

## ANNOTATION

thesis for the degree of Doctor of Philosophy (PhD) in the specialty  
6D060700-Biology

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### **BIOLOGICAL CONTROL OF BLOOD-SUCKING MIDGES NUMBER OF THE IRTYSH RIVER MIDDLE REACH**

**The relevance of the research topic:** The abundance of "gnats" is often a very important (and sometimes decisive) factor for comfortable life. Many species of midges - vicious bloodsuckers, their massive attack makes it practically impossible to recruit people in the open air without protection. The massive attack of midges leads to total a severe allergic reaction in humans and animals, sometimes with fatal outcome (Simuliidosis). An attack of midges dramatically reduces the productivity of people and livestock productivity (weight gain, milk production, egg production, etc.). It should be added that blood-sucking midges are non-specific vectors of pathogens of a number of infectious diseases. When interrupted bloodsucking on the sick animal and resume it on healthy females can mechanically transmit pathogens tularemia, anthrax and other infectious diseases. Midges are specific vectors of pathogens number of pet diseases, onchocerciasis primarily cattle and some poultry diseases caused by protozoa (species of the genus *Leucocytozoon*).

In 1990-2000-ies in the Pavlodar Irtysh region began to celebrate Mass attacks of gnats on people and pets. In this regard, there is an urgent need to study the features of fauna, ecology and biology of local populations of black flies, to develop and implement measures to reduce the number of bloodsuckers.

**The purpose and objectives of research:** The working and use of efficient and environmentally friendly measures of blood-sucking midges biological control in Pavlodar and Aksu.

1. Definition of fauna midges middle course. Irtysh Pavlodar within the region;
2. Investigation of biology (the timing of the phases of water and adult flight) species of lice, including blood-sucking;
3. The study of daily dynamics of flight and attack adults of lice, the influence of meteorological factors on the active and aggressive insects;
4. Factors determining the effectiveness of biological control of the number of blood-sucking midges.
5. Determination of the indicators necessary for the biological control of population during the bloodsucking, aggressive midges.

**The object of study** is to determine ways to biological fight against bloodsucking Diptera midges.

#### **Scientific research hypothesis**

Clarification of fauna, phenology and biology of black flies in the period 2012-2014 of the Irtysh River middle reaches.

The development of efficient algorithms for the use of biological agents.

### **Research objectives:**

- Defining the fauna and biology of midges of the Irtysh River middle reaches in Pavlodar region within 2012-2014;
- Seasonal and daily dynamics of the summer and an attack of midges in the valley of the middle reaches of the Irtysh River;
- phenological characteristics of populations of midges, synchronizing the timing of anti simuliid events and deadlines of larvae mass species of blood-sucking midges in the district. Irtysh;
- Evaluating the effectiveness of bacterial preparations;
- The impact of anthropogenic factors on the biology of midges in the river Irtysh;
- Assessment of the biological products impact on non-target hydrofauna.

### **The scientific novelty** of this study is as follows:

The thesis composed by efficient algorithms for the use of biological agents. Refined fauna, biology, and phenology midges middle reaches of the Irtysh River in the period 2012-2014. Determination of the effect of biological drugs on non-target hydrofauna.

**The theoretical significance** of theoretical value of work is expressed in clarifying and supplementing the information available on the fauna, zoogeography midges investigated region. For the first time analyzed the influence of anthropogenic factors on the species composition and ecology of lice on the example of a large plain of the Irtysh River. The proposed algorithm in the anti simuliid event can be used in a similar lowland rivers. The data obtained can be used in accordance with the curriculum specialties "Biology", "Medicine" and "Veterinary Medicine" in the disciplines of "Invertebrate Zoology", "parasitology" and "Entomology".

**The practical importance** of ensuring the reliability of the effect of reducing the midges attacks on a large administrative and industrial center of Pavlodar.

Experience in calculating the amount of larvicidal formulation may be used in conducting biological control lice numbers.

Experience calculating the distance above to be protected from the attacks of the village, which should be applied in the preparation of the watercourse can be extrapolated when conducting such work on other taking into account features of the treated water reservoir.

Data on the seasonal dynamics of the development of immature phase and summer midges determine the terms of the application of measures to protect people and livestock from attacks bloodsuckers.

**The accuracy and validity of the results of scientific research**, some taken in zoological and parasitological surveys of:

abundance index (Io) represents the average number of biological objects on the unit of account (number of larvae of midges on the same substrate). Deemed reliable index calculated on the basis of not less than 20 sites.

occurrence Index (BPI) - the number of sites (nests), which met the larvae of midges - all species or the amount of each individual, expressed as a percentage.

dominance index (Id) - the number of larvae of each species in the total charges, expressed as a percentage. The sum of all id is 100%.

**The provisions for the defense:**

- Determine the fauna and biology of lice middle reaches of the river Irtysh Pavlodar within the region in the period 2012-2014;
- Compiled by seasonal and daily dynamics of the summer and an attack of midges in the valley of the middle reaches of the Irtysh River;
- Work on phenological characteristics of lice populations, synchronized timing of antisimulida measures with the terms of the mass species of blood-sucking midges in the district. Irtysh;
- The estimation of efficiency of application of bacterial preparations;
- characterize the influence of anthropogenic factors on the biology of midges in the river Irtysh;
- The estimation of the impact of drugs on non-target hydrofauna.

**Results of dissertation is published** in 10 papers. 3 articles of these in journals recommended by the Committee for Control of Education and Science of the MES KR, 6 articles in international scientific journals, including 1 article included in the Scopus database, 1 job in the materials of international and national conferences.

**The structure and scope of the thesis:** The thesis is stated on 114 pages of typewritten text and is composed of definitions, designations and abbreviations, an introduction, four chapters (Review of literature, Material and methods, Results, Discussion), a conclusion and the list of references consisting of 240 titles of native and foreign authors. The text is illustrated with 27 tables and 25 pictures.