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Study on protection of forest plants from pests inhabited in the dry part of the Aral Sea

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Abstract. 34 types of pests were found on haloxylon and other sand-retaining plants planted in the dry area of the Aral Sea. The main dominant species of these pests are large and small haloxylon humpback grasshoppers. When the insecticide Imitrin 20% sus.K. was tested on humpback grasshoppers at 0.05 L/ha distribution pater measurement against 2-3-year-old nymphs of grasshoppers and 0.1 L/ha against 4-5-year-old nymphs: after 3 hours - 89.2-87.4%, 24- 95.1-94.0% after 72 hours - 96.3-95.6% biological efficiency was obtained respectively. This preparation has been recommended to produce at the specified measures and periods.

1. Introduction

The protection and determination potential use of the flora, preservation of soil fertility, the negative effects of biotic and abiotic factors on the growth and development of plants for the safety and improvement of biodiversity in order to create new forests and pastures in the dry bottom of the Aral Sea have become one of the most important issues in the Aral Sea region of the Republic of Uzbekistan. Due to the negative impact of anthropogenic factors on nature, bioecological disturbances are occurring in many places. One of them is the drying up of the Aral Sea [1-5]. As a result of the retreat of the sea water, a typical desert consisting of a complex of huge sandy-salty landscapes was formed in its place. This desert has been called a newly emerging natural region in Central Asia - "Orolkum". Orolkum is the youngest desert in the world. Its northern part is located in the territory of Kazakhstan, and the southern part is located in the Republic of Uzbekistan (Karakalpakstan). According to the latest data, its area is 5 million hectares, of which about 2.5-3 million hectares belong to the Republic of Karakalpakstan.

The areas from where the seawater has retreated faced the scientists with the important problem of comprehensive study of its flora and plant cover. The structure and directions of development of new natural complexes, as well as the activity of plants, succession, and landscape changes, challenges to study carefully the dry part of the Aral Sea. In this regard, it is necessary to study the migration and growth of plants in natural conditions and under the influence of the human factor [6-8].

In recent years, as the seedlings and saplings of most agricultural crops are brought from abroad, it has been noted that their sorts being nonresistant to endemic phytopathogenic microorganisms, or non-endemic phytopathogenic microorganisms are entering to country along with the saplings and adapting to our conditions, rapidly growing and spreading. Accordingly, it is of great importance for our republic to develop agrotechnology for the protection of newly planted forest and pasture plants from diseases in



the dry part of the Aral Sea, as well as to control phytopathogenic diseases in traditional plantations, to determine their types, ways of spreading, and to develop control measures.

In order to prevent sand and salt landslides caused by strong winds in the dry bottom of the Aral Sea, there is no system for protection of desert plants, including haloxylon, *Calligonum polygonoides*, Circassian plants, from diseases and pests. As a result, we plan to maintain healthy trees in the regions, prepare quality seed for establishing afforestation and create a basis for natural reproduction of trees. One of the urgent problems is the significant increase in forest cover in the region, and as a result, preventing strong salt sand storms from rising into the air from the seabed.

In particular, scientific research is being carried out on the identification of the main types of diseases and pests that harm the newly established forest-desert vegetation in the dry bottom of the Aral Sea and the development of a coordinated control system against them.

When *Locusta migratoria* L., *Dociostaurus maroccanus* Thunb., *Dociostaurus kraussi* Ingen., *Calliptamus turanicus* Tarb., are the locust species that cause the main damage to agricultural crops in Uzbekistan, *Dociostaurus maroccanus* Thunb., *Calliptamus italicus* L., *Ramburiella turcomana* F.-W. breeds have been observed in Surkhandarya region [1-5].

Among the 41 breeds that were discovered in Karakalpakstan *Locusta migratoria* L., *Calliptamus italicus* L. (live as a group), *C. barbarus* Costa, *Thrinchus campanulatus* F.d.W., *Tetrix tartara* I.Bol., *Heteractis adspersus* Redt. (live alone), and others are considered main damaging pests [1-4].

The chemical control method remains acceptable not only in Uzbekistan, but also on a global scale to eliminate quickly the damage they can cause in order to fight against the locusts [1-5].

2. Research Methods

Chemical processing is mainly carried out with the help of OVX-28 fan tractor sprayer and motorized hand sprayers in the fields of haloxylon, *Calligonum polygonoides*, Circassian plants. Insecticides tested against pests are carried out using special agrotoxicological methods.

The method created by Goncharev is used to calculate agricultural and economic efficiency of preparations. Economic efficiency is calculated based on Chenkin method.

The results of the experiments carried out on the project are analyzed by the method of Dospekhov. The results obtained in the experiment are mathematically analyzed by various methods. The minimal detectable difference between experimental values is calculated based on the method.

3. Results and Discussions

According to numerous researches carried out between 2020-2022, 34 types of pests were identified as a result of experimental studies on the species composition, distribution, damage, development, and bioecology of the main dominant species of forest-desert plants in the dry bottom of the Aral Sea. The main dominant species have been studied among these pests.

Through the agency of the conducted research, it was found that 34 types of pests identified during the study of the harmful entomofauna of haloxylon and other sand-catching plants in the forests established in the dry bottom of the Aral Sea belong to 1 class, 3 genera, and 14 families. It was discovered in the research that the main dominant species of them causing great damage to the haloxylon are the large and small haloxylon humpback grasshoppers (*D.albidula* and *D.annulata roseipennis*).

Biological effectiveness of modern chemical preparations against the main harmful species of locusts that habitat in the forests and areas established in the dry bottom of the Aral Sea was determined for the first time between 2020-2022 by testing at different rates of consumption. The insecticide Imitrin 20% sus.K. (imidacloprid, 100 g/l + bifenthrin, 100 g/l), which consists of a mixture of chemical preparations belonging to different groups against the large haloxylon locust was tested at rates of consumption of 0.05 l/ha against 2-3-year-old nymphs of locusts and 0.1 l/ha against 4-5-year-old nymphs. As a result, the biological effectiveness was seen: 89.2-87.4% after 3 hours, 95.1-94.0% after 24 hours, and 96.3-95.6% after 72 hours.

Atilla (0.15-0.25 l/ha) insecticide showed high biological efficiency in both experiments (Table 1). We can make conclusion as follows: Atilla super preparation has a high initial efficacy against locusts, while Imitrin compound has a high initial and sustained biological efficacy against locusts.

Table 1. Biological efficacy of chemical preparations against large haloxylon humpback locust nymphs (Field experiment, The Republic of Karakalpakstan, Moynaq region, K-45 motor hand sprayer (120 l/ha), 2020-2022)

Variants	Consum. measure, l/ha	The average number of locusts in 1m ² .									Efficacy, % after n hours		
		Observation after n hours											
		3			24			72			3	24	72
<i>Against 2-3 years old nymphs, 2020-2022.</i>													
Imittrin, 20% EC	0.05	5.2	43.2	48.4	2.3	45.4	47.3	1.6	41.9	43.5	89.2	95.1	96.3
Atilla, 5% EC	0.15	3.7	43.2	46.9	1.0	44.8	45.8	4.3	39.9	44.2	92.1	97.8	90.2
Control	-	41.6	0.1	41.7	40.8	0.1	40.9	39.7	0.1	39.8	0.0	0.0	0.0
<i>Against 4-5 years old nymphs, 2020-2022.</i>													
Imittrin, 20% EC	0.1	4.5	31.3	35.8	2.0	31.8	33.8	1.3	28.5	29.8	87.4	94.0	95.6
Atilla, 5% EC	0.25	3.9	31.0	34.9	1.0	30.7	31.7	3.0	24.7	27.7	88.8	96.8	89.1
Control	-	34.6	0.0	34.6	35.1	0.1	35.2	31.2	0.0	31.2	0.0	0.0	0.0
MDD ₀₅ =											0.9	0.6	0.5

Table 2. Biological efficacy of chemical preparations against large haloxylon humpback locust nymphs (Field experiment, The Republic of Karakalpakstan, Moynaq region, K-45 motor hand sprayer (120 l/ha), 2020-2022)

Variants	Consum. measure, l/ha	The average number of locusts in 1m ² .									Efficacy, % after n hours		
		Observation after n hours											
		3			24			72			3	24	72
<i>Against 2-3 years old nymphs, 03.06.2021.</i>													
Comprodor, 350 EC	0.08	8.1	247.6	255.7	3.3	247.8	251.1	2.9	242.9	245.8	96.8	98.6	98.8
Starin, 30 % EC	0.170	21.6	225.5	247.1	9.2	237.1	246.3	23.5	219.2	242.7	91.2	96.2	90.3
Alpac 100 EC	0.1	20.3	229.1	249.4	8.7	234.8	243.5	21.9	218.1	240.0	91.8	96.4	90.8
Atilla, 5% EC	0.15	15.8	146.1	161.9	4.1	148.2	152.3	15.1	132.0	147.2	90.2	97.3	89.6
Control	-	239.0	0.3	239.3	236.9	0.2	237.1	237.9	0.4	238.3	0.0	0.0	0.0
<i>Against 4-5 years old nymphs, 09.06.2021.</i>													
Comprodor, 350 EC	0.08	15.3	184.3	199.6	5.0	196.5	201.5	4.7	191.6	196.3	92.3	97.5	97.6
Starin, 30 % EC	0.170	16.3	176.8	193.1	8.7	181.9	190.6	19.8	153.3	173.1	91.5	95.4	88.5
Alpac 100 EC	0.1	14.1	186.6	200.7	7.1	187.8	194.9	17.3	173.1	190.4	92.9	96.3	90.9
Atilla, 5% EC	0.25	20.3	229.1	249.4	8.7	234.8	243.5	21.9	218.1	240.0	91.8	96.4	90.8
Control	-	204.4	0.1	204.5	189.4	0.0	189.4	188.4	0.3	188.7	0.0	0.0	0.0
MDD ₀₅ =											0.9	0.6	0.5

In addition to this, when the new chemical insecticide preparations belonging to different groups presented by "SafaTarim" LLC was used against the main harmful locusts that are common in forest and pasture plants in the Moynaq region of the Republic of Karakalpakstan, namely, 2-3, and 4-5 years nymphs of old large haloxylon humpback locust high biological efficiency was obtained in 2021.

Atilla (0.15-0.25 l/ha) insecticide showed high biological efficiency in both experiments at the dosage (Table 2).

Thus, the following conclusions can be drawn regarding the insecticides that participated in the test. Imittrin, Atilla super, as well as the new preparations Comprodor, Starin and Alpac are highly

biologically effective when used against locusts in the prescribed rates and on their terms. It ensures the preservation of plants in the economically harmless amount.

To summarize, as a result of our monitoring observations and experiments carried out on the study of disease and pest species that harm the forest and pasture plants established in the dry bottom of the Aral Sea in 2020-2021 in the Aral regions of the Republic of Karakalpakstan, we can conclude the following.

4. Conclusions

1. 34 types of pests belonging to 1 class, 3 genera, and 14 families were identified during our monitoring observations on the study of harmful entomofauna of haloxylon and other sand-retaining plants in the dry bottom of the Aral Sea. The main dominant species of these pests are large and small haloxylon humpback locusts.
2. Biological effectiveness of modern chemical preparations against the main harmful species of locusts that habitat in the forests and areas established in the dry bottom of the Aral Sea was determined for the first time between 2020-2022 by testing at different rates of consumption. The insecticide Imitrin 20% sus.K. (imidacloprid, 100 g/l + bifenthrin, 100 g/l), which consists of a mixture of chemical preparations belonging to different groups against the large haloxylon locust was tested at rates of consumption of 0.05 l/ha against 2-3-year-old nymphs of locusts and 0.1 l/ha against 4-5-year-old nymphs. As a result, the biological effectiveness was seen: 89.2-87.4% after 3 hours, 95.1-94.0% after 24 hours, and 96.3-95.6% after 72 hours. When it comes to new preparations like Comprodor 350 sus.k. (0.08 l/ha.), Starin, 30% sus.k. (0.170 kg/ha.), Alpac 100 EC sus.k. (0.1 l/ha.) correspondingly high biological efficiency was achieved. It is recommended to use the above-mentioned preparations in the production according to the established norms and terms.

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