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Significance and Conservation of Birds of the Genus of Bee-eater *(MEROPS)* in Uzbekistan

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Abstract

The purpose of this article is to identify and evaluate the importance of birds of the genus *Merops* (European Bee-eater -*Merops apiaster* and Blue-cheeked Bee-eater -*Merops persicus*) in Uzbekistan, as well as to develop recommendations aimed at solving some problems associated with its conservation. As a result of the study, in the aspect of biocenotic relations, the natural significance of these species was revealed. The economic value is determined and analyzed in beekeeping farms. From the study of the remains of food contained in the stomachs, throats and nests of *M.apiaster*, a preliminary list of the main species of the food spectrum has been compiled. Based on the bioacoustic repellent "Korshun-8", a new, more effective bioacoustic repellent has been developed to repel bee-eaters. To solve some of the problems associated with the conservation of bee-eaters, recommendations have been developed aimed at preventing the illegal extermination of bee-eaters, preserving their nesting colonies, etc.

Keywords: Bees, Biocenotic communications, Bioacoustic repellent, Commensalism, Distress signal, Food residues Predation, Pellet.

Introduction

Usually, an incorrect definition and assessment of the values of an animal species can affect the stability of the population or its continued existence. The same species in different parts of its range has different meanings. Therefore, it is very difficult to characterize a species in terms of its values and take appropriate measures. Based on these complexities, serious problems are created regarding the conservation, use and management of the behavior of the species. In many countries, there is currently a one-sided approach to determining the value of a species, that is, the value of a species is mainly estimated from an economic point of view[1]. Unfortunately, as a result of such an unacceptable approach in Uzbekistan and in some other countries[2,3], many birds from the bee-eater genus -*Merops* are destroyed. These are European Bee-eater -*Merops apiaster* and Blue-cheeked Bee-eater -*Merops persicus*).

In Uzbekistan, the significance of the biocenotic relationships of these species has not been sufficiently studied[3] The lack of these and other

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information, especially about the conservation status, is the main reason for the negative attitude of humans toward hunting these species.

At present, M. apiaster is listed in the Red Book of the Republic of Belarus and a number of Red Books of the subjects of the Russian Federation (Bashkortostan, Mari El, Chuvashia, Tatarstan, Udmurtia, Vladimir regions, Altai etc.). *M. persicus* is listed in the Red Books of the Astrakhan region and the Staropol of the Russian Federation[4]. Despite this, in Uzbekistan and in many countries where beekeeping is developed, this species is destroyed by shooting, as beekeepers consider these species to be the main enemy of bees. This situation dictates that in the future, with the development of beekeeping, the scale of the negative impact of birds of the genus *Merops* may increase.

Based on this, consider the definitions and assessment of the importance of birds of the genus *Merops* bee-eaters to be relevant in terms of their conservation and rational use.

Materials and Methods

The materials were collected for the period 2020–2021 in various administrative-territorial entities of the Republic of Uzbekistan (Tashkent, Bukhara, Samarkand, Fergana, Karakalpakstan, Surkhandarya). The field study was carried out in natural landscapes, nesting colonies, beekeeping farms and agrocenoses.

The number of birds was taken into account in stationary areas and fixed routes[5-7]. At the same time, the length of the route was 1-2 km, the width was 50 meters, in total 168.45 km^2 were covered. To determine the composition of food, stomachs were collected from shot birds (n=115), from nocturnal and nesting colonies of pellets (n=1020) and food remains from nests (n=48).

Animal species found in food remains were studied in the laboratory of the Department of Zoology of the National University of Uzbekistan. An Eschenbach mobilux led magnifier and MBS-1 binoculars and guides were used to determine the species belonging to animals[8-10].

In order to control the behavior of birds by scaring them away from beekeeping farms, the bioacoustic repellant Korshun-8 (manufactured in Ukraine) was tested. For this purpose, it's tested the "*Merops* – distress signal" developed by us, which is adapted to broadcast distress signals of local widespread bird species (*Accipiter nisus, Falco naumanni, M. apiaster).*

During research, examined 5 museum collections in Uzbekistan and found 196 specimens of these species of datiryushi there at the main end of the XIX th and in the first quarter of the XX th century[11]. An analysis of these samples shows that *M. apiaster* (110) is larger in abundance than *M. persicus* (86), and in terms of geographical distribution, it is different.

Results

At present, in Uzbekistan, the total abundance of *M. persicus* (0.87±0.02 ind/ha) is greater than that of *M. apiaster* (0.45±0.01 ind/ha). This is explained by our own research on the accounting and description of bird distribution areas.

It should be noted that people involved in beekeeping consider these species to be harmful. In their opinion, the bee-eaters mainly feed on bees and, at the same time, the economic efficiency of the economy decreases. Our data obtained from the determination of the species composition and number of food objects of *M. apiaster* (Table 1) confirms that these species are useful.

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Table 1.Animal species found in the food composition of M. apiaster in the reproductive and post-reproductive cycles

№	Species	Reproductive cycle: the number and share of participation of the species in the composition of food		After the reproductive cycle: the number and proportion of the species in the composition of the food	
		Absolute quantity	Share of participation (%)	Absolute quantity	Share of participation (%)
1.	**Odonata:**	18	1,44	5	0,48
	Calopteryx splendens				
2.	*Calopteryx virgo*	8	0,64	15	1,45
3.	*Lestes dryas*	16	1,28	6	0,58
4.	*Ischnura elegans*	13	1,04	8	0,77
5.	*Ischnura forcipata*	6	0,48	4	0,38
6.	*Gomphus flavipes*	9	0,72	13	1,26
7.	*Cordulegaster coranatus*	20	0,16	12	1,16
8.	*Aeschna juncea*	35	2,81	20	1,94
9.	*Aeschna isoscelis*	22	1,77	47	4,57
10.	*Anax imperator*	50	4,02	35	3,40
11.	*Anax partenope*	46	3,70	59	5,73
12.	*Libellula depressa*	31	2,49	26	2,52
13.	*Sympetrum flavelonum*	19	1,52	30	2,91
14.	*Sympetrum vulgatum*	42	3,38	21	2,04
15.	*Sympetrum pedemontanum*	25	2,01	45	4,37
16.	*Orthetrum brunneum*	31	2,49	19	1,84
17.	***Blattodea:***	9	0,72	-	
	Polyphaga saussurei				
18.	*Blatta jrientalis*	5	0,40	-	
19.	**Mahtodea**	7	0,56	12	1,16
	Mantis religiosa				
20.	**Orthoptera:**	12	0,96	4	0,38

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	Tettigonia viridissima				
21.	*Melanogryllus desertus*	-	-	2	0,19
22.	*Gryllus bimaculatus*	-	-	10	0,97
23.	*Pteronemobius gracilis*	-	-	6	0,58
24.	*Calliptamus italicus*	24	1,93	18	1,75
25.	*Calliptamus turanicus*	40	3,22	64	6,22
26.	*Calliptamus sp.*	34	2,73	23	2,23
27.	*Locusta migratoria*	46	3,70	50	0,48
28.	*Dociostaurus maroccanus*	48	3,86	21	2,04
29.	**Homoptera:**	12	0,96	9	0,87
	Chloropsalta ochreata				
30.	*Melampsalta musiva*	8	0,64	-	-
31.	*Lepyronia sp.*	7	0,56	-	-
32.	**Hemiptera:**	21	1,69	10	097
	Eurygaster integriceps				
33.	*Aelia sp.*	-	-	9	0,87
34.	*Dolycoris penicillatus*	30	0,24	-	-
35.	*Camptopus lateralis*	43	3,46	-	-
36.	*Reduvius sp.*	26	2,09	11	1,07
37.	**Coleoptera:**	12	0,96	-	-
	Calosoma sp.				
38.	*Thanatophilus terminatus*	19	1,52	-	-
39.	*Necrophorus satanas*	4	0,32	-	-
40.	*Aclypea turkestanica*	6	0,48	-	-
41.	*Scarabaeus acuticollis*	14	1,12	3	0,29
42.	*Scarabaeus transcaspicus*	5	0,40	6	0,58
43.	*Netocia marginicollis*	7	0,56	3	0,29
44.	*Capnodis sexmaculata*	11	0,88	6	0,58
45.	*Capnodis tenebricosa*	3	0,24	8	0,77
46.	*Meligethes aeneus*	7	0,56	-	-
47.	*Blaps sp.*	3	0,24	-	-
48.	*Prosodes sp.*	2	0,16	-	-

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49.	**Lepidoptera sp.**	6	0,48	-	-
50.	***Hymenoptera:***	9	0,72	14	1,36
	Campsoscolia tartata				
51.	*Scolia maculata*	21	1,69	18	1,75
52.	*Scolia rubida*	15	1,20	22	2,14
53.	*Scolia turkestanica*	18	1,44	15	1,45
54.	*Pompilidae sp.*	12	0,96	-	-
55.	*Ammophila heydeni*	17	1,36	11	1,07
56.	*Psenulus laevis*	14	1,12	7	0,68
57.	*Liris nigra*	18	1,44	22	2,14
58.	*Philanthus triangulum*	15	1,20	9	0,87
59.	*Cerceris sabilosa*	10	0,80	13	1,26
60.	*Cerceris rybyensis*	16	1,28	6	0,58
61.	*Cerceris sp.*	15	1,20	15	1,45
62.	*Apus mellifera*	8	0,64	31	**3,01**
63.	*Psithyrus sp.*	27	2,17	42	4,08
64.	*Bombus sp.*	33	2,65	37	3,59
65.	*Myrmilla sp.*	21	1,69	18	1,75
66.	*Vespa orientalis*	17	1,36	8	0,77
67.	*Polistes caspica*	21	1,69	31	3,01
68.	*Prionix sp.*	9	0,72	15	1,45
69.	*Formicidae sp.*	16	1,28	11	1,07
70.	*Cataglyphis setipes*	19	1,52	6	0,58
71.	**Diptera:**	11	0,88	11	1,07
	Muscidae sp.				
72.	*Asilidae sp.*	5	0,40	8	0,77
73.	*Syrphidae sp.*	7	0,56	9	0,87
74.	*Culicidae sp.*	-		4	**0,38**
75.	*Simuliidae sp.*	-		2	**0,19**
76.	*Phlebotomus sp.*	5	0,40	3	**0,29**
77.	Skeletion of vertebrates	1	0,08	-	-
	Total	**1242**	**100%**	**1028**	**100%**

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Under the conditions of Uzbekistan, bee-eaters are actively involved in biocenotic relationships and play an important role in maintaining the stability of the biocenosis[12,13]. One of the participation in the biocenotic relationships of bee-eaters is commensal shelter. In the old nests of these birds, found some species of Arthropoda and Chordata *(Bufo viridis, Phrynocephalus interscapularis, Trapelus sanguinolentus, Cyrtopodion russowi, Coliber karelini, Eryx miliaris).* These species in such nests are reliably protected from predators and from adverse climatic conditions. Some nests are used for breeding other bird species *(Coracias garrulus, Acridotheres tristis, Passer indicus, Passer montanus)*[14].

Discussion

In Uzbekistan, the reproductive cycle of species of the genus *Merops* occurs mainly in natural landscapes. This period covers from April to August. After the reproductive cycle, the bee-eater leaves the nesting sites, since, during this period, natural landscapes cannot satisfy the food needs of birds. The reason for this is the lack of food resources associated with climatic conditions.

In this regard, after the reproductive cycle, the bee-eater is pumped out into cultural landscapes (agrocenoses, settlements), where many insects are still preserved. They are especially concentrated in large numbers in beekeeping farms. It is during this period (from the beginning of august to the end of September) that bee-eaters feed on bees in local areas and cause some damage to beekeeping farms.

Thus, in Uzbekistan, depending on the change in trophic relationships, the habitat, abundance and practical significance of these species change. This is evidenced by the indicators of the food spectrum of *M. apiaster*. If, in the reproductive cycle in the food composition, the share of *Apus mellifera* is 0,64%, then after the reproductive cycle it is 3,04%.

Usually pellets accumulate around and inside the nests of the bee-eater and in the places of their roosting. In these pellets, found some species and their larvae (*Lasius niger, Monomorium pharaonis, Dermestidae*). Surely these pellets are food resources for them. The relationship of commensal specious obtaining nutrients and locomotion ensures the formation and stability of the food chain in biocenosis.

The trophic relationships of bee-eaters in biocenosis are very diverse and complex. Bee-eaters, when stalking, ambushing and in other behaviors while hunting for insects, will demonstrate the behavior characteristic of predatory animals. It should be noted that the insect also reacts to the sounds of the bee-eater and exhibits the behavior characteristic of the victims. In turn, bee-eaters and their chicks and eggs also become prey of some species (*Vulpes vulpes, Canis aureus, Falco naumanni, Circus aeruginosus, Varanus griseus, Coluber karelini* and *Coluber ravergieri*). In 2020, in one of the nesting colonies located in an old quarry in the Bukhara region, Varanus griseus was found swallowing an adult *M. persicus.* As a result, bee-eater predation is involved in regulating the number of insects, causing some damage to beekeeping, and predatory animals are involved in regulating the number of bee-eaters.

It should be said that in many countries, including Uzbekistan, *M. persicus* and *M. apiaster* are considered the main pest of beekeeping farms and therefore they are scared away or destroyed using different methods (shooting, catching with nets, destroying nests). Sometimes various optical and acoustic devices are used to scare away birds. According to our observations and the results of the survey, it was revealed that only in the Bukhara region for 2016-2018. Approximately 10000 individuals of *M. persicus* have been shot, more than any other illegally shot species[4]. Although, both species are listed in the Red Books. Such an attitude towards species of the genus *Merops* and a one-sided assessment of their importance require further development of appropriate measures to control their behavior and protect these species from illegal destruction. Currently, in many countries, different repellents are used to control the behavior of birds[12]. When testing the bioacoustic repellent "Korshun-8", the expected result was not obtained. This can be explained by the population individuality of the sound signals that species perceive and respond to.

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Based on this repellent developed by us, the bioacoustic repellent "*Merops* – distress signal" is more effective in controlling the behavior of bee-eaters.

Conclusion

It is fact that *M. apiaster* and *M. persicus* have a positive value in nature and in human economic activity. Especially, in the biocenoses of the arid zone of Uzbekistan, where many factors (lack of nesting sites and food resources, harsh climatic conditions, etc.) are at a critical level, it is necessary to take appropriate measures to prevent illegal hunting and destroy the nesting sites of these species.

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Authors' Declaration

- Conflicts of Interest: None.
- We hereby confirm that all the Figures and Tables in the manuscript are ours. Furthermore, any Figures and images, that are not ours, have been included with the necessary permission for re-publication, which is attached to the manuscript.
- Ethical Clearance: The project was approved by the local ethical committee in University of National University of Uzbekistan.

Authors' Contribution Statement

Sh. F.O.: She did the conception, and design of paper, Also she did the acquisition and analysis of the data. Y.E.Ch. The paper was my idea. Also, the relationship of bird species with other animals, especially reptiles, given in the article, was the results of my research. Kh. F. R. and R. M. Sh: they did analysis, interpretation, revision and proofreading.

References

1. Ravkin ES, Chelintsev NG. Methodical recommendations for integrated route counting of birds. 1st ed. Moskva: VNII Priroda, 1990. 33 p
2. Shodieva F, Xolboyev F. Reproduction ecology of the genus Merops in Uzbekistan. Int Multidiscip Res J. 2022; (12); 67-73. https://doi.org/10.5958/2249-7137.2022.00623.1
3. Kholboev FR. Fauna, population and ecology of birds in towns of Kyzylkum region. Int J Res publ . 2021; 1(69) 564-575. https://doi.org/10.47119/IJRP100691120211675
4. Shodieva FO, Kholboev FR. Distribution, ecology and significance of the genus beeter (Merops) in Uzbekistan. Int J Res publ. 2021; 209-214. https://doi.org/10.47119/IJRP100841920212237
5. Casas-Criville A, Valera F. The European bee-eater (Merops apiaster) as an ecosystem engineer in arid enviornments. J Arid Environ. 6(2): 2005; 227-238. https://doi.org/10.1016/j.jaridenv.2004.03.012
6. Ryabov VM, Ashikhmina TY. Faunistic characteristics and monitoring of vertebrates on the territory of the State Nature Reserve "Bylina". Theor App Eco. 2021; 1: 79-84. https://doi.org/10.25750/1995-4301-2021-1-079-084
7. Whittaker RH. Evolution and Measurement of Species Diversity. Taxon. 1972; 213-251. https://doi.org/10.2307/1218190
8. Plavilshikov NN. Insect identifier. 1st ed. St University. Tashkent. 1994; 542p.
9. Schweizer M., Aye R., Roth T. Birds of Central Asia. Almaty. 1st ed. 2007; 554p.
10. Shodieva F. Current status of birds of the genus of beam (Merops) in Uzbekistan. Web Sci J. 2022; (6): 745-750. https://doi.org/10.17605/OSF.IO/MA9N2
11. Kholboev FR, Shodieva FO, Mirkhonova ZP. Hunting animals of the Bukhara region and issues of their rational use. Int J Res publ. 2021; 556-564. https://doi.org/10.47119/IJRP100691120211673
12. Yangiboyev ECh, Rakhimov MSh. Ecology and fauna of the species belonging to the families elapidae and viperidae of Kashkadarya region. Universum J. 2022; 1(91): 84-86. https://doi.org/10.32743/UniChem.2022.91.1.12860

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https://doi.org/10.21123/bsj.2023.7109
P-ISSN: 2078-8665 - E-ISSN: 2411-7986
Baghdad Science Journal

13. Roitberg ES, Bulakhova Nina A, Kuranova Valentina N, Eplanova Galina V, Zinenko Oleksandr I, Arribas Oscar, et.al. Variation in body size and sexual size dimorphism in the most widely ranging lizard: testing the effects of reproductive mode and climate. Eco Evo. 01.2020; 10(11): 4531-4561. https://doi.org/10.1002/ece3.6077
14. Hui C, McGeoch MA. Zeta diversity as a concept and metric that unifies incidence-based biodiversity pattern. Am Nat. 2014; 184 (5): 684–694. https://doi.org/10.1086/678125

أهمية والحفاظ على طيور من جنس اكلة النحل (ميروبس) في أوزبيكستان

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الخلاصة

الغرض من هذه المقالة هو تحديد وتقييم أهمية الطيور من جنس الميروبس) آكل النحل الأوروبي - آكل النحلة الميروبس والنحل الأزرق الخدين - آكل النحلة الميروبس (في أوزبكستان ، بالإضافة إلى وضع توصيات تهدف إلى حل بعض المشاكل المرتبطة بحفظها .نتيجة للدراسة، في جانب العلاقات الحيوية الحيوية ، تم الكشف عن الأهمية الطبيعية لهذه الأنواع .يتم تحديد القيمة الاقتصادية وتحليلها في مزارع تربية النحل.من دراسة بقايا الطعام الموجود في المعدة والحلق وأعشاش *M.apiaster* ، تم تجميع قائمة أولية للأنواع الرئيسية من الطيف الغذائي .استنادًا إلى طارد الحشرات الصوتي الحيوي "Korshun-8" ، تم تطوير طارد حيوي صوتي جديد وأكثر فاعلية لصد آكلات النحل .لحل بعض المشاكل المرتبطة بالحفاظ على آكلي النحل ، تم وضع توصيات تهدف إلى منع الإبادة غير القانونية لمن يأكلون النحل ، والحفاظ على مستعمراتهم العشوائية ، وما إلى ذلك.

الكلمات المفتاحية: الاتصالات الحيوية، طارد الصوت الحيوي، إشارة الاستغاثة، التعايش، الافتراس، النحل، الحبيبات، بقايا الطعام.