

Observations on Insect and Spider Fauna in The Aestivation Period of *Eurygaster integriceps* Put. (Heteroptera: Scutelleridae) on the Nemrut Mountain of Adiyaman Province

Mahmut İslamoğlu¹ and Şener Tarla¹

¹Uşak University, Faculty of Agriculture and Natural Sciences, Department of Plant Protection Uşak Turkey
Corresponding Author: Mahmut İslamoğlu

Abstract: As a result of two years' studies, insects' species in the aestivation period of Sunn pest, *Eurygaster integriceps* Put. (Heteroptera; Scutelleridae) were obtained from 3 different order on the Nemrut Mountain in overwintering area of Adiyaman Province in Turkey. These were Coleoptera, Heteroptera and Hymenoptera. A total of 22 species were identified from Carabidae, Chrysomelidae, Cicindelidae, Coccinellidae, Curculionidae and Scarabaeidae in Coleoptera order. 16 species identified from Cydnidae, Scutelleridae, Pentatomidae, Coreidae, Alydidae, Lygaeidae, Pyrrhocoridae and Miridae in Heteroptera order. Only 1 species of Hymenoptera were obtained. And also in Araneae order Areneidae, Thomisidae, Gnaphosidae, Salticidae, Selenopidae, Arenoidae and Theridiidae collected. In total, 15 different species of spiders were determined from the Nemrut Mountain of Adiyaman Province.

Keywords: Aestivation period, Nemrut Mountain, spider, Sunn pest

Date of Submission: 02-12-2018

Date of acceptance:19-12-2018

I. Introduction

The long-distance migratory behavior of insects usually occurs in mature periods. The flights made by insects to travel to and from the overwintering areas are called "immigration". These flights are more prominent in insect species that are more likely to have a long life [5, 6]. One of the most important of these insects is Sunn pest, *Eurygaster integriceps* Put. (Heteroptera; Scutelleridae). The Sunn pests, *Eurygaster* spp. (Heteroptera: Scutelleridae) are the most important harmful insect pests on wheat in Turkey. They are distributed on 75% of wheat fields and their chemical control is carried out over an average of 1.2 million hectares every year. Both nymphs and adults of Sunn pest cause plant damage, feeding on leaves, stems, and grains [2]. Yield losses were estimated by 50 to 90% in wheat and 20 to 30% in barley [4, 5]. Apart from the direct yield reduction, the insect injects digestive enzymes during feeding which reduce the baking quality of the dough. If as little as 2 to 3% of the grain has been fed on, the entire grain lot may be rendered unacceptable for baking purposes because of poor quality flour [4, 5, 6]. Adults of Sunn pests spend their life span under bushes and litter at the high elevations around cereal fields during the hot and dry months of late summer and autumn. They hibernate during the cold and often severe winter months on hill sides of the mountains. In the spring, when soil surface temperature reaches up to 15 °C, at the overwintering sites, adults usually migrate to cereal fields. Overwintered adults appear in the fields during 1 to 4 weeks' period. After feeding, females lay eggs on leaves, stems and spikes. After five nymphal instars, a new adult generation is seen. These new adult generations feed and moved to higher elevations after barley and wheat harvesting [5, 6].

The Nemrut Mountain in Adiyaman Province is one of the highest overwintering area of Turkey's Southeastern Anatolia Region. It is one of the most important overwinter area of Sunn pest in Turkey [8]. This mountain is at an altitude of 2.300 m and its forms of dominant flora, *Astragalus diphtherites* Fenzl., *Noea spinosissim* Moq., *Acantholimon* sp. and *Astragalus* spp. Many insects along with the Sunn pest spent their aestivation periods under these plants.

The main purpose of this study was to determine the insect fauna which with along Sunn pest during the aestivation period on the Nemrut Mountain in Adiyaman Province

II. Materials and Method

Studies were carried out on plants of *A. diphtherites*, *N. spinosissim*, *Acantholimon* sp. and *Astragalus* sp., at altitudes of 1600 – 2200 m. and the South, North and East facing slopes on the Nemrut Mountain. Because of the limited number of plants and habitat, destruction sampling was not done in overwintering areas of the western aspect. Studies were initiated after the completion of wheat harvest and Sunn pest withdrawal to overwintering sites in late June and early July. The principal vegetation of the Nemrut Mountain (37°09 N, 37°07 E) consists of *A. diphtherites*, *N. spinosissim*, *Acantholimon* sp. and *Astragalus* sp., and these plants were

categorized as small, medium and large according to their size [7]. To determine insects, a total of 180 plants from various locations were harvested and the number of insects recorded. The plants were harvested by cutting them near the soil surface. Each harvested plant was shaken over polyethylene sheets to dislodge the insects, and the insects remaining between branches and leaves were removed manually and counted. In addition, 4–5 cm of loose soil beneath the crown of each plant were searched for Sunn pests and all counted. These counts were repeated for each plant species, altitude and direction. The insects were brought to Adana Plant Protection Research Institute for the diagnosis. In addition, the spiders under these plants were collected and they were brought to the same Institute for the diagnosis.

III. Results and Discussion

The insects collected on the Nemrut Mountain of Adiyaman Province, host plants and the altitude are given in Table 1.

Table 1. The insects collected on the Nemrut Mountain of Adiyaman province, host plants and the altitude

Order	Family	Species	Plant	Altitude
Coleoptera	Carabidae	<i>Amara aenea</i> De Geer	<i>Astragalus diphterites</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1800–2000 m.
		<i>Harpalus</i> sp.	<i>Astragalus diphterites</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 2000–2200 m.
		<i>Zabrus</i> spp.	<i>Acantholimon</i> sp. <i>Astragalus</i> sp..	1600–1800 m.
	Cicindellidae	<i>Cicindella campestris</i> L.	<i>Acantholimon</i> sp. <i>Astragalus</i> sp.	1800–2000 m.
	Chrysomelidae	<i>Chrysomelina chalcites</i> Germ.	<i>Astragalus diphterites</i> , <i>Acantholimon</i> sp. <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Cassida pannonica</i> Suffr.	<i>Acantholimon</i> sp.	1600–1800 m.
	Coccinellidae	<i>Coccnella septempunctata</i> L.	<i>Astragalus diphterites</i> , <i>Noea spinosissim</i> , <i>Acantholimon</i> sp. <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m. 2000–2200 m.
	Curculionidae	<i>Eptacus arachnoides</i> Stierlin	<i>Astragalus diphterites</i> , <i>Astragalus</i> sp.	1800–2000 m.
		<i>Hypera</i> spp.	<i>Acantholimon</i> sp. <i>Astragalus</i> sp..	1600–1800 m.
		<i>Mecaspis alternans</i> Herbst	<i>Astragalus diphterites</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Pachytychius hordei</i> Brulle	<i>Astragalus diphterites</i> , <i>Acantholimon</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Sitona</i> spp.	<i>Astragalus diphterites</i> , <i>Acantholimon</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Coniocleonus nigrosuturatus</i> Goeze	<i>Astragalus diphterites</i> , <i>Acantholimon</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Otiorhynchus</i> spp.	<i>Astragalus diphterites</i> , <i>Noea spinosissim</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m. 2000–2200 m.
		<i>Lixus</i> sp.	<i>Astragalus diphterites</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Larinus</i> sp.	<i>Noea spinosissim</i> , <i>Acantholimon</i> sp. <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Larinus fucatus</i> Faust	<i>Astragalus diphterites</i> , <i>Noea spinosissim</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m. 2000–2200 m.
	Scarabaeidae	<i>Aphodius erraticus</i> L.	<i>Astragalus diphterites</i> , <i>Noea spinosissim</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m. 2000–2200 m.

				m.
		<i>Aphoius</i> spp.	<i>Astragalus diphtherites</i> , <i>Astragalus</i> sp.	1800–2000 m.
		<i>Copris hispanus</i> L.	<i>Astragalus diphtherites</i> , <i>Noea spinosissim</i> , <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Onthophagus lucidus</i> L.	<i>Astragalus diphtherites</i> , <i>Noea spinosissim</i> , <i>Acantholimon</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Onthophagus</i> spp.	<i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1800–2000 m.
Heteroptera	Cydnidae	<i>Legnetus limbatus</i> L.	<i>Acantholimon</i> sp.	1800–2000 m.
	Scutelleridae	<i>Eurygaster integriceps</i> Put.	<i>Astragalus diphtherites</i> , <i>Noea spinosissim</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m. 2000–2200 m.
		<i>Eurygaster austriaca</i> Schrank	<i>Astragalus diphtherites</i> , <i>Noea spinosissim</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m. 2000–2200 m.
	Pentatomidae	<i>Aelia rostrata</i> Boh.	<i>Astragalus diphtherites</i> , <i>Noea spinosissim</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m. 2000–2200 m.
		<i>Carpococoris iranus</i> Tam.	<i>Astragalus diphtherites</i> , <i>Noea spinosissim</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m. 2000–2200 m.
		<i>Dolycoris baccarum</i> L.	<i>Astragalus diphtherites</i> , <i>Noea spinosissim</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m. 2000–2200 m.
		<i>Psacasta exanthematica</i> Scopoli	<i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1800–2000 m.
	Coreidae	<i>Coriomeris denticulatus</i> Scop.	<i>Astragalus diphtherites</i> , <i>Noea spinosissim</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m. 2000–2200 m.
		<i>Coriomeris hirticornis</i> F.	<i>Astragalus diphtherites</i> , <i>Noea spinosissim</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Enoplops disciger</i> Kit.	<i>Astragalus diphtherites</i>	1600–1800 m.
	Alydidae	<i>Camptopus lateralis</i> Germ	<i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
	Lygaeidae	<i>Lygaeus equestris</i> L	<i>Astragalus diphtherites</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Lygaeus pandurus</i> Schill	<i>Astragalus diphtherites</i> , <i>Astragalus</i> sp.	1800–2000 m.
		<i>Rhyparochromus phoeniceus</i> Rossi	<i>Astragalus diphtherites</i> , <i>Noea spinosissim</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m. 2000–2200 m.
	Pyrrhocoridae	<i>Scantius aegyptius</i> L.	<i>Astragalus diphtherites</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
	Miridae	<i>Trigonotylus ruficornis</i> Geoffroy in Fourcroy	<i>Astragalus diphtherites</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
Hymenoptera	Vespidae	<i>Polites</i> spp.	<i>Astragalus diphtherites</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1800–2000 m.

The spider collected on the Nemrut Mountain of Adiyaman Province, host plants and the altitude are given in Table 2.

Table 2. The spider collected on the Nemrut Mountain of Adiyaman Province, host plants and the altitude

Order	Family	Species	Plant	Altitude
Araneae	Areneidae	<i>Argiope lobata</i> Pallas	<i>Astragalus diptherites</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Zilla diodia</i> Walc.	<i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Aculeperira</i> sp.	<i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
	Thomisidae	<i>Xysticus</i> sp.	<i>Astragalus diptherites</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Xysticus robustus</i> Hahn.	<i>Astragalus diptherites</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m. 2000–2200 m.
		<i>Heriaeus</i> sp.	<i>Astragalus diptherites</i> , <i>Acantholimon</i> sp.	1600–1800 m. 1800–2000 m.
	Gnaphosidae	<i>Gnaphosa</i> sp.	<i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1800–2000 m.
		<i>Haplodrassus signifer</i> Koch.	<i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1800–2000 m.
		<i>Drassodes</i> sp.	<i>Astragalus diptherites</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m. 2000–2200 m.
	Salticidae	<i>Hyllus</i> sp.	<i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
		<i>Aelurillus</i> sp.	<i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1800–2000 m.
		<i>Heliophanus</i> sp.	<i>Astragalus diptherites</i> , <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
	Selenopidae	<i>Selenops</i> sp.	<i>Astragalus diptherites</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.
	Arenoidae	<i>Anelosimus</i> sp.	<i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1800–2000 m.
	Theridiidae	<i>Steatoda phalerata</i> Pan.	<i>Astragalus diptherites</i> , <i>Acantholimon</i> sp., <i>Astragalus</i> sp.	1600–1800 m. 1800–2000 m.

IV. Results

In the two years of studies on the Nemrut Mountain in overwintering area of Adiyaman Province in Turkey. Insects species were obtained from 3 different families: these families were Coleoptera, Heteroptera and Hymenoptera. A total of 22 species were identified from Carabidae, Cicindelidae, Chrysomelidae, Coccinellidae, Curculionidae and Scarabaeidae in Coleoptera order. 16 insect species which belong to Cydnidae, Scutelleridae, Pentatomidae, Coreidae, Alydidae, Lygaeidae, Pyrrhocoridae and Miridae were identified from Heteroptera order. Only 1 species of Hymenoptera were obtained in the study.

Areneidae, Thomisidae, Gnaphosidae, Salticidae, Selenopidae, Arenoidae and Theridiidae from Araneae order have been identified from Nemrut Mountain. In total, 15 different species of spiders were identified, 5 of which were identified at species level and 10 at the genus level.

Some of these insects are important harmful species for our country. For example, *E. integriceps* and *E. austriaca* Schrank with *E. maura* L. (Heteroptera: Scutelleridae) which is another species are the most important harmful insect pests on wheat in Turkey. Overwintered adults of the Sunn pest attack the leaves and stems of young, succulent wheat and barley plants, causing them to wither and die before spike formation. They also suck the base of the spike during the early growing period, resulting in whitish spikes without kernels, producing white spikes. Yield losses are estimated at 50% to 90% in wheat and 20% to 30% in barley. Apart from the direct yield reduction, the insect injects digestive enzymes during feeding that reduce the baking quality of the dough. If as little as 2% to 3% of the grain has been fed on, the entire grain lot may be rendered unacceptable for baking purposes because of poor-quality flour [3,6].

In conclusion, many species known to be beneficial and harmful were determined in overwintering areas in the aestivation period of Sunn pest. Especially considering that spiders and others are useful as natural enemies, it can be thought that theirs in this winter area have a significant effect on population density of pests. In order to clarify this subject, it will be appropriate to carry out studies in the future.

References

- [1]. Canhilal, R., Kutuk, H., Kanat, A.D., Islamoglu, M., Haremein, F., Bouhssini, M., 2005. Economic threshold for the Sunn Pest, *Eurygaster integriceps* Put. (Heteroptera: Scutelleridae), on wheat in southeastern Turkey. J. Agric. Urban Entomol., 22: 191-201.
- [2]. Critchely, B. R. 1998. Literature review of Sunn pest *Eurygaster integriceps* Puton. (Heteroptera: Scutelleridae). Crop Prot., 17:271-287.
- [3]. İslamoğlu, M, Kornosor, S., and Tarla, 2010. Mass Rearing of *Trissolcus semistriatus* Nees (Hymenoptera: Scelionidae), Sun Pest Egg Parasitoids and Determining Their Efficiency in Released Fields. Symposium on National Grain, 2 - 5 June 2008, Konya, Turkey: 921-931.
- [4]. İslamoğlu, M., 2012. Mass Rearing and Release of the Egg Parasitoid, *Trissolcus semistriatus* Nees. (Hymenoptera: Scelionidae), A Biological Control Agent of the Sunn Pest, *Eurygaster integriceps* Put. (Heteroptera: Scutelleridae) in Turkey. Egyptian J. Biolo. Pests Control., 21: 131-136.
- [5]. Lodos, N. 1961. Investigations on the problem of *Eurygaster integriceps* (Hetroptera; Scutelleridae) in Turkey, Iraq, Iran and Syria. Ege University Faculty of Agriculture Publications No: 51. İzmir.
- [6]. Lodos, N. 1986. Turkey Entomology II. General Applied and Fuanistik. Ege University Faculty of Agriculture Publications No: 429. İzmir.
- [7]. Simsek, Z., 1998. Past and current status of sunn pest (*Eurygaster* spp.) control in Turkey. Integrated Sunn Pest Control, II. Workshop Report (eds. K. Melan & C. Lomer), pp. 49-60. Ankara Plant Protection Central Research Institute, Ankara, Turkey.
- [8]. Yüksel, M., 1968. Investigation on distribution, biology, epidemiology, and damage of the Sunn pest (*Eurygaster integriceps* Put.) in the South and Southeast Anatolia Region of Turkey. In: Publications of General Directorate of Plant Protection and Agricultural Quarantine, the Ministry of Agriculture, No. 46.

Mahmut İslamoğlu "Observations on the Insect and Spider Fauna in the Aestivation Period of Sunn Pest (*Eurygaster integriceps* Put.) (Heteroptera; Scutelleridae) on the Nemrut Mountain of Adiyaman Province" International Journal of Engineering Science Invention (IJESI), vol. 07, no. 12, 2018, pp 38-42