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Determination of harmful and beneficial predator insect species and the distribution and density of *Eurygaster integriceps* Puton (Hemiptera: Scutelleridae) in wheat-cultivated areas of Siirt province

Siirt ili buğday ekiliş alanlarında bulunan zararlı ve predatör türler ve *Eurygaster integriceps* Puton (Hemiptera: Scutelleridae)'in yayılışı ve yoğunluğunun belirlenmesi

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ABSTRACT

Wheat is nowadays the most important source of food on earth. Many pest species have been identified that affect wheat yield and quality negatively. This study was conducted to identify harmful and beneficial insect (predator) species and of the distribution of Sunn pest in wheat cultivation areas in the districts (Siirt province Merkez, Kurtalan, Eruh, Tillo, Şirvan, Pervari, and Baykan) of Siirt Province, Türkiye in 2018 and 2019. Samplings were taken periodically for 1-2 weeks from April to July. The sweep nets, frame, pitfall trap, and visual control methods were used for sampling. At the end of the study, 42 species belonging to 6 orders and 25 families were determined. The distributions of the species were recorded as 27 species belonging to 12 families in Coleoptera, 10 species belonging to 7 families in Hemiptera, 2 species belonging to 2 families in Neuroptera, and 1 species belonging to each family in Hymenoptera, Orthoptera and Diptera. The most common and abundant species: the main pest *Eurygaster integriceps* Puton, 1881 (Hemiptera: Scutelleridae), the secondary pests *Aelia acuminata* (Linnaeus, 1758), *Dolycoris baccarum* (Linnaeus, 1758) (Hemiptera: Pentatomidae), *Cephus pygmaeus* (Linnaeus, 1767) (Hymenoptera: Cephidae) *Gryllus bimaculatus* De Geer, 1773, (Orthoptera: Gryllidae) were determined. In the study, a total of 16 species were identified, which is the first record for the local fauna of Siirt province. The highest average density of *E. integriceps* (2 adult + nymph / m^2) was found in the Garzan and Gozpinari locations of the Kurtalan district. Besides, among the beneficial species, general predators *Chrysoperla carnea* (Stephens, 1836) and *Coccinella septempunctata* (Linnaeus, 1758) are remark as the most common species

INTRODUCTION

Wheat is a cereal of the Gramineae or Poaceae family. Among cultivated plants, wheat takes place at the top, in terms of cultivation area and production amount worldwide (Anonymous 2021). Since wheat covers numerous production areas, it provides a very attractive and abundant source for diseases and pests. Drought and related yield losses occur due to climate change. Moreover, product losses caused by diseases, pests, and weeds in wheat are at levels that cannot be recently ignored. In this context, it is observed that various pesticides are used to increase the amount of product obtained per unit area in wheat. Random use of non-selective pesticides significantly affects biodiversity and deteriorates the natural balance. Pesticides enter water sources and may cause damage to non-target organisms such as plants and animals, including soil microorganisms, insects, fish, birds, and wildlife. On the other hand, it goes into the body of animals and causes them a longer existence in the food chain (Rani et al. 2021). For all of these reasons, there is a need for research on alternative methods to reduce the use of chemical control and the development of integrated control programs that are emphasized (Atlıhan and Özgökçe 2003).

In terms of wheat cultivation area, Siirt covers 36.1% of the total grain and other crop production areas of the province with 338.040 decares (Anonymous 2020). The yield obtained from the production in this area is below the average of Turkey and the region. The low yield in production may be due to various reasons such as climate, soil, disease, and pests. Generally, there are few studies on the detection of harmful and natural enemy species in wheat fields in the world (Afonina et al. 2001, Gallo and Peker 1999, Zhang et al. 2022, Zhao et al. 2013). In our country, in the study conducted by Özgökçe et al. (2022), 66 species belonging to 7 orders and 39 families were found in 165 different localities in Van province and its districts. Kıvan and Dirik (2016) identified 45 species from nine families belonging to the Heteroptera suborder at the end of the study they carried out in the wheat fields in Edirne province. In another study, 109 species belonging to 65 families and 95 genera belonging to the orders Odonata, Orthoptera, Hemiptera, Homoptera, Thysanoptera, Neuroptera, Coleoptera, Diptera, Lepidoptera, and Hymenoptera were identified in the wheat agro-ecosystem in the Adana (Sayan 2010). On the other hand Bulu (1995), 74 species were found in irrigated wheat fields and 78 species in non-irrigated fields in irrigated and dry wheat fields in the Çukurova region in 1993 and 1994.

Sunn pest, *Eurygaster integriceps* Puton (Hemiptera: Scutelleridae) is the most serious pest of cereals (Parker et al. 2011, Sanaey and Mirak 2012). Sunn pest has infested more than 15 million hectares in total, including Syria, Iraq, Iran, Turkey, Afghanistan, and Lebanon, as well as Central Asia, the Caucasus, Bulgaria, and Romania (Salis et al. 2013). Many studies have reported that sunn pest affects wheat quality and yield negatively (Dizlek and İslamoğlu 2010, Gözüaçık and Yiğit 2020, Özgen et al. 2005). If there is not done effective control against sunn pests, losses may reach 100% (Kıvan and Kılıç 2006). Moreover, some studies have drawn attention to aphid species as potential pests apart from Sunn pests in wheat fields (Lodos 1982, Özder and Toros 1999).

We must determine harmful species and their natural enemies to implement integrated pest programs for sustainable agriculture. Moreover, which must reveal the population density and distribution of the economically important species. In the region where this study was conducted, there is no study on pests, which is one of the important factors that negatively affect crop growth. There has been no previous research on the presence, density, and prevalence of wheat-harmful species in the surroundings of Siirt province. The harmful species and their natural enemies have not been studied sufficiently in that region.

The aim of the study was to determine harmful and predator insect species found in wheat fields in Siirt province. Furthermore, the population density of the sunn pest, which is the main pest of the wheat plant, and the harmful species that have the potential to cause yield losses were determined.

MATERIALS AND METHODS

The research was carried out from April to July in Siirt and its surrounding wheat production areas (Siirt province Merkez, Tillo, Şirvan, Eruh, Kurtalan, Pervari, and Baykan) in 2020-2021. Sampling was carried out in 3 wheat fields to represent each district by going out to the field once every 15 days to the extent possible. Sampling was completed at 21 locations. The harmful and predator insects were collected by visual inspection, pitfall traps, and sweep nets from the sampling area. Depending on the size of the field, 100-200 sweep netting was made by walking along the field edges and diagonals in the samplings made using the sweep net. To determine the population densities of the Sunn pest and Aelia species, which are the main pests of wheat, were applied 1/2x1/2 = 1/4 m^2 size of the wireframes. How many counts will be made in a surveyed wheat field is related to the width of the field and is determined by adhering to the measurements given below (Polat 2003) (Table 1).

Table 1. Number of frames discarded according to field sizes (Polat 2003)

Parcel Area (da)	Number of frames (pcs)
1-15	8-12
16-50	13-16
51-200	17-24
201-800	25-32
800-<	33-42

The counts of the Sunn pests remaining in the frames were made by starting from the edge of the field and proceeding toward the center of the field at intervals of at least 20 steps. The Sunn pest species made of counts are labeled and prepared for identification in the laboratory.

Then, the population density per m^2 was calculated by evaluating the census results. Moreover, in the sampling of the species that are active by walking in the field, sufficient (3-10) pitfall traps were randomly placed in the pits opened at the soil level, depending on the size of the field. In addition to these, the stems and shoots found in all soil parts of the plant were visually inspected. Smaller insects found in these parts were transferred to Eppendorf cups and falcon tubes containing 70% and 96% alcohol, with brushes or plant parts.

The pest and predator species obtained in the study were identified to species, genus, or family level using a stereo microscope (SZ61; Olympus) by Assoc. Prof. Dr. Cevdet KAPLAN Assis. Prof. Dr. Mustafa Cemal ÇİFTÇİ and Assis. Prof. Dr. Halil DİLMEN. Some insect samples were identified using the literature at the species level and the museum material available in the Department of Plant Protection, Faculty of Agriculture, Siirt University.

RESULTS AND DISCUSSION

The total list as a result of the identification and classification of the species obtained as a result of the studies is given in Table 2. In this work, 42 species belonging to 6 orders and 25 families were identified in 21 different locations. The distributions of the species were recorded as 27 species belonging to 13 families in the order Coleoptera, 10 species belonging to 7 families in the order Hemiptera, 2 species belonging to 2 families in the order Neuroptera and 1 species belonging to each family in the orders Hymenoptera, Orthoptera and Diptera (Table 2). In similar studies, Özgökçe et al. (2022) detected 66 species in the Van wheat agricultural ecosystem, while Sayan (2010) detected 109 species in the wheat fields of Adana province. However, in this study, a total of 16 species were identified, which is the first record for the local fauna of Siirt province.

From Coleoptera species, *Cantharis lateralis* (Linnaeus, 1758), *Cantharis annularis* (Ménétriés, 1836), (Coleoptera: Cantharidae), *Haplomalachius flabellatus* (Frivaldzsky, 1835), *Clanoptilus geniculatus* (Germar, 1823), (Coleoptera: Melyridae) and *Calamosternus granarius* (Linnaeus, 1758), (Coleoptera: Scarabaeidae), *Tachyporus hypnorum* (Fabricius, 1775), (Coleoptera: Staphylinidae), *Meligethes aeneus* (Fabricius), (Coleoptera: Nitidulidae), *Brachypterolus pulicarius* (Linnaeus, 1758), (Coleoptera: Kateretidae) and *Cryptocephalus parvulus* (Müller, 1776), *Labidostomis mesopotamica* (Heyden, 1886), *Chaetocnema tibialis* (Illiger, 1807), (Coleoptera: Chrysomelidae) and *Sitona lineatus* (Linnaeus, 1758) (Coleoptera: Curculionidae) are the first records for the fauna of the Siirt province.

Furthermore, *Cercopis vulnerata* (Rossi, 1807), (Hemiptera: Cercopidae), *Carpocoris pudicus* (Poda, 1761), *Carpocoris fuscispinus* (Boheman, 1850), (Hemiptera: Pentatomidae) and *Libelloides macaronius* (Scopoli, 1763), (Neuroptera: Ascalaphidae) are the first records for the fauna of the Siirt province.

The most common harmful species found were *Eurygaster integriceps*, *Aelia acuminata*, and *Cephus pygmaeus* in the study areas (Table 2). *Aelia acuminata* (7 adults / 100 sweep nets) and *C. pygmaeus* (10 adults / 100 sweep nets) were found most intensely in the Kurtalan district. It has been determined that some insect species mentioned in Table 2 are common pests in wheat fields, both in our observations and in previous studies. It has been observed that *E. integriceps*, *A. acuminata*, and *C. pygmaeus* species from these species cause significant damage from region to region and farmers apply chemical pesticides against these species.

E. integriceps, one of the important species of Sunn, belonging to the *Eurygaster* genus belonging to the Scutelleridae family of the Hemiptera order, which causes economic losses in wheat fields in many regions of the world and in Turkey, was found in 7 different districts of Siirt province and at 21 different sampling points (Table 2 and Figure 1). The Sunn pest was most intensely recorded in Kurtalan and Merkez districts. As a result of all samplings, 833 overwintered adults in the Kurtalan district and 494 overwintered adults in the Merkez district were determined. The lowest density was found in Tillo (248 overwintered adults) and Pervari (201 overwintered adults). The Sunn pest density reached its highest level with 170 individuals on 01.06.2021 in the Kurtalan district. On these dates, overwintered adult and nymph density in Kurtalan, Merkez, Şirvan, Eruh, Tillo, Baykan, and Pervari districts were 170,105, 98, 72, 56, and 49 individuals, respectively.

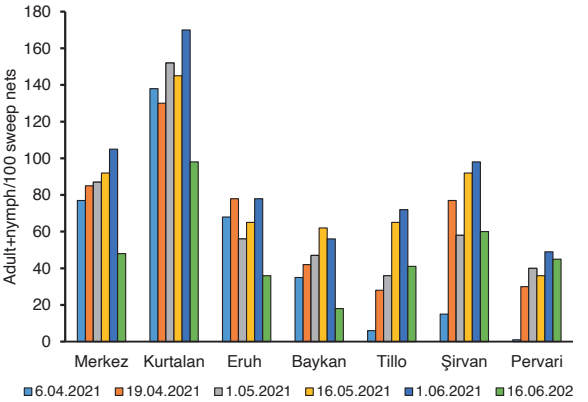

Figure 1. Locations and densities of Eurygaster integriceps (adult+nymph/100 sweep nets)

Table 2. Predator and pest species were seen in wheat cultivation areas in Siirt province

Order	Family	Species	Locations						
			1	2	3	4	5	6	7
		Predator insect species							
Coleoptera	Coccinellidae	*Coccinella septempunctata*	+	+	+	+	+	+	+
		Oenopia conglobata	-	+	-	-	-	+	-
		Scymnus bivulnerus	+	+	+	-	-	+	-
	Carabidae	*Scarites* sp.	+	+	+	+	+	+	+
Neuroptera	Ascalaphidae	*Libelloides macaronius**	+	+	-	-	-	+	-
	Chrysopidae	*Chrysoperla carnea*	+	+	+	+	+	+	+
Hemiptera	Nabidae	*Nabis* sp.	+	+	+	-	-	+	-
	Reduvidae	*Triatoma* sp.	-	+	+	-	-	-	-
		Pest insect species							
Coleoptera	Scarabaeidae	*Tropinota hirta*	+	+	+	+	+	+	+
		Anisoplia spp.	+	+	+	-	+	+	+
		*Calamosternus granarius**	+	+	+	+	+	+	+
	Melyridae	*Clanoptilus geniculatus**	+	+	-	-	+	-	-
		*Haplomalachius flabellatus**	+	+	+	+	+	+	+
	Cantharidae	*Occathemus tarsalis*	+	+	+	+	+	+	+
		*Cantharis lateralis**	+	+	+	+	+	+	+
		*Cantharis annularis**	+	+	+	+	+	+	+
	Carabidae	*Microlestes sahlbergii*	+	+	+	+	+	+	+
		Bembidion properans	+	+	-	-	-	+	+
		Notiophilus substriatus	+	+	+	+	+	+	+
	Staphylinidae	*Tachyporus hypnorum**	+	+	-	-	-	-	-
	Tenebrionidae	*Omophlus caucasicus caucasicus*	+	+	+	+	+	+	+
	Nitidulidae	*Meligethes aeneus**	+	+	-	-	-	-	-
	Kateretidae	*Brachypterolus pulicarius**	-	+	-	-	-	-	-
	Bruchidae	*Bruchus* sp.	+	+	+	+	+	+	+
	Chrysomelidae	*Cryptocephalus parvulus**	+	+	-	-	+	-	-
		Oulema melanopus	+	+	+	-	-	+	-
		*Labidostomis mesopotamica**	+	+	+	+	+	+	+
		*Chaetocnema tibialis**	+	+	+	+	+	+	+
	Curculionidae	*Protapion apricans*	+	+	+	+	+	+	+
		*Sitona lineatus**	+	+	+	+	+	+	+
		Tychius reitteri	+	+	+	+	+	+	+
Hymenoptera	Cephidae	*Cephus pygmaeus*	+	+	+	+	+	+	+
Orthoptera	Gryllidae	*Melanogryllus* sp.	+	+	+	+	+	+	+
Diptera	Tabanidae	*Tabanus* sp.	+	+	+	+	+	+	+
Hemiptera	Cercopidae	*Cercopis vulnerata**	+	+	+	-	+	+	+
	Pentatomidae	*Dolycoris baccarum*	+	+	+	+	+	+	+
		Aelia acuminata	+	+	+	+	+	+	+
		*Carpocoris fuscispinus**	+	+	+	+	+	+	+
		*Carpocoris pudicus**	+	+	+	+	+	+	+
	Scutelleridae	*Eurygaster integriceps*	+	+	+	+	+	+	+
	Miridae	*Stenodema* sp.	+	+	-	+	-	+	-
	Cicadellidae	*Aphrodes* sp.	+	+	+	+	+	+	+

*Species of which there is no record that they are wheat pests in the literature. 1: Merkez, 2: Kurtalan, 3: Eruh, 4: Tillo, 5: Şirvan, 6: Pervari, 7: Baykan

The population densities of adult Sunn pests in Siirt province were recorded as a result of field samplings made as of 06.04.2021 when the landing of *E. integriceps* from the wintering was completed. Generally, when the population densities and environments of E. integriceps are examined in Table 3; the average of the Sunn pest population densities in all districts was found to be below the Economic Damage Threshold (EDT). An average of 2 individuals/m^2 was found in the Garzan and Gözpınarı locations of the Kurtalan district, where the Sunn pest is most concentrated. This location was followed by Merkez Aktaş village with an average of 1.66 individuals /m^2 and Baykan Tütenocak village with an average of 1.26 individuals /m^2 in terms of density. On the other hand, other locations were generally determined at an average of 1 individual/m^2 or less. *E. integriceps*, *A. acuminata*, and *C. pygmaeus*, are shown among the most important pests of wheat in many reports. In the study, it is a pleasing situation that they do not reach the population

Table 3. Sunn pest population densities and averages in Siirt province and districts

District	Locations	Wheat phenology	Sunn density in m² (number of individuals/m²)	District average (number of individuals/m²)	General average (number of individuals/m²)
Merkez	Merkez	Spike period-Milk stage	0.66	0.88	0.74
	Kezer		0.33		
	Aktaş		1.66		
Kurtalan	Çayırlı	Spike period-Milk stage	0.4	1.42	
	Garzan		2		
	Gözpınar		1.86		
Eruh	Çizmeli	Spike period-Milk stage	0.73	0,79	
	Bayramlı		0.66		
	Bilgili		1		
Tillo	Sinep	Spike period-Milk stage	0.4	0.40	
	Hatrant		0.4		
	Tasbalta		0.4		
Şirvan	Taşlı	Spike period-Milk stage	0.7	0.69	
	İncekaya		1.06		
	Tatlıpayam		0.33		
Pervari	Ekindüzü	Spike period-Milk stage	0.4	0.37	
	Köprüçay		0.4		
	Güleçler		0.33		
Baykan	Tütenocak	Spike period-Milk stage	1.26	0.66	
	Çaykaya		0.4		
	Dedebakırı		0.33		

level that requires control and are generally not subject to complaints by producers and agricultural organizations.

The degree and form of damage caused by Sunn pest to wheat; vary depending on the pest's density, biological periods, phenological status, product variety, and climatic conditions (temperature, precipitation, and light). Some researchers state that the economic loss threshold for the adult density overwintered by sunn pest is 0.8 individuals/m2 (Lodos 1961, Şimşek and Sezer 1985, Şimşek 1998). It was reported that the overwintered adult Sunn pest density was 2.93 individuals/m² in 1987 when there was an epidemic, and 0.69 individuals/m² in 1991 when there was no epidemic in a study conducted in Tekirdağ between 1987 and 1991 (Kıvan 1991). In another similar study, when 2-7 individuals/m² adults were detected in the chemical control of overwintered adults, and chemical control against nymphs, it is stated as EDT between 3-20 individuals/m² nymphs, although it is usually 10 individuals/m² nymphs.

In addition, pest insect species, and predator insect species were detected in the wheat fields of Siirt province and are listed in Table 2. Among the predator species given in Table 2 are *Chrysoperla carnea* (Stephens) (7 adult/100 sweep nets), *Coccinella septempunctata* (L.) (12 adult/100 sweep nets) and Nabis sp. (4 adult/100 sweep nets) drawn attention as the most common species. The species belonging to the Chrysopidae family, which are common in both agricultural and non-agricultural areas in our country, as in many parts of the world, are the predators of many harmful insect groups. These species feed on harmful species such as aphids, mites, thrips, pre-adults of whiteflies, and leafhoppers (Kasap et al. 2003). *Chrysoperla carnea* is primarily a predator of aphids, although it feeds on psyllids, mealybugs, spider mites, and other soft-bodied insects (Atlıhan and Özgökçe 2003, Rashid et al. 2012, Souliotis et al. 2002).

Many species belonging to the Coccinellidae family play a leading role in biological control. Undoubtedly, William (2002) stated that species belonging to the Coccinellidae family are the most common of all beneficial insect species. Among these species, *C. septempunctata*, known as the seven-spotted ladybug, has been reported as an important predator of aphids, psyllids, potato beetles, and leafhoppers (Bolu et al. 2007, Erler 2004, Honek and Hodek 1996, Kedici et al. 1998, Mehrnejad et al. 2010). This species has been reported to be common throughout our country (Uygun 1981). Yiğit et al. (2007) reported *C. septempunctata* as a predator of aphids in wheat fields in Antakya (Serinyol) and Reyhanlı (Hatay). Among the coccinellidae species, the most common *C. septempunctata* species was detected in agricultural and non-agricultural areas (Buğday et al. 2015).

Nabis species (Hemiptera: Nabidae) were detected at all sampling locations. Kıvan and Dirik (2016) reported that *Nabis pseudoferus* is a predator of aphids in wheat production areas in Edirne province. Moreover, Nabis species have been shown as predator species in various ecosystems in many studies (Alaoğlu and Özbek 1987, Atlıhan and Özgökçe 2003, Kıvan and Dirik 2016).

Samplings made using a sweep net were made in fields with weeds and cultivated fields. Most of the collected species were insects infesting weeds, especially abundant flowers and pollen-bearing, found in these areas. Simultaneously, insect density and diversity were found to be higher in wheat fields close to meadows, pasture, and wooded areas. The general situation of the region was found to be high in terms of insect diversity in wheat fields. We have observed that particularly Merkez, Kurtalan, and Pervari districts are at a very good level in this respect. Pervari, stands out with its very rich flora, natural flora, and fauna, as it has a microclimate feature due to its special geography.

From the sampling locations, are very common *E. integriceps*. *A. acuminata*, *Dolycoris baccarum* (Linnaeus, 1758), *Carpocoris fuscispinus* (Boheman, 1850), *Carpocoris pudicus* (Poda, 1761), *Aphrodes diminutus* (Ribaut, 1952), and *Cercopis vulnerata* (Rossi 1807) have been identified to the Hemipter species. Furthermore, among Coleopter species, *Tropinota hirta* (Poda, 1761), *Clanoptilus geniculatus* (Germar, 1823), *Haplomalachius flabellatus* (Frivaldzsky, 1835), *Cantharis lateralis* (Linnaeus, 1758), *Cantharis annularis* Ménétriés, 1836, *Cryptocephalus parvulus* Müller, 1776, *Oulema melanopus* (Linnaeus, 1758), *Bruchus* sp. and *Ceutorhynchus* sp. species have been identified. In addition to these, *Melanogryllus* sp., (Orthoptera: Gryllidae) (7-48 adult/pitfall trap) and *Scarites* sp. (Coleoptera: Carabidae) (1-27 adult/pitfall trap) were recorded as common species.

Apart from harmful species, there is a fauna that cannot be underestimated in terms of predator species diversity in the region. Although the wheat fields are sprayed in every period, the number and density of natural enemy species are at a level that cannot be underestimated. For this reason, it is extremely important to develop methods that can be an alternative to pesticide control within integrated pest management programs. Besides, it was concluded that it would be a predator to monitor the population developments of predators and harmful species during the wheat planting period and to conduct studies to determine the activities of important natural enemy species.

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ÖZET

Buğday, günümüzde dünyanın en önemli besin kaynağıdır. Buğday verimini ve kalitesini olumsuz yönde etkileyen birçok zararlı böcek türü tespit edilmiştir. Bu çalışma 2020-2021 yıllarında Siirt ili ve ilçeleri (Merkez, Kurtalan, Eruh, Tillo, Şirvan, Pervari ve Baykan)'nde buğday ekiliş alanlarında bulunan zararlı ve yararlı böcek (predatör) türlerinin belirlenmesi ve zararlı *Eurygaster integriceps* Puton, 1881 (Hemiptera: Scutelleridae)'in yayılışının belirlenmesi amacıyla yürütülmüştür. Örneklemeler nisan-temmuz aylarında 1-2 haftalık aralıklarla yapılmıştır. Çalışmada atrap, çerçeve, çukur tuzaklar ve gözle kontrol yöntemleri kullanılmıştır. Çalışma sonunda 6 takım ve 25 familyaya bağlı 42 tür saptanmıştır. Türlerin dağılımları Coleoptera takımında 12 familyaya bağlı 27 tür, Hemiptera takımında 7 familyaya bağlı 10 tür, Neuroptera takımında 2 familyaya bağlı 2 tür, Hymenoptera, Orthoptera ve Diptera takımlarında 1'er familyaya bağlı 1'er tür olarak kaydedilmiştir. Bu türler içerisinde en yaygın ve yoğun türler: ana zararlı *E. integriceps*, ikincil zararlılar *Aelia acuminata* (Linnaeus, 1758), *Dolycoris baccarum* (Linnaeus, 1758) (Hemiptera: Pentatomidae), *Cephus pygmaeus* (Linnaeus, 1767) (Hymenoptera: Cephidae) ve *Melanogryllus sp.* (Orthoptera: Gryllidae) belirlenmiştir. Çalışmada Siirt ilinin lokal faunası için ilk kayıt niteliğinde olan toplam 16 tür tespit edilmiştir. Ayrıca *E. integriceps*'ın en yüksek ortalama yoğunluğu (2 ergin + nimf / m^2) Kurtalan ilçesi Garzan ve Gözpınarı lokasyonlarında bulunmuştur. Bunlara ilaveten faydalı türler arasında genel predatör *Chrysoperla carnea* (Stephens) (Neuroptera: Chrysopidae) ve *Coccinella septempunctata* L. (Coleoptera: Coccinellidae) en yaygın türler olarak dikkat çekmektedir.

Anahtar kelimeler: buğday, *Eurygaster integriceps*, predatör, Siirt, zararlı

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