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THE BIOLOGICAL EFFECTIVENESS OF MODERN DRUGS IN THE FIGHT AGAINST THE LOCUST

Abstract

About 270 types of acridoids insects live in various natural-economic zones of Kazakhstan. The greatest danger to agricultural lands is constituted by 15-20 types. Among them especially dangerous types are Asian (pereletnay) locust (*Locusta migratoria L.*) and Italian locust (*Calliptamus italicus L.*) on the extent of distribution and level of injuriousness.

The studies obtained data on the biological effectiveness of the modern drugs used against locusts in conditions of semi-desert zone of West Kazakhstan region.

Keywords: *grasslands, locusts, monitoring, biological effectiveness, modern drugs.*

Mass reproduction of acridoids which in the territory of the Republic of Kazakhstan continues more than 10 last years has forced to pay attention again to the Italian locust (*Calliptamus italicus L.*), migratory locust (*Locusta migratoria L.*) and some types of not gregarious acridoids, as on serious wreckers of crops. In the republic, fight with acridoids in the last 5 years was annually carried out on the area of tens of thousands hectares. At the same time, intensive growth of the territories occupied by gregarious acridoids, their distribution from primary centers of dwelling located mainly in northeast areas, practically on all territory of the country was noted here [1, 2, 3, 4, 5, 6].

Observed global warming within the last decades became the reason of desertification of the territory that has in turn increased threat of acridoids danger. Ecosystems of the countries of arid and droughty climate, including Kazakhstan were most vulnerable to the climate changes in general and to global warming in particular. At a turn of the millennia, devastating flashes of acridoids have captured the countries of Africa, Australia, South America, East and Southeast Asia [2, 3, 4].

The work was performed within the program of grant financing of Science Committee of MES RK on "Development of technology on production of own forages for feeding complexes and industrial type farms" project in 2015-2017 years.

The study of features of biology, phenology and ecology of acridoids was carried out on the territories of 2 areas of West Kazakhstan region (Zhangalinsky and Syrymsky) differing among themselves on soil climatic conditions.

During the project implementation, modern insecticides were studied as chemical fight against acridoids: Detsis-extra, concentrate emulsion (125 gr/l) active ingredient deltametrin, consumption rate 0,05 l/hectare, Herold, water and suspension concentrate (240 gr/l) active ingredient diflubenzuron, consumption rate 0,04 l/hectare, Tanrek, water-soluble concentrate 200 gr/l active ingredient imidacloprid, consumption rate 0,05 l/hectare.

The accepted techniques were used at the definition of acridoids resistance to insecticides.

Biological efficiency of insecticides was defined by the comparison of larvae quantity before processing and calculation for the accepted formula.

Now, the range of insecticides applied against acridoids is rather wide. In recent years, in fight against them both organophosphate, and pyrethroid insecticides were widely applied. Among pyrethroids, there were applied such medicines as Arrivo, Detsis, Karate, Mavrik, Fury, etc. Among organophosphorous medicines, Carbophos, Rogor-S, Fufanon, etc. are applied.

In recent years, the medicines Detsis-extra, Herold and Tanrek are widely known. In 2015-2017 according to the research aim at the application of the specified modern insecticides in a semidesertic zone of West Kazakhstan region determination of their biological and economic efficiency was carried out.

In 2015-2017, researches in the framework of implementation in production on the definition of biological and economic efficiency of insecticides were carried out in the conditions of "Daulet" farm of Zhangalinsky area on the crops of barley.

Total area of allotment was 60 m², frequency was 3 triple Ultra small-volume sprayer "Analog 2" was used. During chemical processings against Italian locust, the wrecker has been presented generally by larvae of the 2nd age.

Accounting of the researches carried out in Zhangalinsky district have shown that for the years of researches (2015-2017) biological efficiency of the tested insecticides has averaged from 93,9 to 97,6%. The highest efficiency was received from application of such medicines as Herold and Tanrek. The greatest death of larvae was noted at application of Herold – 97,6% and Tanrek – 95,9%. The smallest efficiency – Detsis-extra, death of larvae – 93,9%.

The carried out researches have allowed to determine that maximum efficiency of insecticide Detsis-extra on average for 3 years was noted for the 3rd day after their application where about 93,9% of wrecker larvae have died. Rather high effect has been reached at application of Tanrek. Here, for 3 years, the death of acridoids larvae for the 7th day after processing has averaged 95,9%. However, for the 15th day after application, the efficiency of Tanrek has decreased to 76,7% (Figure 1).

At the choice of insecticide it is necessary to consider key indicators of toxicity and properties of medicines and phytosanitary situation in acridoids centers. Insecticides with high speed of toxic action provide fast decrease in number of acridoids, thereby prevent their migrations in agroecosis and possible losses of harvest of crops. It is especially important when processings during mass reproduction of wreckers.

In Zhangalinsky district, Herold was more effective on duration action at continuous processings against larvae of Italian locust of the 2nd age.

On average for 3 years, biological efficiency of Herold in the first days of crops processing was the highest and was respectively for the 3rd day - 90,3% and for the 7th day after processing - 93,3%. Further, increase in efficiency of Herold insecticide from 94,8 (10 day) to 96,0% (14 day) was noted. Its high efficiency also remained within 21-28 days after application. So, for the 21st day, biological efficiency of medicine was at the level of 97,6%, for the 28th day it has decreased to 82,3%, but still remained at rather high level.

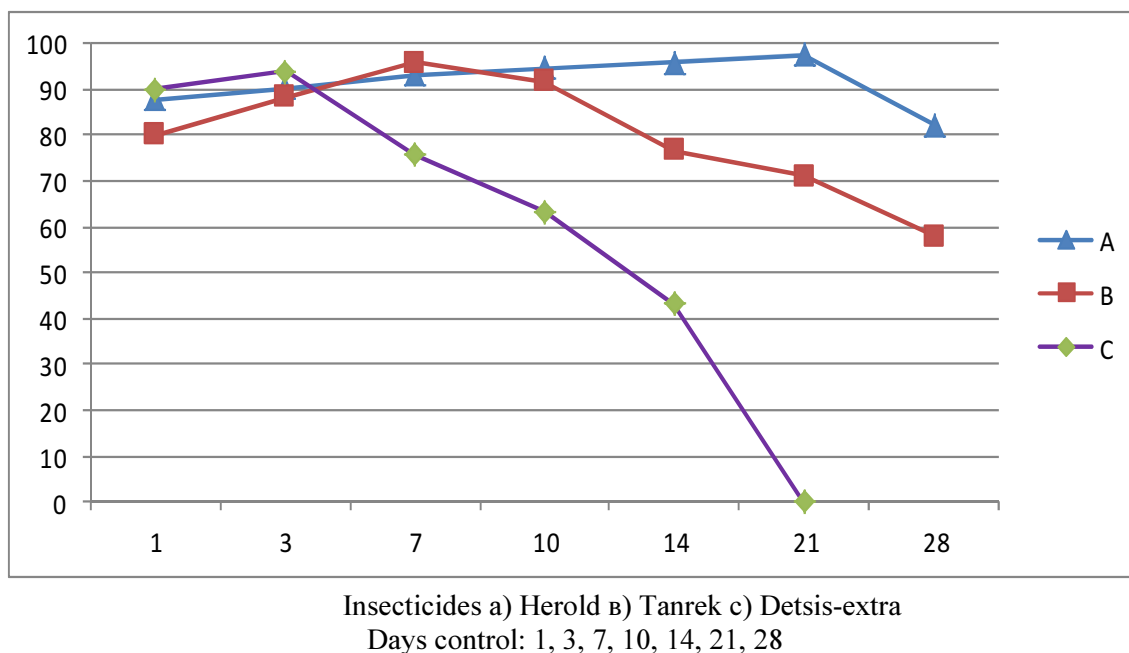


Figure 1 – Efficiency of continuous processings by insecticides against larvae of Italian locust of the 2nd age, Zhangalinsky district, average for 2015-2017,%

On average for 3 years of researches, biological efficiency of Tanrek was high within 10 days. For the 3rd day after processing, biological efficiency of medicine was at the level of 88,3%. For the 7th day, biological efficiency of Tanrek has grown and was 95,9%, for the 10th day it has decreased to 91,8%. In the next days, biological efficiency of insecticide naturally continued to decrease from 76,7 to 71,0% and for the 28th day it was already 58,0%.

Biological efficiency of Detsis-extra for the 3rd day of processing was high – 93,9%. In the next days, the efficiency of medicine quickly decreased and was: for the 7th day after application - 75,7%, for the 10th day – 63,3% and for the 14th day – 43,2%. For the 21st day after application, Detsis-extra completely lost toxicity in relation to larvae of Italian locust of the 2nd age.

In Zhangalinsky district high efficiency on action duration at continuous processings against larvae of Italian locust of the 2nd age was shown by Herold from the studied medicines, the smallest efficiency Detsis-extra. Tanrek is intermediate.

In 2015-2017 we have carried out monitoring of sensitivity of Italian locust populations in the conditions of Zhangalinsky district to 3 studied insecticides. The most sensitive populations were found in Zhangalinsky district, their minimum toxicological parameters (CK_{50} and CK_{95}) have been taken for the indicators of specific sensitivity of locust included in the methodical recommendations and were used for calculation of resistance levels of the wrecker of other populations.

The researches carried out in the conditions of Zhangalinsky district demonstrate that the insecticides applied against Italian locust not only significantly differ among themselves in toxicity, but these indicators change in relation to larvae of different age (Table 1).

Table 1 – Toxicity of insecticides for Italian locust, average for 2015-2017

Name of medicine	Larvae of the 2nd age		Larvae of the 5th age	
	CK_{50} , % rate application	CK_{95} , % rate application	CK_{50} , % rate application	CK_{95} , % rate application
Detsis-extra	0,05400	0,2203	0,0044	0,0135
Herold	0,00016	0,0006	0,0014	0,0056
Tanrek	0,00891	0,0271	0,0020	0,0075

On average for 3 years, Herold was (2015-2017) the most toxic for larvae of the 2nd age. 50% of death of larvae were reached at the application of 0,00016 active ingredients of this medicine. 95% of death of larvae at the application of the specified medicine were reached at active ingredient 0,0006.

Detsis-extra was the least toxic for larvae of the 2nd age. At application of this medicine for achievement of death of 50% of larvae, concentration of active ingredient was 0,05400. 95% of the 2nd age larvae death were reached at application of this medicine in concentration of active ingredient 0,2203. Tanrek was intermediate on the toxicity to larvae of the 2nd age.

Herold was the most toxic for larvae of Italian locust of the 5th age. 95% of death of larvae were reached with the concentration of medicine on active ingredient 0,0056. Detsis-extra was the least toxic for the larvae of the 5th age. Almost full death of larvae of the 5th age was noted at the concentration of active ingredient of this medicine 0,0135. Among above-stated medicines on the toxicity to larvae of the 5th age Tanrek was intermediate.

The obtained new data confirming the created resistance of Italian locust to the insecticides once again confirm the gravity of problem.

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ТҮЙІН

Қазақстанның әр-түрлі табиғи-экономикалық аудандарында шегірткелердің 270 түрлері тараған. Олардың ішінде ауыл шаруашылығы танаптарына 15-20 түрі өте қауіпті. Таралу қарқыны мен зияндылығы жқнінен азаттық шегіртке мен (*Locusta migratoria* L.) итальяндық прус (*Calliptamus italicus* L.) ерекшеленеді.

Зерттеу нәтижелері бойынша Батыс Қазақстан облысының жартылай шөлейт аймағында шегірткелерге қолданылатын заманауи дәрумендердің биологиялық тиімділігі анықталды.

РЕЗЮМЕ

В различных природно-экономических зонах Казахстана обитают около 270 видов саранчовых насекомых. Наибольшую опасность сельскохозяйственным угодьям представляют 15-20 видов. Среди них по степени распространения и уровню вредоносности особо опасными видами являются азиатская (перелетная) саранча (*Locusta migratoria* L.) и итальянский прус (*Calliptamus italicus* L.).

В результате исследований получены данные о биологической эффективности современных препаратов, применяемых против саранчовых в условиях полупустынной зоны Западно-Казахстанской области.

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INFLUENCE OF MODES OF GRAZING ON VEGETATIVE AND SOIL COVERS OF PASTURES

Abstract

The researches established the expediency of moderated (65-75% browsing) use of pastures. The change of floristic structure and efficiency, and also deterioration of agrochemical and agrophysical indicators of pastures soil cover was noted at the intensive use of pastures.

Keywords: *pastures, monitoring, browsing, floristic structure, soil cover, efficiency.*

In the XX century arid ecosystems of Eurasia underwent intensive anthropogenous influence. In this connection, their efficiency decreased, valuable types of fodder plants disappeared from herbage, vulnerable ecosystems are exposed to degradation. Today there are 187 million hectares of pastures in the republic from which about 81 million hectares are used, thus, among the used pastures - 26 million hectares are degraded - generally these are pastures lying near the settlements [1, 2].