] / A. T. Bissembayev, N. E. Zemskova, V. N. Sattarov, V. G. Semenov, M. T. Kargayeva & A. D. Baimukanov // On Line Journal of Biological Sciences. – 2023. 23(2), - P. 170-176. https://doi.org/10.3844/ojbsci.2023.170.176

6 Balazuc, J. La teratologie des coleopteres et experiences de transplantation chez Tenebrio molitor L. [Text] / J. Balazuc // Mem. Mus. nat.hist. nat. de Paris. – 1948. - Volume 25. - P.1-93.

7 Prisny, Yu. A. To avoid using the frequency distribution of morphological anomalies in insects to assess the qualities and environments [Text] / Yu. A. Prisny // Ecological and faunal studies in the Central Chernozem and adjacent territories: Collection of materials of the III Regional Conference. Lipetsk: LGPU. – 2008. - P.107-113.

8 Written, A. S. Morphological anomalies of the Colorado beetle Leptinotarsa Decemlineata Say (Coleoptera, Chrysomelidae) [Text] / A. S. Written // Entomological state. – 1983. - Vol. 52. - issue 4. - P 690-701.

9 Zakharov, V. M. Analysis of morphological modification as a method of assessing the status of equivalent populations [Text] / V. M. Zakharov and A. S. Yablkov // New methods of searching for the obtained results in radioecological research. - Moscow: Nauka. – 1985. -P. 176-185.

10 Gribina, N.S. Morphological anomalies in the ontogenesis of potato ladybug Henosepilachna vigintioctomaculata (Motschulsky, 1857) (Coleoptera: Coccinellidae). (Federal Scientific Center of Agrobiotechnology in the Far East named after A.K. Chaika, Ussuriysk, Timiryazevsky village) [Text] / N.S. Gribina, P.S. Fisenko, O.A. Sobko // Bulletin of the FEB RAS. - 2021. - No. 3. - P.57-62. DOI: 10.37102/0869-7698_2021_217_03_09

11 Ruttner, F. Biological justification and technical recombination [Text] / F. Ruttner // Apimondia. 1982. – 345 p.

12 Mannapov, A. G. Spring Growth Rates of Bee Families and the Level of Certain Amino Acids in Bees-Feeders with Stimulating Feeding [Text] / A. G. Mannapov, A. A. Khudaiberdiev, R. T. Mannapova, Y. A. Yuldashbayev & D. A. Baimukanov //*American Journal of Animal and Veterinary Sciences*, *17*(2), 108-112. https://doi.org/10.3844/ajavsp.2022.108.112

13 FAO. Good beekeeping practices: Practical manual on how to identify and control the main diseases of the honeybee (Apis mellifera) [Text] / FAO // TECA – Technologies and practices for small agricultural producers. - 2020. - №1. - Rome. DOI: https://doi.org/10.4060/ca9182en

14 Jacques, J. M. van Alphen and Bart, J. F. Natural selection, selective breeding, and the evolution of resistance of honeybees (Apis mellifera) against Varroa [Text] / J. M. Jacques van Alphen and J. F. Bart // Alphen and Fernhout Zoological Letters. - 2020. – №6. - 6 p. DOI: https://doi.org/10.1186/s40851-020-00158-4

15 Noctor, G., & Feuer, S. Simultaneous measurement of foliar glutathione, glutamyl cysteine and amino acids by high-performance liquid chromatography: comparison with two other methods for determining glutathione [Text] / G. Noctor, & S. Feuer // J. Anal. Biochemistry. - 1998. - V. 264. - p. 98.

16 Ursu, N. A. & Eremia, N. G. (1984). Age-related changes in the activity of aminotransferases in the body of bees [Text] / N. A. Ursu & N. G. Eremia // Beekeeping. - 1984. - No. 10. -P.8-9.

17 Nuraliyeva, U. A. The Impact of Environment on the Morphometric Characteristics of Honeybees *Apis Mellifera Carnica* in South-East Kazakhstan [Text] / U. A. Nuraliyeva, N. N. Spatay, A. M. Davletova, M. R. Toishimanov, G. A. Moldakhmetova, Z. A. Kussainova, A. A. Khudaiberdiev, S. N. Khrapova & D. A. Baimukanov // *OnLine Journal of Biological Sciences.* - 2020. -23(4). -P. 520-527.https://doi.org/10.3844/ojbsci.2023.520.527
https://thescipub.com/abstract/ojbsci.2023.520.527

18 Alpatov, W. W. Biometrical studies on variation and races of the honey bee (Apis mellifera L.) [Text] / W. W. Alpatov // The Quarterly Review of Biology. -1929. - 4(1), 1-58. https://doi.org/10.1086/394322

19 Ilyasov, R. A. A revision of subspecies structure of western honey bee Apis mellifera [Text] / R. A. Ilyasov, M. L. Lee, J. I. Takahashi, H. W. Kwon, & A. G. Nikolenko //. Saudi Journal of Biological Sciences. - 2020. - 27(12), - P. 3615-3621. **https://doi.org/10.1016/j.sjbs.2020.08.001**

20 Nawrocka, A. Computer software for identification of honey bee subspecies and evolutionary lineages [Text] / A. Nawrocka, İ. Kandemir, S. Fuchs, & A. Tofilski // Apidologie, - 2018. – 49. P. 172-184.

ТҮЙІН

Балшырындар мен тозаңдарды жинау кезеңінде аралар ксенобиотиктерді (пестицидтер, инсектицидтер және т.б.) қабылдау кезінде биоценоз компоненттерінің алғашқы осал нысандарының бірі болып табылады. Жасанды түрде жасалған әртүрлі химиялық препараттарды жүйелі қолдану биологиялық және морфологиялық өзгерістерге ықпал ететін араларға антропогендік әсер етудің маңызды факторларының бірі болып табылады.

Зерттеу нысаны дрондар болды. Көздің түсінің өзгеруін бағалау қолмен үлкейткіштің көмегімен көзбен жүргізілді. Әдістеме зерттелетін объектілерді нормамен салыстыруға негізделген. Норма-бұл белгілі бір уақытта ұқсас жағдайларда бірдей объектілердің көпшілігіне тән сипаттамалары бар объектінің шартты түрде бөлінген күйі. Морфологиялық ауытқулар-бұл қалыпты дамудан ауытқудың нәтижелері, яғни.ағзалардың немесе бүкіл ағзаның типтік емес құрылымдары мен әрекеттерінің пайда болуы.

Фасеттік және дорсальды көздердің әртүрлі түстері бар дрондардың болуын бағалау бойынша жүргізілген зерттеулер екі түстің таралуын көрсетеді: қоңыр немесе анар түстес және ақ. Аудандардағы экологиялық жүктememен өзара байланыстағы осы өзгерістердің мониторингі экотоксиканттар ұсталатын ортаның биоуыттылығын растау болып табылады. Бұл факт мутациялық процестерді тудыратын экологиялық жағдайдың мүмкін болатын өзгерістерін атап өтуге мүмкіндік береді. Орталық орыс бал араларының кіші түрлерінің Чуваш популяциясын сақтау үшін болашақта Чуваш Республикасының барлық аудандарына экологиялық мониторинг жүргізу қажет. Мұндай іс-шара осы аудандарда араларды ұстауға немесе осы нүктелерден ара шаруашылығы өнімдерін пайдалануға тыйым салуды одан әрі енгізе отырып, экотоксиканттары жоғары орындарды анықтауға мүмкіндік береді.

РЕЗЮМЕ

В период сбора нектара и пыльцы пчелы являются одной из первых наиболее уязвимых мишеней из компонентов биоценозов при поступлении в них ксенобиотиков (пестициды, инсектициды и пр.). Систематическое применение искусственно создаваемых различных химических препаратов является одним из наиболее существенных факторов антропогенного воздействия на пчел, который способствует биологическим и морфологическим изменениям.

Объектом исследований явились трутни. Оценку наличия изменений цвета глаз проводили визуально, с помощью ручной лупы. Методика основана на сравнении исследуемых объектов с нормой. Норма условно выделенное состояние объекта, обладающее характеристиками, присущими большинству таких же объектов в сходных условиях, в данный момент времени. Морфологические аномалии – результаты отклонения от нормального развития, т.е. возникновения нетипичных строений и деятельностей органов или всего организма.

Проведенные исследования по оценке наличия трутней с различными цветами фасеточных и дорсальных глаз свидетельствуют о распространенности двух цветов: коричневые или гранатовые и белые. Мониторинг данных изменений во взаимосвязи с экологической нагрузкой в районах, является подтверждением биотоксичности среды, где содержатся экотоксиканты. Данный факт позволяет отметить возможные изменения экологической ситуации, вызывающие мутационные процессы. В целях сохранения чувашской популяции среднерусского подвида медоносной пчелы в дальнейшем необходимо полностью провести экологический мониторинг всех районов Чувашской Республики. Подобное мероприятие позволит выявить места с высоким содержанием экотоксикантов с дальнейшим введением запрета на содержания пчел в данных районах или на использование продуктов пчеловодства из данных точек.

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