Nat. Volatiles & Essent. Oils, 2021; 8(6): 1792-1798

NVEO
Natural Volatiles &
Essential Oils

Fauna Of Dragonflies (Odonata: Anisoptera, Zygoptera) In Khorezm Oasis, Uzbekistan

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Abstract: The article presents the results of odonatafauna of the Khorezm oasis in the north - western part of Uzbekistan for 2020-2021. Observations were made at seven points in different biotopes of the oasiSs. Observations were made in the spring-summer-autumn seasons, when the temperature rose above +20 C. According to the results, 23 species of odonatafauna belonging to 5 families and 8 subfamilies were identified. They are divided into three groups according to their dominance: **D** = dominant, **SD** = subdominant **R** = rare species. Accordingly, dominant species account for 17%, subdominant species for 22%, and rare species for 61%. There are 11 palearctic species (47.8%), 7 cosmopolitan species (30.4%), 2 holoarctic and transpalearctic species each (8.7%), and 1 Australia-Asian species (4.3%).

Key words: faunistic, zoogeography, analysis, amphibian, species, population, cosmopolitan, palearctic, holoarctic, transpalearctic.

INTRODUCTION

Nearly 6338 species of dragonflies belonging to 693 genera of the Odonata family are distributed throughout the world [11]. Dragonflies, being one of the ancient flying insects, appered 300 million years ago during the Coal Age. They also kill a number of blood-sucking insects, keeping their population stable. In nature, they are described as a bioindicator species. Dragonflies are amphibian insects [13]. Their larvae provide natural biological control over the larvae of several insects that reproduce in water, thereby helping to control a number of infectious diseases such as malaria, fever, and filariasis [9]. Due to the fact that their development takes place in changing phases, water and land, this insect occupies a large biomass in the biocenosis, dragonflies make a significant contribution to the circulation of matter on Earth - ensuring the return of biogenic elements from the aquatic ecosystem to land [19]. The study is used as a valuable material for practical training in zoology, hydrobiology and entomology. The research of the species composition of the odonatafauna of a particular region is also of great importance in assessing the state of the populations of the species distributed here. 85 species of dragonflies have been recorded in Central Asia [2]. In terms of first researches of dragonflies in Uzbekistan, Belyshev studied, collected the fauna of dragonflies around Nukus, Tashkent, Samarkand and analyzed them in the monograph "Fauna and Ecology". The monograph "Insects in Uzbekistan"

contains information about some species of dragonflies found in Uzbekistan. Abdurahmon Kulmamatov's book "Study and field practice in entomology" provides information on the bioecology and identification of species of dragonflies in Uzbekistan. In the article "Central Asian dragonflies, parts 1-2" by Borisov S.N, 56 species of dragonflies in Uzbekistan and the composition of the species are mentioned [2, 3]. Research is currently underway to promote the conservation of biodiversity and the rational use of wildlife resources around the world. In this regard, faunistic analysis of the animals of the region is one of the important tasks in the current period when the influence of anthropogenic factors is increasing and natural ecosystems are changing.

MATERIALS AND METHODS

Description of the study area

The experiments were conducted in Khorezm oasis. The region is located in the northern region in the lower reaches of the Amu Daryas of Uzbekistan and differs from other regions with its unique soil and climatic conditions. The climate of the region is affected by the Kyzylkum and Karakum deserts [1]. The territory of Khorezm region is located in the northern part of the Turan lowland, occupies a part of the left bank of the ancient Amudarya delta and a small part of the Kyzylkum on the right bank. It is bounded on the west, southwest, and on the south by the Ungiz Back Karakum Desert of Turkmenistan, the Tashauz Region, and on the northwest and northeast by the Republic of Karakalpakstan and the Bukhara Region.

The climate is sharply continental, with very cold winters (up to -25^{0}C -30^{0}C) and very hot summers (up to 40^{0}C -45^{0}C). The average annual temperature of the oasis is +13.9 ^{0}C, in the southern part of the oasis +15 ^{0}C, relative humidity is 80.0%, and precipitation is 13.7 mm. Due to its location in the desert zone, the climate is dry. The total land area of Khorezm region is 605.2 thousand hectares, of which 206 thousand hectares are irrigated. In agriculture, cotton, rice, wheat, fruits and vegetables are grown. It is mainly irrigated agriculture. Groundwater with saline soils is close to the soil surface and varies at a depth of 0.6-3 meters. There are special irrigation systems and a drainage system to drain the sewage. Such a farming system requires constant control of natural factors in obtaining high yields from crops. Classical methods are used for continuous monitoring [8, 16].

Regional studies

Survey areas are as follows:

1. Urgench district, Cholish checkpoint, tugai forests along the Amudarya (41°38'22.79"N, 60°41'21.43"E).
2. Urgench district, Turkmenlik n.c.u. (41°30'07.86"N 60°33'46.42"E).
3. Khiva district, Govuk lake recreation area (41°24'29.13"N, 60°22'42.41"E).
4. Main collector heights of Khiva district (41°22'38.02"N, 60°14'33.56"E).
5. Kushkopir district, Konazey village, small lakes and artificial fisheries (41°27'25.84"N, 60°17'48.18"E).
6. Yangibozor, Qilich-arna canal (41°42'49.44"N 60°36'02.42"E).
7. Amudarya biosphere reserve (41°58'43.03"N 60°21'49.15"E.)

The activities of material collection was carried out in 2020-2021, from the days when the spring temperature was above +20 degrees in April and the summer and autumn seasons in October. The observation of dragonflies was carried out from 10:00 in the first half of the day to 16:00 in the afternoon (depending on the climatic conditions of the oasis). Because dragonflies are very active during

this time of day [14, 17]. Some species were captured in the evening using artificial lighting (Borisov, 2008). The collection of dragonflies was carried out using generoentomological methods [14].

Indicators of the number of encounters of collected species are as follows:

D = dominant (> 10% of the total number),

SD = subdominant (5-10% of the total number),

R = rare species (<5% of the total number collected) [12].

As a result, of research in the Khorezm oasis, more than 600 insect specimens of dragonflies were collected. As a result of the analysis of the samples, six families, eight subfamilies, 23 genera and 11 subspecies of Odonata were identified. The number of species collected is given below (Figure 1).

Identification of captured species was carried out using identifiers, with the help of entomologists from the Institute of Zoology under the Academy of Sciences of Uzbekistan and by comparison with the collections in the museum of the Institute of Zoology [5]. The scientific names of the identified species are based on Schorr, Paulson (2020).

RESULTS AND DISCUSSION

According to the results of observations made in the spring-summer-autumn season of 2020-2021, the order of dragonflies (Odonata), belonging to the subfamilies Anisoptera and Zygoptera: 6 families, 10 generations, 23 species were determined in this territory. The general taxonomic structure of Odonatas in the Khorezm oasis is as follows (Table 1).

Arthropoda- Phylum
Hexapoda- Subphylum
Insecta - Class
Pterygota- Subclass
Neoptera - Infraclass
Odonatoidea - Main order
Odonata - Order

Table 1. The taxonomic structure of dragonflies

Family	Subfamily	Number of genera	%	Number of species	%
Lestidae	Sympycmatinae,	1	12,5	9	5,08
Coenagrionidae	Ischnurinae,	1	12,5	15	8,47
Gomphidae	Gomphinae	2	25	6	3,38
Aechnidae	Aechninae	1	12,5	17	9.60
Libellulidae	Libellulinae	2	25	48	27,11
	Pantaliinae	1	12,5	28	15,81
	Sympetrinae	1	12,5	36	20,33
Macrodiplactidae	Macrodiplacinae	1	12,5	18	10,16
Total: 6	8	11		177	

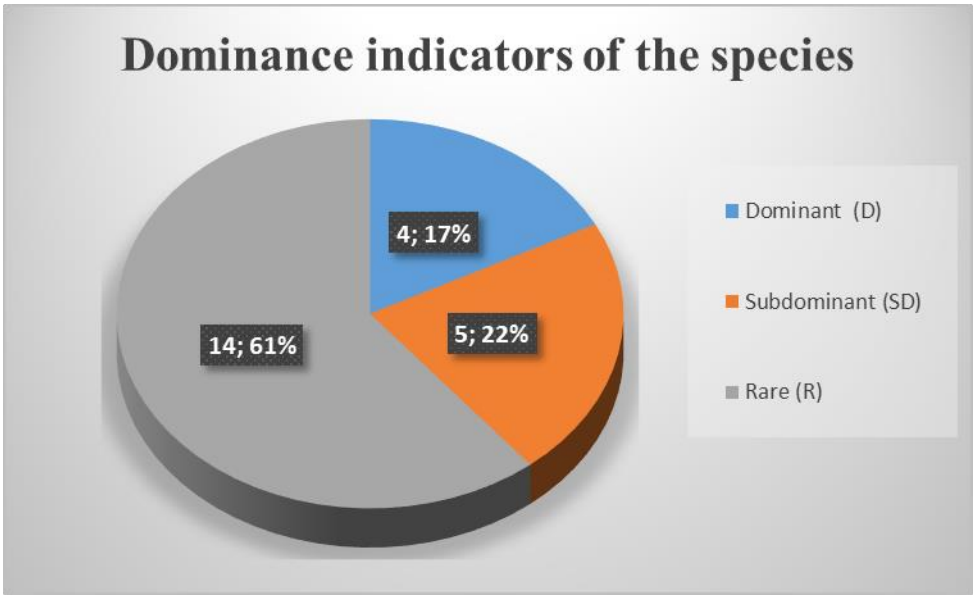
The largest number of species belonging to the family **Libellulidae** (12 species) was collected from the Odonatas in the Khorezm oasis, furthermore, **Lestidae (03), Coenagrionedae (03), Gomphidae (02), Aechnidae (02), Macrodiplactidae (01).** In terms of dominance indicators:

Dominant (D) species 4 species: Orthetrum sabina, Selysiothemis nigra, Crocothemis servilia, Pantala flavescens. These species were observed in large numbers in all designated areas and accounted for 17% of the total collected species (Figure 1)

Subdominant (SD): Ischnura elegans, Anax p. Parthenope, Crocothemis erythraea, Sympetrum vulgatum decoloratum, Orthetrum a. Albistylum were also found in all designated areas but were less numerous than the dominant species.

Rare (R): Although these species have a greater number of species than dominant and sub-dominant species, they are very few in number. For example, once observed species are Stylurus flavipes liniatus, Sympetrum f. Flaveolum (Urgench district, Turkmen, arable land). The species Anax emperor is less common than the species Anax parthenhope. It was found in two of the studied areas: in the tugai biota group in the Amudarya biosphere reserve and in the tugai forests near the Cholish post in Urgench district. They were mainly encountered while hunting. The species Sympecma fusca, Sympecma gobica have also been observed in small numbers mainly around crop fields. Sympecma paedisca, on the other hand, was found in drainage, along ditches, in late April during egg-laying and spawning periods.

Figure 1. Dominance indicators of the species encountered



Sympecma fusca (2020) was observed until late autumn, according to observations in November. Sympecma fusca is a wintering species in the imago state (Striganova B. R., Zakharov A. A.). Ischnura fountainei, Ischnura pumilio were encountered in the second half of April while laying eggs in the reeds around the lakes. Lindenia tetrsaphylla - found in reeds in the vicinity of Lake Govuk, Khiva district, as well as in the groves of the Amudarya River, Urgench district. The International Union for Conservation of Nature (IUCN) lists the species as endangered. Lindenia tetraphyllaasosan is a species distributed in plain and desert areas. Limiting factors are water pollution, habitat conversion into irrigated crop areas, and human assimilation [4]. Three species of the Sympetrum genus Sympetrum striolatum pallidum, Sympetrum arenicolor, Sympetrum meridionale are less common than other species. Orthetrum brunneum was found mainly in the tugai biotope. Orthetrum cancellatum was found in water bodies, around lakes.

Table 2. Dominance indicators and zoogeographic analysis of dragonflies in Khorezm oasis

	Species	Zoogeographic division	Dominance indicators
Suborder Zygoptera: Family Coenagrionedae (03)			
	Sympecmafusca (VanderLinden, 1820)	Palearctic	R
	Sympecmagobica (Foerster, 1900)	Palearctic	R
	Sympecma paedisca (Brauer, 1877)	Transpalearctic	R
Family Lestidae (03)			
	Ischnura elegans (VanderLinden, 1820)	Palearctic	SD
	Ischnura fountainei (Morton, 1905)	Palearctic	R
	Ischnura pumilio (Charpentier, 1825)	Palearctic	R
Suborder Anisoptera: Family Aeshnidae (02)			
	Anax imperator (Leach, 1915)	Cosmopolitan	R
	Anax p. Parthenope (Selys, 1839)	Cosmopolitan	SD
Family Gomphidae (02)			
	Stylurus flavipes liniatus (Bartenef, 1929)	Holoarctic	R
	Lindenia tetraphylla (Vander Linden,1825)	Palearctic	R
Family Libellulidae (13 species)			
	Crocothemis erythraea (Morton, 1920)	Palearctic	SD
	Crocothemis servilia (Drury, 1770)	Holoarctic	D
	Sympetrum striolatum pallidum (Selys, 1887)	Palearctic	R
	Sympetrum f. Flaveolum (Linnaeus, 1758)	Palearctic	R
	Sympetrumvulgatumdecoloratum(Selys, 1884)	Transpalearctic	SD
	Sympetrum arenicolor (Jodicke, 1994)	Australia-Asian	R
	Sympetrum meridionale (Selys, 1841)	Cosmopolitan	R
	Pantala flavescens (Fabricius, 1798)	Cosmopolitan	D
	Orthetrum brunneum (Fonscolombe, 1837)	Cosmopolitan	R
	Orthetrum cancellatum (Linnaeus, 1758)	Palearctic	R
	Orthetrum a. albistylum (Selys, 1848)	Palearctic	SD
	Orthetrum sabina (Drury, 1770)	Cosmopolitan	D
Family Macrodiplactidae			
	Selysiothemisnigra (VanderLinden,1825)	Cosmopolitan	D

According to the data obtained from the study of zoogeography in the study area, there are 11 species of Palearctic (47.8%), 7 species of cosmopolitan (30.4%), 2 species of holoarctic, transpalearctic species (8.7%), 1 species of Australia-Asian species (4.3%). These data are given in Table 2.

CONCLUSION

As a result of observations in 2020-2021 in the Khorezm oasis, material was collected from various biotopes and 23 species of dragonflies were recorded. In the Khorezm oasis, observations were made in 7 designated areas. According to the results of the observations, the dominant species accounted for

17% of the total of 4 encountered species. Subdominant species accounted for 5,22% of total encountered species and 14 of rare species, 61% of total encountered species. According to the zoogeographic analysis of the dragonflies of the Khorezm oasis, it is divided into seven geographical areas. There are 11 palearctic species (47.8%), 7 cosmopolitan species (30.4%), 2 holoarctic and transpalearctic species each (8.7%), and 1 Australia-Asian species (4.3%).

Acknowledgement: We thank the Khorezm Academy of Mamun for the provided scientific base. In addition, the Khorezm Regional Committee for Ecology and Environmental Protection and the Lower Amudarya biosphere reserve for permission to collect in the tuqai forest zone.

Conflict of interest: None

Financial support: None

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