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Bioecology of Pasture Grasshopper and Biological Effectiveness of Chemical Preparations Against It

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Annotation: The article presents the results of experiments on the study of bioecology, the development of the bogarny prus, and based on the results of the experiment conducted against larvae of different ages, Imidashans plus is recommended, sk. 0.1-0.15 l/ha. and Imidashans, VRK (200 g/l). 0.07-0.1 l/ha. in the specified rate of consumption in pastures of the southern and central regions of the Republic of Uzbekistan.

Keywords: Turanian Prus, adult phase, larvae, egg cod, egg, bioecology, habitat, optimum temperature, nutrient medium, favorite plant, the area of distribution.

51% of the total land area of the Republic of Uzbekistan is pastures and haypasture s. There are more than 1,700 species of plants used as forage in pastures and haypasture s. Pastures and haypasture s are very important in providing livestock with nutritious feed and producing abundant, high-quality and cheap products from them.

The productivity of free-range livestock is 20-25 percent higher than the productivity of stable livestock. The cost of the product is reduced by 30-40 percent. Since cattle are fed on pastures for 180-280 days, during this period it is not required to mow, transport, spread grass, feed and manure, and carry out irrigation. The quality of meat, milk, wool and leather products will improve dramatically. Livestock fed on pastures will be provided with vitamin blue feed for a long time.

In pastures, the combined growth of ephemeral, ephemeroid, semi-shrub and shrub plants protects the soil from wind and water erosion. Also, it prevents sand migration, dust and pollen rising by blowing the soil, and eliminates atmospheric air pollution. By allowing atmospheric precipitation to slowly soak into the ground, it creates a reserve of moisture in the soil and protects it from physical evaporation. Perennial grasses, bushes and trees in the lands near the surface of the ground where the seepage waters act as a biological drain, reduce the process of salinization and waterlogging in the soil [5, 7, 9].

But during the growth and development of pasture plants, which are the main source of livestock feed, various types of harmful insects cause significant damage.

It is known that locusts are the most dangerous pest of agricultural crops and pasture plants. As a result of the mass increase of some harmful species of locusts, the population of many countries of the world is faced with the problem of famine.

Only after the use of modern techniques and chemicals in the fight against locusts, the damage caused by them was reduced to a minimum.

Uzbekistan is included among the countries in the world where there is a risk of constant attacks of locusts.

About 200 species of locusts are distributed in Uzbekistan, of which 8-10 species can cause serious damage to agricultural crops, pastures and other plants. Among them, Asian locust (*Locusta migratoria* L.), Moroccan locust (Dociostaurus maroccapus Thunb.), Italian Prussian (*Sallirtatus italicus* L.), species are widespread [4;5;6]. Fighting against them is one of the urgent issues, and for several decades, chemical preparations have been sprayed on large areas. Only during 1982-1990, the area of chemically treated area was 4.2 million ha. The next outbreak of locusts was observed in 1994-1995, and the area affected by them exceeded 1 million hectares.

Up to now, the fight against this type of pests is carried out every year in large areas of our Republic, and the extent of their damage has been fully controlled.

Nevertheless, in the following years, it is observed that grasshopper species that do not form swarms multiply in the pasture s around agricultural crops and cause great damage. In order to properly organize effective control measures against swarming and non-swarming species, it is necessary to have information about their distribution, morphological, biological, and ecological characteristics.

Therefore, the development of pest control measures by studying the species composition and bioecology of harmful locusts is the main task of our research.

Information about the bioecological characteristics of the pasture grasshopper is very scarce and can be found only in the works of Zimin (1934) and P.A. Ler (1962) [1;6].

However, this pest has not been studied in the pastures of the southern and central regions of our Republic.

Research method. We carried out research on the study of grasshoppers in the pastures of the southern and central regions of Uzbekistan during 2015-2021. Phenological and faunistic observations in research V.P. Palli [3] test of new drugs against locusts Kurdyukov V.V., Vasiliev S.V., Bunin L.D. (1995), Sh.T. It was conducted based on the methods of Khojaev (2004) [2;8].

Results of the experiment: Grasshopper lays its eggs in non-irrigated dry lands, compacted soils, often bordering oases, especially in areas with light sandy soils. Locusts usually lay 10-20 eggs per 1 m^2 of land, but in some years 140-150 eggs are laid.

The temperature of 25-300C is the most favorable for grasshopper larvae to hatch. Larvae start hatching at the end of April and continue until the end of May. According to our observations, hatching of larvae does not differ significantly in the pastures of the southern and central regions of Uzbekistan, in each region they appear from the third decade of April. It can only vary by 2-3 days. In the southern regions of Uzbekistan, in particular, in the pastures of Guzor district of Kashkadarya region, larvae appeared on April 25, 2017, and on April 22, 2020, while in the central region, namely, in Forish district of Jizzakh region, it was observed that they appeared on April 27-25, respectively. Larvae appear from April to the end of May. Larvae mature in 35-45 days in optimal temperature and nutrient environment. In the adult phase, mating begins 12-15 days after hatching, and egg-laying another 8-10 days later.

In the pasture grasshopper, especially during the years of its many years, the instinct to live in chaos is clearly visible. In such years, grasshopper larvae gather in large swarms that are always on the move, and mature grasshoppers gather in smaller swarms and fly over short distances.

Because the larval stages of hatching, growing, and winging are so long, the egg-laying period lasts about a month, sometimes up to two months. The area occupied by larvae expands 15-20 times during the last period of development.

According to experiments, the level of wind blowing greatly affects the feeding of the grasshopper. Grasshoppers feed in the morning on windy days and when the temperature is high. On windy days, the larvae begin to feed when the air temperature is not less than 20 ºC, and when there is a strong wind, when the temperature reaches 28 ºC. Larvae are especially hungry in the morning and in the evening from 15 to 17. When the temperature exceeds 37 ºC, the larvae stop feeding and hide in the shade.

Grasshopper larvae feed on a wide variety of plants such as cotton, legumes, oilseeds, cereals, pulses, cabbage, carrots, onions and other vegetable crops, as well as vines and mulberries. During our research, it was observed that they caused great damage to agricultural crops in 2018, when the season was dry. Only Nurota seriously damaged the dry cereal crops planted in the foothills of the mountains, adjacent to the pastures, as well as the newly cultivated chickpea, sunflower, and poliza crops. At the same time, it also eats berries and wormwood from wild plants.

Table 1. Phenology of the development of grasshopper in the pastures of the central regions of Uzbekistan

Months	October-March			April			May			June			July			August			September		
Decades	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Turon or pasture grasshopper	(*)	(*)	(*)	(*)	(*) *	(*) * -	(*) * -	(*) * -	-	- +	- +	- + (*)	- + (*)	+ (*)	+ (*)	+ (*)	+ (*)	+ (*)	+ (*)	+ (*)	(*)

*Conditional symbols: * - egg; - - larva; + - mature insect; (*) (-) (+) – rest phase*

Grasshopper larvae also eat dried parts of various plants. Young larvae mainly damage the leaves, gnawing the center of the leaves, while the youngest larvae make holes in the leaves. Adult larvae often gnaw around the leaves, and in some cases, the middle. In addition to leaves, these larvae also eat flower buds and fruits of plants.

Grasshoppers hatched in dry areas move to more vegetated areas as the vegetation there begins to dry out, but prefers to remain in areas where plants grow in low water conditions without going deep into the oasis, as it returns to sandy deserts to lay eggs.

The egg-laying period is observed from the end of June to the end of July. The period of natural extinction lasts from August to October (Table 1).

In order to test new chemical preparations to fight against kir or turon locust, an experiment was conducted using Imidashans plus, sus.k drug against larvae of different ages of turon locust in the pastures of Nurota Karakol breeding farm, Nurota district, Navoi region in 2017-2021. It differed from the other experiments in that the treatment in this experiment was carried out using a motorized hand sprayer. In practice, water consumption corresponded to 120 l per 1 hectare of land. "Imadoshans" (0.1 l/ha) against 2-3 and 4-5-year-old larvae of locusts after 3 hours 89.6-89.4%, after 24 hours 96.5-95.8%, 72- showed 98.1-96.4% biological effect after hours.

When applied to locust larvae of the same age in the amount of 0.15 l/ha: 93.3-92.7% after the 3rd hour, 98.6-96.1% after the 24th hour, 99.4% after the 72nd hour 96.4% efficiency was recorded.

In options 3-4 of our experiment, Imidashans, s.e.k. (200 g/l) drug was tested against larvae of different ages of Turan grasshopper, and the following results were obtained. When applied against 2-3 and 4-5-year-old larvae of grasshoppers in the amount of 0.07 l/ha: after the 3rd hour - 90.2-89.6%; 97.0-96.5% after 24 hours, 97.7-96.8% after 72 hours, and when applied to locust larvae of the same age at 0.1 l/ha: 91.0-90 after 3 hours .2%, 97.9-97.6% after 24 hours, 98.4-97.9% after 72 hours (Table 2).

Table 2. Biological effectiveness of chemical preparations against Turon grasshopper

Pasture experience, Nurota district, Nurota Karakol breeding farm, K-45 motorized hand sprayer (120 l/ha), 2017-2021.

Options	Consumption rate, l/ha	The average number of grasshoppers per $1m^2$ area, pcs. Observations after *n* hours									Efficiency, % after *n* hours		
		3			24			72					
		Alive	Dead	Total	Alive	Dead	Total	Alive	Dead	Total	3	24	72
Against 2-3 year old larvae													

Imidashans plus, sus.k.	0,1	3,7	31,9	35,6	1,2	33,5	34,7	0,6	31,6	32,2	89,6	96,5	98,1
This too	0,15	2,6	36,5	39,1	0,4	36,8	37,3	0,2	35,9	36,1	93,3	98,6	99,4
Imidashans, s.e.k. (200 g/l)	0,07	3,8	35,3	39,1	1,1	36,2	37,3	0,8	35,3	36,1	90,2	97,0	97,7
This too	0,1	3,6	36,6	40,2	0,8	39,0	39,8	0,6	37,4	38,0	91,0	97,9	98,4
Atilla, 5% em.k. *(template)*	0,25	2,4	26,3	28,7	0,5	27,8	28,3	0,3	27,6	27,9	91,6	98,2	98,9
Control *(unprocessed)*	-	29,8	0,3	30,1	29,9	0,1	30,0	29,0	0,2	29,2	0,0	0,0	0,0
Against 4-5 year old larvae													
Imidashans plus, sus.k.	0,1	3,1	26,2	29,3	1,2	27,5	28,7	1,0	27,0	28,0	89,4	95,8	96,4
This too	0,15	1,8	23,1	24,9	0,9	22,3	23,2	0,5	22,4	22,9	92,7	96,1	97,8
Imidashans, s.e.k. (200 g/l)	0,07	3,7	31,9	35,6	1,2	33,5	34,7	1,0	31,2	32,2	89,6	96,5	96,8
This too	0,1	3,9	36,3	40,2	0,9	37,7	38,6	0,8	38,7	39,5	90,2	97,6	97,9
Atilla, 5% em.k. *(template)*	0,25	2,9	24,2	27,1	0,9	24,7	25,6	0,8	26,4	27,2	89,3	96,4	97,0
Control *(unprocessed)*	-	23,8	0,1	23,9	22,8	0,2	23,0	22,5	0,3	22,8	0,0	0,0	0,0
EKF_{05}=											1,9	0,7	0,6

Also, the drug atilla, which was used as a model in the experiment, showed that it is a drug with high biological efficiency against locust larvae.

Conclusion: The temperature of 25-30ºC is the most favorable for grasshopper larvae to hatch. Larvae start hatching at the end of April and continue until the end of May. Larvae mature in 35-45 days in optimal temperature and nutrient environment. In the adult phase, mating begins 12-15 days after hatching, and egg-laying another 8-10 days later. The egg-laying period is observed from the end of June to the end of July. The period of natural extinction lasts from August to October. Imidashans plus against large and small larvae of grasshopper, sk. 0.1-0.15 l/ha. and Imidashans, VRK (200 g/l). 0.07-0.1l/ha. biological efficiency is 96.4-99.4% when the drugs are used in the specified rate.

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