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ORIGINAL RESEARCH PAPER

A CONTRIBUTION TO THE KNOWLEDGE OF THE STINK BUGS (PENTATOMIDAE, HEMIPTERA) IN THE COASTAL ECOSYSTEMS IN KAVAJA REGION, ALBANIA

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SYNOPSIS

This study aims to present a systematic and ecological analysis to the *Pentatomidae* family, stink bugs (Hemiptera), in the different coastal ecosystems of Kavaja region. The collection of biological material is performed during the period 2009-2011. The study analyzed 112 individuals, which represented 19 genus and 29 species. The collected biological material revealed the genera *Aelia* is more represented, with 4 species and a frequency of 13.79%. Habitats of Spille station were represented by more species compared to other stations, 15 species and frequency of 51.72%. While with less represented species was Mali Robit station with 12 species and a frequency of 41.38%.

Based on the coefficient of species' similarity "*Jaccard index*", Mali Robit and Golem stations, present higher coefficient of similarity compared to other stations, 26.66%, which mean a similarity between these habitats.

The Paleartic and Mediterranean Zoogeographic regions are represented by highest number of the species, with 10 species and frequency 34.48%.

INTRODUCTION

Stink Bugs (Fam. Pentatomidae Leach, 1815) are insects with antennas that are constituted by 5 segments. This family includes individuals of middle (6-8 mm) to big dimensions (11-13 mm) and are predominantly small (3-4.5 mm). Their body is of oval shape and covered by a solid mantel. Their scutellum is big and of triangle shape as 'mantel' (Servadei, 1967). They present green, yellow and metallic bright colours. Tarsus is constituted by 2 or 3 segments (Tremblay, 1981). They are classified as phytophagy species. Their negative impact in agriculture is

encountered mainly in crops, rice, fruit trees, etc. They stand grouped by sacking the liquid of the host tree and are characterised by considerable resistance toward pesticides (Gennaro, 1977; Miller, 1971; Pollini, 2002). Also, in this group are included predators that are feed with other insects (Silvestri, 1939; Servadei et al., 1972).

Our study considers species of this family in the ecosystems of the Elbasan Region, attempting to present a general panorama of this family in this habitat. Conclusions are drawn up through the analysis.

MATERIALS AND METHODS

Collection of the biological samples was conducted for the period 2009-2011, in different habitats of the Kavaja Region, sampling stations of Spille, Mali Robit, Bardhore, Golem and Rrogozhine. The collection of individuals was achieved through random procedures during the warm part of year May-September, for each station, during the day time 09^{00}-15^{00}.

The collection of species was accomplished by using entomological nets of 80 cm diameter. Shaving of the insects was conducted in diagonal equal surfaces of 100 m^2 (10m x 10m), passing 5 times across each rectangle diagonals (Colas, 1969). In our field expedites were used also air nets.

After the field collection, individuals were placed in plastic bottles, and were labelled, by giving information on place and date, respectively. Regarding to the tinny samples they were placed in plastic flacons of 150-200 cc. The biological material, in scientific laboratory, was kept in bottles with Ethanol solution (95%), acetic acid, distilled water in ratio 80:5:20 (v/v/v) and some ether drops added consequently (Colas, 1969; Chapman, 1998).

Scientific determination of the biological material was conducted through investigation with stereomicroscope ZEISS (Carl Zeiss, Stemi 2000-C, Series 455044-9901, Optics: W-Pi 10x/23). The individuals were determined by using the determination keys for each family, collections and previous scientific publications (Aukema et al., 1999; Dolling 1991; Halimi et al., 2012; Schuh et al., 1995; Ribes, 2008; Tremblay, 1990).

RESULTS AND DISCUSSIONS

Determination of species that belong to the Pentatomidae family (Tab. 1) includes species encountered in the ecosystems of Kavaja. The table 1 present the number of every species according to station: Spille, Mali Robit, Bardhore, Golem and Rrogozhine, accompanied by information related to the zoogeographical region.

Table 1: List of species for Pentatomidae Family.

No	Scentific name	No. exempl.	Spille	Mali Robit	Bardhore	Golem	Rrogozhine	Zoogeographic Region
1	Genus *AELIA*							
1	*Aelia acuminata* Linnaeus, 1758	6		+			+	Palearctic
2	*Aelia rostrata* Boheman, 1852	1			+			Euro-Mediterranean
3	*Aelia virgata* Herrich-Schaeffer, 1841	3	+		+			European
4	*Aelia klugi Hahn, 1833*	3	+					Euro-Siberian
2	Genus *BAGRADA*							
5	*Bagrada abeillei Puton, 1881*	2				+		Mediterranean
3	*Genus CARPOCORIS*							
6	*Carpocoris fuscispinus Boheman, 1853*	4		+				Euro-Siberian
7	*Carpocoris purpureipennis* De Geer, 1773	14	+		+			Euro-Siberian
4	Genus *CODOPHILA*							
8	*Codophila varia* Fabricius, 1787	4					+	Palearctic
5	Genus *DOLYCORIS*							
9	*Dolycoris baccarum* Linnaeus, 1758	16	+			+	+	Palearctic
6	Genus *DYRODERES*							
10	*Dyroderes umbraculatus Fabricius, 1775*	3					+	Mediterranean
7	Genus *EURYDEMA*							
11	*Eurydema ornate* Linnaeus, 1758	1	+					Palearctic
12	*Euryderma oleracea Linnaeus, 1758*	3		+	+			Palearctic
8	Genus *EYSARCORIS*							
13	*Eysarcoris inconspicous Herrich – Schâffer, 1844*	3				+	+	Palearctic
14	*Eysarcoris fabricii Kirkaldy, 1904*	2		+		+		Palearctic
9	Genus *GRAPHOSOMA*							
15	*Graphosoma lineatum* Linnaeus, 1758	10	+		+		+	Palearctic
10	Genus *HOLCOSTETHUS*							
16	*Holcostethus fissiceps Horvàth, 1906*	1	+					Holarctic
11	Genus *MUSTHA*							
17	*Mustha spinosula* Lefebvre, 1831	3		+		+		Mediterranean
12	Genus *NEOTTIGLOSSA*							
18	*Neottiglossa leporina* Herrich – Schâffer, 1930	2	+				+	Mediterranean

No	Scentific name	No. exempl.	Spille	Mali Robit	Bardhore	Golem	Rrogozhine	Zoogeographic Region
19	*Neottiglossa lineolata* (Mulsant & Rey, 1852)	3		+		+		Mediterranean
13	Genus *NEZARA*							
20	*Nezara viridula Linnaeus, 1758*	3	+	+			+	Cosmopolitan
14	Genus *PALOMENA*							
21	*Palomena prasina* Linnaeus, 1761	2	+		+			Palearctic
15	Genus *RHAPHIGASTER*							
22	*Rhaphigaster nebulosa* Poda, 1761	4	+		+			Palearctic
16	Genus *SCIOCORI*							
23	*Sciocori sculatus Fieber, 1851*	3	+	+				Mediterranean
24	*Sciocoris homolonatus Fieber, 1852*	2	+	+				Mediterranean
17	Genus *STAGONOMUS*							
25	*Stagonomus amoenus* Brullé, 1832	2	+				+	Mediterranean
26	*Stagonomus bipunctatus Linnaeus, 1758*	3		+		+		Mediterranean
27	*Stagonomus pusillus* Herrich – Schâffer, 1830	4		+	+			Mediterranean
18	Genus *VENTOCORIS*							
28	*Ventocoris trigonus Krynicki, 1871*	2	+					Euro-Mediterranean
19	Genus *ZICRONA*							
29	*Zicrona caerulea* Linnaeus, 1758	3		+	+			Holarctic

From investigation of the biological samples, in our study, were encountered 112 individuals of Pentatomida family, which represented 19 genera and 29 species. In that aspect was determined also the frequency per every species according to equation:

$$F = \frac{n}{N} \times 100$$

Where: n- number of species for each family; N- number of species in total encountered

Analysis and interpretation of the data results in our study, indicates that according to species' diversity (Tab. 2, Fig. 1), genus *Aelia* is represented with more species, 4 species and frequency 13.79%, *Stagonomus* genus is represented with 3 species and frequency 10.34%. *Carpocoris, Eurydema*, *Eysarcoris*, *Neottiglossa* and

Sciocori genera are represented by 2 species and frequency 6.90%, while other genera were represented by only one species and frequency 3.45%.

Table 2: Number of species according to genera.

No	Scientific name	Species number	Species frequency (%)
1	*Aelia*	4	13.79
2	*Bagrada*	1	3.45
3	*Carpocoris*	2	6.90
4	*Codophila*	1	3.45
5	*Dolycoris*	1	3.45
6	*Dyroderes*	1	3.45
7	*Eurydema*	2	6.90
8	*Eysarcoris*	2	6.90
9	*Graphosoma*	1	3.45
10	*Holcostethus*	1	3.45
11	*Mustha*	1	3.45
12	*Neottiglossa*	2	6.90
13	*Nezara*	1	3.45
14	*Palomena*	1	3.45
15	*Rhaphigaster*	1	3.45
16	*Sciocori*	2	6.90
17	*Stagonomus*	3	10.34
18	*Ventocoris*	1	3.45
19	*Zicrona*	1	3.45
	Total	**29**	**100**

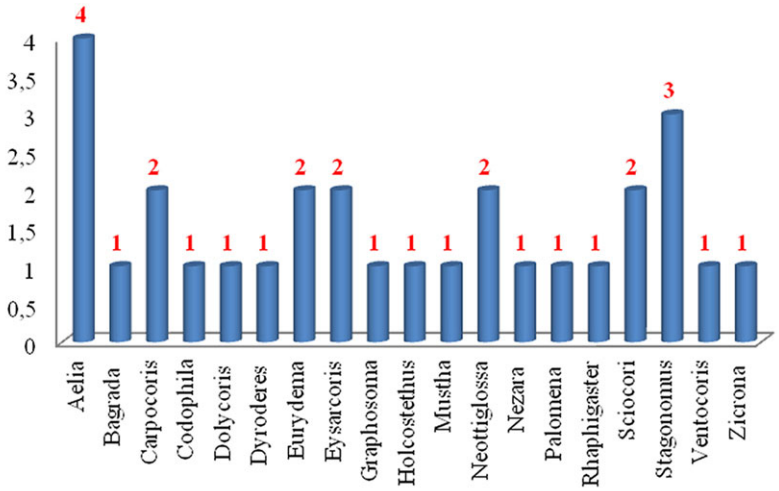

Figure 1: Distribution of species according to the genera.

According to the species variety, more represented resulted Spille station, respectively with 15 species, or frequency 51.72%, followed by Mali Robit station with 12 species or frequency 41.38%, Bardhore and Rrogozhina stations with 9 species and frequency 31.03%, and last resulted Golem station with 7 species or 24.314% frequency (Tab. 3, Fig. 2).

According to their geographical distribution, the stations present a diversification of the ecological conditions and ecosystems. We think that this distribution is conditioned by the species itself, as well as their own ecological valence.

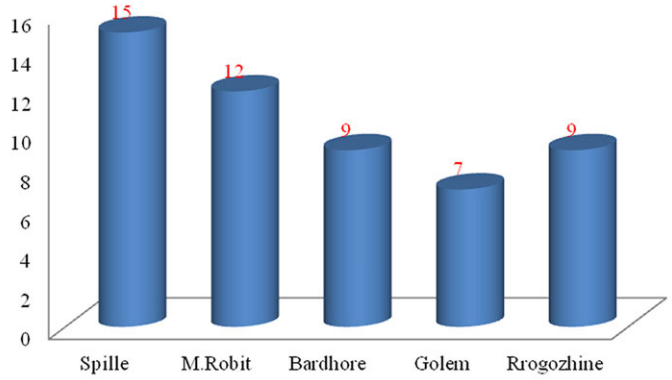

Figure 2:
Distribution of species according to the station in study (number of species).

Table 3: Number of species according to station.

Station	Number of species	Species frequency %
Spille	15	51.72
Mali Robit	12	41.38
Bardhore	9	31.03
Golem	7	24.14
Rrogozhine	9	31.03

Calculation of the coefficient of similarity Jaccard gave an indication on the species similarity among the stations (Jaccard, 1901). In the table are presented the numbers of common species (C), according to the stations, and the coefficient of similarity (C_J) for each station (Tab. 4).

From analysis, we concluded that the higher values of the coefficient of species' similarity stands among Mount Robit and Golem stations by 26.66% with 4 common species, followed from similarity among stations Spille and Bardhore, Spille and Rogozhine by 26.31% and with 5 common species, Mali Robit and Bardhore by 16.66% and 3 common species. The lowest value stands among Golem and Rrogozhine by 14.28% and 2 species, Spille and Mali Robit by 12.5% and 3 common

species, Mali Robit and Rogozhine with coefficient 10.52% with 2 common species, between Bardhore and Rogozhine station by 5.88% and 1 common species.

Table 4: Number of common species and similarity coefficient according to each station.

	Mali Robit	Bardhore	Golem	Rrogozhine
Spille	C = 3 C_J = 12.5%	C = 5 C_J = 26.31%	C = 1 C_J = 4.76%	C = 5 C_J = 26.31%
Mali Robit		C = 3 C_J = 16.66%	C = 4 C_J = 26.66 %	C = 2 C_J = 10.52%
Bardhore			C = 0 C_J = 0 %	C = 1 C_J =5.88 %
Golem				C = 2 C_J = 14.28%

We think that these comparative data are deducted by the impact of ecological and anthropogenic factors in the studied stations.

Table 5: Number of species according to the zoogeographical regions.

Zoogeographical region	Number of species	Species' frequency (%)
Holarctic	2	6.90
Palaearctic	10	34.48
Euro – Siberian	3	10.34
European	1	3.45
Euro – Mediterranean	2	6.90
Mediterranean	10	34.48
Cosmopolitan	1	3.45
TOTAL	**29**	100

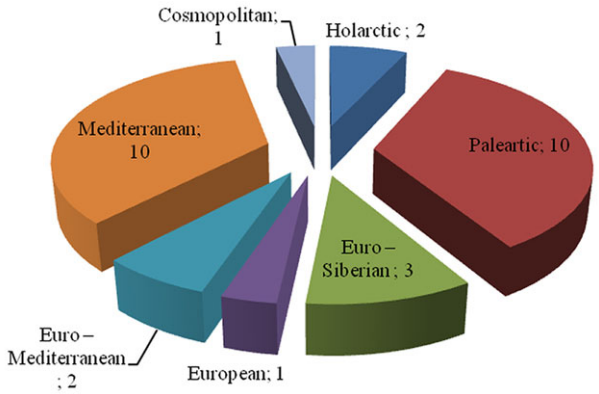

Figure 3: Distribution of species frequency according to zoogeographical regions.

From the study of the zoogeographical groups (Tab. 5, Fig. 3), the nucleus of the Pentatomidae family are the Palaearctic and Mediterranean Zoogeographic groups with 10 species each and frequency 34.48%, and consecutively Euro-Siberian group with 3 species or 10.34%, and in very small number of species Holarctic and Euro-Mediterranean with 2 species or 6.90%, European and Cosmopolitan by 1 species or 3.45%.

CONCLUSIONS

The systematic and ecological analysis revealed 19 genera and 29 species of the Pentatomidae order in ecosystems of Kavaja region. The genus *Aelia* is presented with a higher number compared to other genera.

Regarding to the species diversity, the Spille station dominates compared to other stations in the study. It comes due to the fact tha Spille station owns more field ecosystems. We think that this distribution is conditioned by the species itself, as well as their own ecological valence.

Maximum value of coefficient of species' similarity stands between Mali Robit and Golem stations. We think that these comparative data are deducted by the impact of ecological and anthropogenic factors in the studied stations.

More represented with species are Palaearctic and Mediterranean zooge-ographic regions.

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