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Integrated system of protection of soybeans from insect pests in the fields of "Ontustik Agropark" Llp

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ABSTRACT

The article presents data on research on crops, LLP "Agropark Ontustik" in Almaty region. Developed an innovative scheme of soybean cultivation is introduced in the crops since 2018 all work is carried out in LLP "Ontustik Agropark". The question of the best ways of sowing soybeans in different soil and climatic zones, remained unresolved. This is a consequence of various natural and agrotechnical conditions, as well as varietal composition.

***Key words**: Soybean, Innovative technology, Integrated protection system, Processing, Method.*

Introduction

In line with the strategic course of development of the Republic of Kazakhstan Strategy "Kazakhstan-2050", President's address, "the Third modernization of Kazakhstan: global competitiveness" (2017), the President's address "New opportunities of development in the context of the fourth industrial revolution" (2018), the State program of development of agriculture of the Republic of Kazakhstan for the years 2017-2021, a priority and an important direction of development of plant breeding is to increase productivity, production of competitive products to meet the domestic needs of the population and the development of the export potential of the country on the basis of increasing the knowledge intensity of agricultural technologies. It is emphasized that the agricultural sector of the country should become a new driver of the economy, the task of increasing the efficiency of land use, increasing the area of irrigated land by 40 %, thereby bringing them to 2 million hectares (State program of development of agriculture of the Republic of Kazakhstan, 2017).

Place of Research

When performing the work, methods adopted in agricultural entomology and plant protection were used. To determine pests, entomophages and pollinators, to clarify their biological characteristics, distribution and economic significance, we used summaries, guidelines, articles and definitions from the list of references (Sagitova and Ishmuhambetova, 2004; Fasulati, 1971; Temreshev, 2017, 2018; Azheganova 1968; Galuzo, 1947; Mitiaeva, 2006; Temreshev *et al.*, 2015; Handbook of pesticides, 2015).

Results

The economic significance and species composition of identified pest insects belonging to 55 families and 11 orders of several classes were evaluated (Table 1).

Of the useful pollinating insects, 15 species be-

Table 1. The most common pests-insects in the fields of LLP "Àgropark Ontusik"

Type of pest 1	Frequency 2	Control measures 3
Candaharia rutellum (Hutton, 1849)	+++	Currently, there is not a single drug against slugs and snails, either chemical or biological, in the Handbook of pesticides of the Ministry of agriculture of the Republic of Kazakhstan
Fruticicola lantzi (Lindholm, 1927)	+++	-//-
Chirothrips manicatus (Haliday, 1836)	++	Treatment with drugs against sucking pests according to the existing reference List.
Limothrips cereallum (Haliday, 1836)	+++	-//-
Adelphocoris lineolatus (Goeze, 1778)	+++	-//-
Aelia acuminata (Linnaeus, 1758)	++	-//-
Dolycoris baccarum (Linneaus, 1758)	+++	-//-
Stenodema calcarata (Fallén, 1807)	+++	-//-
Trigonotylus ruficornis (Geoffroy, 1785)	+++	-//-
Cicadella viridis (Linnaeus, 1758)	+++	-//-
Empoasca vitis (Göethe, 1875)	++	-//-
Phylaenus spumarius (Linnaeus, 1758)	++	-//-
Tettigonia viridissima (Linnaeus, 1758)	++	Treatment with drugs against locust pests according to the existing reference List
Calliptamus barbarus cephalotes (Fischer-Waldheim, 1846)	++	-//-
Chorthippus karelini (Uvarov, 1910)	++	-//-
Epacromius tergestinus (Charpentier, 1825)	+++	-//-
Ramburiella turcomana (Fischer-Waldheim, 1833)	+++	-//-
Stenobothrus fischeri (Eversmann, 1848)	+++	-//-
Harpalus smaragdinus (Duftschmied, 1812)	+++	Currently, there is no drug against this species in the Handbook of pesticides of the Ministry of agriculture of the Republic of Kazakhstan. An analog can be selected based on the drugs registered against bread beetle
Poecilus sericeus (Fischer-Waldheim, 1824)	++	-//-
Poecilus versicolor (Sturm, 1824)	+++	-//-
Agriotes meticulosus (Candeze, 1863)	+++	Treatment with preparations against soil-growing pests (wireworms and false wireworms) according to the existing reference List
Oxythyrea cinctella (Schaum, 1841)	++	Currently, there is no drug against this species in the Handbook of pesticides of the Ministry of agriculture of the Republic of Kazakhstan. An analog can be selected based on the drugs registered against bread beetles.
Pentodon bidens (Pallas, 1771)	+++	-//-
Phyllotreta vittula (Redtenbacher, 1849)	+++	Treatment with preparations against bread fleas according to the existing reference Book.
Oulema melanopa (Linnaeus, 1758)	+++	Treatment with drugs against the cereal leaf beetle under the current Directory.
Sitona callosus (Gyllenhal, 1834)	+++	Treatment with drugs against nodule weevils according to the existing reference List.
S. crinita (Dejean, 1821)	++	-//-
S. cylindricollis (Fahraeus, 1840)	++	-//-
S. longulus (Gyllenhal, 1834)	-//-	
Nematus clitellatus (Serville, 1823)	+	Treatment with drugs against sawflies on cereals according to the existing reference Book.

Table 1. *Continued ...*

Type of pest 1	Frequency 2	Control measures 3
Mayetiola destructor (Say, 1817)	++	Treatment with drugs against the Hessian fly according to the existing reference Book.

Note: + - the species harms only by foci, in other places the number is insignificant; ++ - it is common everywhere and causes significant damage; + + + - mass, much higher than the Economic threshold of harmfulness

longing to 11 families and 3 orders of insects have been identified. There are 3 species of entomophagous insects listed in the Red book of the Republic of Kazakhstan and the Almaty region - the Tree mantis Hierodula tenuidentata (Saussure, 1869), coranus subapterus (De Geer, 1773) And stethorus punctillum (Weise, 1891).

According to various estimates of experts, crop losses in our country from harmful organisms are very significant and in recent years account for 15-30% of the grain crop, and losses of row crops reach 50% or more.

In accordance with the scheme of experiments on soybean crops, seeds were improved with the following composition: TMTD, V. S. K. (8,0 l/t), celest-top, 312,5 s.K. (1,8 l/t), extrasol (1,0 l/t), for the vegetation of the crop against weeds, a tank mixture of Paradox, V. K. (0,3 l/ha), Bazagran, 48%, V. R. (1,5 l/ha), surfactant (0,2 l/ha), as well as a growth stimulator fertisil (0.1 l/ha), as pests (spider mites) appeared, the drug acarin, 3.6% ke (0.15 l/ha), as well as the new biopreparation actarofit (1.0-3.0 l/ha) were used. The active substance of the drug is a complex of natural avermectins, which are produced by useful soil fungi Streptomyces avermitilis - natural specific neurotoxins, they have a lethal contact-intestinal effect on insects. As a reference against the background of seed etching only with the preparation TMTD, (8.0 l/t) for vegetation, the same herbicides were used in the maximum dosages sequentially (Table 2).

From Table 2 data, it can be seen that the applied integrated plant protection system consisting of seed protectants, herbicides in the tank mixture and insecticides contributed to an additional yield of 10.9 C/ha of soybean seeds per year on the reference variants with one of the protectants and with separate application of herbicides, this indicator was 4.4 C / ha. The results of experiments show that the expected effect in soy experiments was obtained on variants against the background of developed protective and stimulating compositions with the joint use of drugs of various actions with lower consumption rates than when they were used separately in large doses. We also conducted a new service for aerial treatment with pesticides using a specialized Gaia drone. Advantages: Processing areas where access to land is limited and when the rows are closed where ground equipment is risky. Processing of plots of any size (from 1 ha). Low flight of the handler, which reduces losses on the spread of the drug to a minimum. Reliable and deep processing of plants. Possibility of night processing. Possibility of spot processing of problem areas. The cost of processing 1 ha is lower than the cost of processing from an aircraft due to point application and

Table 2. Economic efficiency of integrated protection on soybean crops of Tourmaline variety (LLP "Àgropark Ontusik", Karasay district, Almaty region)

Option	The harvest of the replications				Average yield	
	I	II	III	IV	c / ha	increase,%
Control (no processing)	28.0	30.0	35.1	30.9	31.0	-
TMTD, VSK. + Celest-top, 312,5 s. K. + Extrasol (seed treatment) Paradox, V. K. + Bazagran, 48%, V. R. + Surfactant + Fertisil (herbicides) Acarin, 3.6% C. e. (acaricide) Ectopic (bioinsecticides)	44.1	42.1	38.5	42.9	41.9	35.2
TMTD, VSC. 8.0 l/t, the Paradox, V. K. Basagran, 48%, VR (reference)	41.6	33.9	35.7	30.4	35.4	13.2
LSD_{05}					4.2	

Table 3. Biological effectiveness of avermectin class preparations against the Turkestan spider mite (Karasay district, LLP "Agropark Ontusik")

Variantsexperience	Number of ticks per 1 plant				Decrease in number,% on the day of accounting		
	Before treatment	On the accounting day					
		1	3	7	1	3	7
Actarofit, 3 l/ha	66.7	25.6	19.1	14.4	69.5	78.3	85.6
Acarin, 3.6% 0.15 l/ha (standard)	61.5	28.2	19.7	15.4	63.6	75.8	83.3
Control (without processing)	62	72.5	77	78			

minimal losses of the drug. Biological effectiveness against spider mites averaged 85.6% (Table 3).

Thus, summarizing the results of research for 2018-2020, it was found that in modern technology of cultivation of many agricultural crops, it is more effective to use various plant protection products in tank mixtures, which gives many advantages compared to their separate application. In tank mixtures, the rate of consumption of drugs is reduced, which gives significant savings for large volumes. When using drugs together, the risk of resistance to harmful objects decreases. in addition, the spectrum of action of drugs increases, their effectiveness and duration of action increases. It is possible to reduce the cost of cultivating crops in General, by combining measures to protect and care for crops, thereby increasing labor productivity, reducing the consumption of fuel, water and work time. In the environmental aspect, the pesticide load on the cultivated area and the environment is reduced, and soil compaction and contamination occur to a lesser extent, due to a reduction in the number of passes of equipment through the field.

Conclusion

The results of field testing of our technology indicate the possibility of obtaining a high yield and significant profit compared to the established technology of soybean cultivation in the South-East of Kazakhstan. Scientific research was carried out within the framework of the budget program 267 "Increasing the availability of knowledge and research", subprogram 101 "Program-targeted financing of research and activities", specific 156 "Payment for consulting services and research" under the scientific and technical program "Creation of an innovative agrotechnological Park for the implementation of precision agriculture".

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