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**TRUE BUGS (HEMIPTERA: HETEROPTERA) -
PESTS OF GRAIN CROPS (BARLEY, TRITICALE, WHEAT)
OF «BAYSERKE-AGRO» LLP**

Abstract. The purpose of the study was to clarify the species composition of hemiptera - pests of grain (barley, triticale, wheat) «Baysyerke-Agro» LLP in Almaty oblast. As a result of the research conducted on the fields of grain crops of «Baysyerke-Agro» LLP, 24 species of hemiptera were noted, belonging to 17 genera and 5 families. Of these, the largest number of species belongs to the family of Capsid bugs (Miridae) - 9. Next in terms of the number of families, the Real shield bugs (Pentatomidae) and the Scentless plant bugs (Rhopalidae) belong to 5 and 6 species. The Shield-backed bugs (Scutelleridae) family includes 3 species. And only 1 species belongs to the family of Milkweed bugs (Lygaeidae). Such a diversity of species composition can be explained that the high attractiveness of the fields of forage crops for various species of hemiptera, because there is a rich forage base, as well as on the fields of forage crops «Baysyerke-Agro» LLP does not apply chemical insecticides. According to food relations, hemiptera - pests of grain (barley, triticale, wheat) crops of «Baysyerke-Agro» LLP are plant-eating species. Of them polyphytophagous make up 68 %, wide oligophytophagous – 32 %. The most economically significant species of bugs belong to the families Miridae, Pentatomidae and Scutelleridae. It is they who are capable of causing serious damage to grain crops during mass reproduction. The rest is usually only locally harmful.

Keywords: Hemiptera, Heteroptera, true bugs, pests, barley, triticale, wheat, «Baysyerke-Agro» LLP, Almaty oblast, Kazakhstan.

Introduction. True bugs, previously an independent group, and now are a suborder of Hemiptera group - one of the largest groups of insects, known about 40 thousand species, collected in 50 families. There are 35 families, more than 1200 species in Kazakhstan. Spread worldwide. Body length from 0.7 to 12 cm. Insects are very diverse in their appearance. Distinguished by sucking type mouthparts, that forms articulated proboscis. 2 pairs of wings, usually folded flat, covering abdomen from top. Upper wings (superior wings) consist of main leathery part and the membranous top part, rarely superior wings are entirely leathery or cellular. Short-wings and even absence wings is frequently encountered. Frequently with odorous glands, excretion of which have unpleasant smell, which serves to scare off enemies and attract individuals of a species. Way of life is very diverse. Majority of species live on land, but some have moved to living in water or on its surface (*water striders*). Ground true bugs often live openly on plants, sometimes on soil surface and in its upper layer, in forest floor, under tree bark, etc. They feed on plants juices, mainly on their genesic organs and seeds. Part of terrestrial true bugs, and most of water habitant and all water striders are predators, they feed on various insects, their larvae and eggs, mites, etc. Many predatory true bugs are beneficial because theirs eradicate insects harmful for agriculture and forestry and their larvae and other invertebrates. Mixed feeding species are frequent. There are many pests to agriculture and forestry among species. Some phytophages are plants viral diseases carriers. Some

swimming bugs are harmful to fisheries, feeding on eggs and young fish. Bed bugs and some tropical species are parasites to humans, mammals and birds. True bugs play an important role in biological processes in biogeocenoses and agrobiocenoses. Therefore, their study is not only theoretical, but also practical.

Basis for this work were harvest and field observations of authors made in 2015-2018 on grain crops (triticale, barley, wheat) of "Baysyerke-Agro" LLP in Talgar district of Almaty oblast. Some data have already been published by us before [1-4]. However, overall summary devoted to grains Hemipterans, does not exist. Hence is the relevance of this work.

Material and methods. Research was conducted in April-October 2015-2018 on grain crops fields (triticale, barley, wheat) in "Baiserke-Agro" LLP of Talgar district of Almaty oblast of Kazakhstan. When conducting research using techniques generally accepted in entomology [5-7] (capture with entomological net, manual collection, identification of species and placement in collection), visual observations, photographing, etc. To identify hemipterans, to clarify their biological characteristics and economic significance, we used summaries, guidelines and field guide from list of literature [8-28].

Research results. As a result of research we have compiled a list of species of true bugs noticed in "Baysyerke-Agro" LLP grain crop fields, Almaty oblast, given below. Some of their species are shown in figures 1-8.

Class Insecta - Insects
Order Hemipteran - Hemipterans
Suborder Heteropterans - True Bugs
Family Miridae - Capsid bugs

Adelphocoris lineolatus (Goeze, 1778). Polyphytophage (composites, goosefoot and legume, mostly prevail on legume). Mass pest of legume. It is noted on cultivated grasses as alien species migrated from soybean and alfalfa.

Heterotoma merioptera Scopoli, 1763. Polyphytophage; prefers immature fruits, buds, juices and nectar of various plants.

Lygus gemellatus (Herrich-Schaeffer, 1835). Polyphytophage; universally harms Grains, legumes.



Figure 1 – *Lygus gemellatus* (Herrich-Schaeffer)

Lygus pratensis (Linnaeus, 1758). Chortobiont; poly phytophage (harmful to fruit, grain, legumes and horticultural crops); bivoltine [10] or 3-4 generations per year; wintering imago.

Lygus rugulipennis Poppius, 1911. Horto-tamnobiont (occurs widely throughout, in floodplains, on many herbaceous and shrubby plants); poly phytophage (harmful to many crops: fruit, medicinal crops and other plants); 2 generations per year; wintering imago. Harmful to umbellate vegetable crops seeds (11).

Figure 2 – *Lygus pratensis* (L.)

Polymerus cognatus (Fieber, 1858). Chortobiont; poly phytophage (legumes, crucials, aster family (*Artemisia*) and Chenopodiaceae); up to 4 generations per year; hibernating eggs. Harmful to seeds and plants - lucerne, potatoes, grain crops

Plagiognathus chrysantemi (Wolff, 1804). Chortobiont; herb-bunchgrass grassland, poly phytophage (Chenopodiaceae, legumes, grains and other herbaceous plants, feeds on young leaves, buds, flowers and green beans [13], 10; monovoltine species; wintering eggs.

Stenodema calcarata (Fallen, 1807). Chortobiont (on grassland vegetation); polyphytophage (on grain and Cyperaceae); potential pest to grain crops [9]; 2 generations per year; wintering imago. Sometimes propagated in mass quantities.

Figure 3 – *Stenodema calcarata* (Fall.)

Trigonotylus caelestialium (Kirkaldy, 1902). Imago and larvae feed juice of the leaf blade of many grain crops and forage herbs, sometimes damaging the delicate stems and spires. In case of harm, yellow-brown spot appears, top of the leaf blade is wrapped. Found on many wild grasses.

Family Rhopalidae - Scentless plant bugs

Brachycarenum tigrinus (Schilling, 1829). Polyphytophage live on composites, crucials, and observed on plants of other families, it feeds the contents of the seeds.

Chorosoma schillingii (Schilling, 1829). Chortobiont; inhabits virgin areas, wide oligo phytophage (on grain crops: *Festuca*, *Poa*, *Koeleria*, *Stipa* and other); 2 generations per year; wintering eggs. Pest to grain crops, especially to wheat grass at hayfields and pastures [15].

Corizus hyoscyami hyoscyami (Linnaeus, 1758). Chortobiont; poly phytophage (at spring temporarily feeding on willow flowers, young shoots of birch, pine and other trees and shrubs; then move to sow-thistle, chamomile, *Euphorbia* and other herbaceous plants; main host plants: *Hyoscyamus niger*, *Tabacum*, *Ononis spinosa*, *Erodium*, considered harmful to legumes (16); 2 generations per year; wintering imago. Widespread, dominant species.



Figure 4 – *Corizus hyoscyami* (L.)

Rhopalus parumpunctatus Schilling, 1829. Chortobiont; mesophytous grassfield vegetation, glades and forest edges, areas with ruderal-mixed vegetation, roadsides and other similar habitats); poly phytophage (on various herbaceous plants: Cruciferous, Labiatae, Caryophyllaceous and Compositae (*Arenaria*, *Lepidium*, *Salvia*, *Artemisia*, *Centaurea*, *Achillea*), is considered a lesser pest to perennial legumes and grain legumes); 2 generations per year; wintering imago. Feeding on grain crops was observed in mountains of Central Asia [17].

Rhopalus subrufus (Gmelin, 1790). Chortobiont; poly phytophage (prefers Labiatae, sometimes legumes and plants from other families); 2 generations per year; wintering imago [16].

Stictopleurus punctatonervosus (Goeze, 1778). Chortobiont; poly phytophage, occurs on cultivated legumes and grain crops and other similar habitats; widespread oligophytophage (on Compositae); 2 generations per year; wintering imago.

Family Lygaeidae - Milkweed bugs

Lygaeus equestris (Linnaeus, 1758). Herpetochoborbiont (among wild grasses, grain crops, under different plants); poly phytophage (fallen seeds of many plants and green parts juice) [18, 19]; 1 generation per year, wintering imago [20].



Figure 5 – *Lygaeus equestris* (L.)

Family Scutelleridae - Shield-backed bugs

Eurygaster integriceps Puton, 1881. Chortobiont; occurs in open areas: steppes, floodplains, cultivated fields, and other; widespread oligophytophagous (on *Hordeum*, *Poa*, *Dactylus*, *Elytrigia*, *Agropyron* and grain crops, is a dangerous pest to grain crops); 1 generation species; wintering imago [21].



Figure 6 – *Eurygaster integriceps* Put.

Eurygaster maura (Linnaeus, 1758). Chortobiont; mesophile (meadows, crops, in depression); wide oligophytophagous (grain crop, cereal crops, also on composites [22, 23]; 1 generation per year; wintering as imago.

Odontotarsus purpureolineatus (Rossi, 1790). Chortobiont, trophic connected with composites, grain crops and many other plants, polyphytophage, feeding mainly on generative parts; 1 generation per year; wintering as imago.

Family Pentatomidae- Real shield bugs

Dolycoris baccarum (Linnaeus, 1758). Evri-Chortobiont; it can be found everywhere, in different mesophytic biotopes, including fields, gardens, along flood bed and river-valleys; polyphytophage (on different plants) after wintering imago feeds on shoots and buds of many tree species, and in autumn imago suck the contents of their seeds and fruits, crop pest; 1 generation per year; wintering imago. [20]. They feed on 58 plant species belonging to 24 plants [24] Harm is observed on many cultivated plants- wheat, corn, potatoes and other plants [18].



Figure 7 – Berrylike, *Dolycoris baccarum* (L.), imago on triticale

Aelia acuminata (Linnaeus, 1758). Chortobiont; wide oligophytophagous (on cultivated grasses and cereal crops), 1 generation per year; wintering imago [25, 26].



Figure 8 – *Aelia acuminata* (L.)

Aelia furcula Fieber, 1868. Chortobiont; meso-xerophile (semi-desert, steppe, open areas and steppe biotopes, lowland grasslands up to 800-1600 m); wide oligophytophagous (on cultivated grasses and cereal crops); prevalent and dominant, repeatedly causing significant harm to crops in Kazakhstan; on wheat, barley, wheat grass. Wheat crops are harmed is especially noticeable in the period of wax ripeness. K.A. Slivkina previously noted it as cereal fly [27].

Aelia melanota Fieber, 1868. Chortobiont; meso-xerophile (in steppes, dry meadows, forest, and open areas and steppe biotopes); wide oligophytophagous (on cultivated grasses and cereal crops) [23]; 1 generation per year; wintering imago.

Aelia sibirica Reuter, 1886. Chortobiont; meso-xerophile (prevalent in Kazakhstan steppes, where it is considered as cereal fly) wide oligophytophagous (on cultivated grasses and cereal crops); 1 generation per year; wintering imago. It is observed on grain crop in a wide variety of biotopes. In big quantities on wild grasses. Suck leaves and grain. Specialized pest of spire and grains [18].

Discussion of research results. Table shows taxonomic composition of the hemipterous phytophagous complex - pests of grain crop (barley, triticale, wheat) LLP "Bayskerke-Agro".

Taxonomic composition of hemipterous - pests of grain crop (barley, triticale, wheat) LLP "Baiserke-Agro"

Family	Genus	Species	Found	The nature of the harm
Miridae	<i>Adelphocoris</i>	<i>A. lineolatus</i> (Goeze, 1778)	On alfalfa, wheat, triticale, prevail on alfalfa +++	Polyphytophage (composites, goosefoot and legume, mostly prevail on legume). Mass pest of legume. It is noted on cultivated grasses as alien species migrated from soybean and lucerne.
	<i>Heterotoma</i>	<i>H. merioptera</i> Scopoli, 1763	Alfalfa, soy, barley, wheat, triticale ++	Polyphytophage. Prefers immature fruits, buds, juices and nectar of various plants.
	<i>Lygus</i>	<i>L. gemellatus</i> (Herrich-Schaeffer, 1835)	On alfalfa, wheat, triticale ++	Polyphytophage; universally harms Grains, legumes
		<i>L. pratensis</i> (Linnaeus, 1758)	On alfalfa, triticale, soy, prevail on alfalfa, triticale ++	Polyphytophage. Harms fruit, grain, legumes and vegetable crops.
		<i>L. rugulipennis</i> Poppius, 1911	On alfalfa, triticale ++	Polyphytophage. Harms grain, legumes

	<i>Polymerus</i>	<i>P. cognatus</i> (Fieber, 1858)	On alfalfa, triticale ++	Polyphytophage (on legumes, crucials, composites, goosefoot) Harms seeds and plants - alfalfa, potatoes, cereals, grain crops	
	<i>Plagiognathus</i>	<i>P. chrysantemi</i> (Wolff, 1804)	On alfalfa, triticale +++	Polyphytophage (on composites, legume, grain crop and other herbaceous plants, sucks juvenile leaves, buds, flowers and green beans)	
	<i>Stenodema</i>	<i>S. calcarata</i> (Fallen, 1807)	On triticale ++	Polyphytophage (grain crop and sedge); potential pest of grain crop	
	<i>Trigonotylus</i>	<i>T. caelestialium</i> (Kirkaldy, 1902)	Barley, wheat, wheat ++	Imago and larvae feed juice of the leaf blade of many grain crops and forage herbs, sometimes damaging the delicate stems and spires. In case of harm, yellow-brown spot appears, top of the leaf blade is wrapped. Found on many wild grasses.	
Rhopalidae	<i>Brachycarenum</i>	<i>B. tigrinus</i> (Schilling, 1829)	Alfalfa, soybean, wheat ++	Polyphytophage live on composites, crucials, and observed on plants of other families, it feeds the contents of the seeds	
	<i>Chorosoma</i>	<i>C. schillingii</i> (Schilling, 1829)	On triticale, soy +	Wide oligophytophagous (grain crop) cultivated grasses pest	
	<i>Corizus</i>	<i>C. hyoscyami</i> (Linnaeus, 1758)	On alfalfa, triticale, soy +++	Pest of legume, polyphytophage	
	<i>Rhopalus</i>	<i>Parumpunctatus</i> Schilling, 1829	On alfalfa, triticale, soy ++	Polyphytophage (on various herbaceous plants, is considered a minor pest of perennial legumes and grains-legumes)	
		<i>R. subrufus</i> (Gmelin, 1790)	On alfalfa, triticale, soy ++	Polyphytophage (prefers labiate family, sometimes legumes and plants from other families)	
<i>Stictopleurus</i>	<i>S. punctatonervosus</i> (Goeze, 1778)	On alfalfa, soy, triticale, wheat ++	Wide oligophytophagous (on composites)		
Lygaeidae	<i>Lygaeus</i>	<i>L. equestris</i> (Linnaeus, 1758)	On alfalfa, triticale, soy ++	Polyphytophage (fallen seeds of many plants and the juice of the green parts)	
Scutelleridae	<i>Eurygaster</i>	<i>E. integriceps</i> Puton, 1881	On triticale, wheat, barley +	Wide oligophytophagous (on bread grains, dangerous cereal fly)	
		<i>E. maura</i> (Linnaeus, 1758)	On triticale, wheat +	Wide oligophytophagous (on grain crop and cereal crops)	
	<i>Odontotarsus</i>	<i>O. purpureolineatus</i> (Rossi, 1790)	On triticale +	Polyphytophage (grasses, cereal crops)	
Pentatomidae	<i>Dolycoris</i>	<i>D. baccarum</i> (Linnaeus, 1758)	On alfalfa, triticale, soy, barley, wheat +++	Polyphytophage (on different plants, imago suck the contents of their seeds and fruits, a pest of cultivated plants) Harm is observed on many cultivated plants-wheat, corn, potatoes and other plants	
		<i>Aelia</i>	<i>A. acuminata</i> (Linnaeus, 1758)	On triticale, barley, wheat, alfalfa +	Wide oligophytophagous (on cultivated grasses and cereal crops)
			<i>A. furcula</i> Fieber, 1868	On wheat, barley +	On cultivated grasses and grain crops pest
			<i>A. melanota</i> Fieber, 1868	On wheat, barley +	On cultivated grasses and grain crops
	<i>A. sibirica</i> Reuter 1886	On wheat, barley +	On cultivated grasses and grain crops		
Note: Occurrence: + - low, ++ - medium, +++ - high.					

24 species of Hemipterous related to 17 genera and 5 families were discovered on the grain fields (barley, triticale, wheat) in «Baysyerke-Agro» LLP in Almaty region, Kazakhstan during our research.

Such a variety of species composition can be explained that the high attractiveness of the fields of forage crops for different species of Hemipterous, as there is a rich food reserve, and also chemical insecticides are not used on forage crops fields of «Baysyerke-Agro» LLP.

As per food web, hemipterous - pests of grain crop (barley, triticale, wheat) of «Baysyerke-Agro» LLP is phytophag species with wide range of feeding. Polyphytophage 68 % is and 32 % is oligophytophagous.

Results. 24 species of Hemipterous related to 17 genera and 5 families were discovered during research. Largest number of species belongs Miridae family – 9. Next largest families are Pentatomidae and Rhopalidae includes 5 species. Scutelleridae includes 3 species. And only 1 species belongs to family Lygaeidae.

As per food web, hemipterous - pests of grain crop is phytophag species, polyphytophage is 68 % and 32 % is oligophytophagous.

The most economically significant species of true bugs belong to Miridae, Pentatomidae and Scutelleridae. They are able to cause serious harm to grain crops during mass reproduction. Others usually harm only locally.

It is required to carry out protective measures against hemipterous pest on grain crops during mass reproduction. However, in pesticides (pesticides) reference book [29], permitted for use on the territory of the Republic of Kazakhstan, only chemical insecticides are registered against these pests. Thus, in order to obtain environmentally environmentally compatible agricultural products, it is required to expand the range of biological products designed to control sucking pests through the transfer and adaptation of existing foreign technologies. One of the alternatives can be artificial cultivation aculeate hymenoptera on forage crops field, including grain crop field, some species of which are entomophages of true bugs and other sucking pests. Such experiment was conducted by the authors forage crops field in "Baysyerke-Agro" LLP and show positive result [30]. Similar studies on the breeding of aphidius were conducted by our colleagues [31].

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«БАЙСЕРКЕ-АГРО» ЖШС ДӘНДІ ДАҚЫЛДАРДЫҢ (АРПА, ТРИТИКАЛЕ, БИДАЙ) ЗИЯНКЕСТЕРІ – ЖАРТЫЛАЙ ҚАТТЫҚАНАТТЫЛАР (HEMIPTERA: HETEROPTERA)

Аннотация. «Байсерке-Агро» ЖШС Алматы облысы дәнді дақылдардың (арпа, тритикале, бидай) зиянкестері – жартылай қаттықанаттылардың түр құрамын анықтау. «Байсерке-Агро» ЖШС дәнді дақылдар егісінде жүргізілген зерттеулер нәтижесінде 5 тұқымдасқа 17 туысқа жататын зиянкес жартылай қаттықанаттылардың 24 түр табылды. Олардың ең көп саны соқыр тұқымдастарына жатады (Miridae) – 9. Осы қалқаншалардың (Pentatomidae) және түйреуіштердің (Rhopalidae) тұқымдастарының саны бойынша олардың соңынан келетініне 5 және 6 түрден жатады. Отбасы қалқаншалардың-тасбақалар (Scutelleridae) 3 түрді қамтиды. Тек 1 түрі жердегі отбасына жатады (Lygaeidae). Мұндай түр құрамының алуантүрлілігін дәнді дақылдар егісіндегі қоректік қордың бай болуы және мұнда химиялық инсектицидтердің қолданылуы

мауымен түсіндіруге болады. «Байсерке-Агро» ЖШС дәнді дақылдардың (арпа, тритикале, бидай) зиянкестері – жартылай қаттықанаттылардың барлығы өсімдікқоректі. Олардың ішінде полифитофагтар 68 %, кең олигофитофагтар – 32 % құрайды. Ең маңызды шаруашылық түрлері Miridae, Pentatomidae және Scutelleridae тұқымдастарына жатады. Олар жаппай көбею кезінде дәнді дақылдардың егісіне елеулі зақым келтіруге қабілетті. Қалғандары, әдетте, тек жергілікті зиян келтіреді.

Түйін сөздер: Hemiptera, Heteroptera, жартылай қаттықанаттылар, зиянкестер, арпа, тритикале, бидай, ЖШС «Байсерке-Агро», Алматы облысы, Қазақстан.

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ПОЛУЖЕСТКОКРЫЛЫЕ (HEMIPTERA: HETEROPTERA) – ВРЕДИТЕЛИ ЗЕРНОВЫХ (ЯЧМЕНЬ, ТРИТИКАЛЕ, ПШЕНИЦА) ТОО «БАЙСЕРКЕ-АГРО»

Аннотация. Целью исследования было выяснение видового состава полужесткокрылых - вредителей зерновых (ячмень, тритикале, пшеница) ТОО «Байсерке-Агро» в Алматинской области. В результате проведенных исследований на полях зерновых культур ТОО «Байсерке-Агро» отмечено 24 вида полужесткокрылых, относящихся к 17 родам и 5 семействам. Из них наибольшее количество видов относится к семейству Слепняки (Miridae) – 9. К следующим за ним по численности семействам Настоящих щитников (Pentatomidae) и Булавников (Rhopalidae) относится по 5 и 6 видов. Семейство Щитник-черепашки (Scutelleridae) включает 3 вида. И только 1 вид относится к семейству Наземников (Lygaeidae). Такое разнообразие видового состава можно объяснить, что высокая привлекательность полей кормовых культур для различных видов полужесткокрылых, поскольку здесь имеется богатая кормовая база, а также на полях кормовых культур «ТОО «БайсеркеАгро»» не применяются химические инсектициды. По пищевым связям полужесткокрылые - вредители зерновых (ячмень, тритикале, пшеница) культур ТОО «Байсерке-Агро» являются растительноядными видами. Из них полифитофаги составляют 68 %, широкие олигофитофаги – 32 %. Наиболее хозяйственно значимые виды клопов принадлежат к семействам Miridae, Pentatomidae и Scutelleridae. Именно они способны при массовом размножении нанести посевам зерновых серьезные повреждения. Остальные как правило, вредят лишь локально.

Ключевые слова: Hemiptera, Heteroptera, клопы, вредители, ячмень, тритикале, пшеница, ТОО «Байсерке-Агро», Алматинская область, Казахстан.

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