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Distribution of Stink Bugs Species (Pentatomidae, Hemiptera, Insecta) in the Habitats of Tirana (Albania)

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Abstract

This study presents a systematic and ecological analysis of the family Pentatomidae, commonly known as stink bugs (Hemiptera), in various ecosystems in the Tirana area of Albania. Biological material was collected between 2021 - 2023. A total of 136 specimens were analyzed, representing 27 species and 19 genera. Among these, the genera *Carpocoris*, *Holcostethus*, and *Stagonomus* were the most representative, each comprising 3 species and accounting for a frequency of 11.11%.

The habitats of the Iba station exhibited a higher species

diversity compared to other stations, hosting 14 species (51.85%), while the Ndroq station harbored the fewest species, with 9 species (33.33%). According to the Jaccard index of similarity coefficient, the stations Dajt and Farka and Iba and Ndroq showed a higher similarity coefficient of 27.77% compared to other stations, indicating similar ecological factors between these habitats. Conversely, the Vora with Ndroq and Farka with Ndroq stations exhibited the lowest coefficient at 5%, indicating less ecological similarity between these stations.

Keywords: Stink Bugs, *Pentatomidae*, Ecosystem, Tirana

Introduction

The family Pentatomidae Leach, 1815, commonly known as stink bugs, comprises insects characterized by antennae with five segments. Members of this family typically exhibit medium to large sizes and possess an oval-shaped body encased in a hard exoskeleton. Notably, they feature a large, triangular scutellum, often likened to a "shield" (Servadei, 1967) ^[10]. Stink bugs exhibit a range of colors, including green, yellow, and metallic hues, and their tarsi typically consist of two or three segments (Tremblay, 1981) ^[13]. As phytophagous species, they pose a threat to agriculture by causing damage to crops such as cereals, rice, and fruits. Stink bugs often congregate on plants to feed by piercing and sucking fluids, and they have developed resistance to many agricultural pesticides (Gennaro, 1977; Miller, 1971; Pollini, 2002) ^[5, 7, 8]. Additionally, certain species within this family are predatory, preying on other insects (Servadei *et al.*, 1972; Silvestri, 1939) ^[11, 12]. This paper focuses on investigating the diversity of Pentatomidae species in both lowland and hilly-mountainous ecosystems in the Tirana region, aiming to provide a comprehensive analytical overview of the species present in this area.

Materials and Method

Material collection took place between 2021 and 2023 in various habitats within the Tirana area at stations located in Dajt, Ibe, Vora, Fark, and Ndroq. Specimen collection was conducted randomly during the months of May to September, between 09⁰⁰ and 15⁰⁰ hours. Entomological nets with a diameter of 80 cm were primarily utilized for collection, following a mowing technique along diagonals of equal surface area measuring 100 m² (10m x 10m), traversing each diagonal five times (Colas, 1969) ^[3]. Aerial nets were also employed. Upon collection in the field, individuals were placed in plastic bottles labeled with the date and location of collection. Fine material was deposited in plastic bottles of 150–200 cc capacity. In the laboratory, the bottles were preserved in a solution of 95% ethyl alcohol, acetic acid, and distilled water in a ratio of 80:5:20 (ml) with a few drops of ether (Colas, 1969; Chapman, 1985) ^[3, 2].

The ZEISS Stereomicroscope (Uzi Series 240/3 Model 50240003) was used for taxonomic determination of the specimens. Collections, previous publications, and taxonomic keys of the Pentatomidae family were used for taxonomic identification

(Aukema *et al.*, 1999; Halimi *et al.*, 2018; Schuh, 1995; Ribes, 2008; Tremblay, 1990) [1, 4, 9, 15, 14].

Results and Discussion

During this study, we determined the taxonomic species of

the family Pentatomidae. We have provided a list of the species referred to by us in the lowland ecosystems and hilly terrain of Tirana. For each species, we provide the number of specimens for each venue station: Dajt, Ibe, Vora, Fark, and Ndroq (Table 1).

Table 1: List of species of the Family Pentatomidae

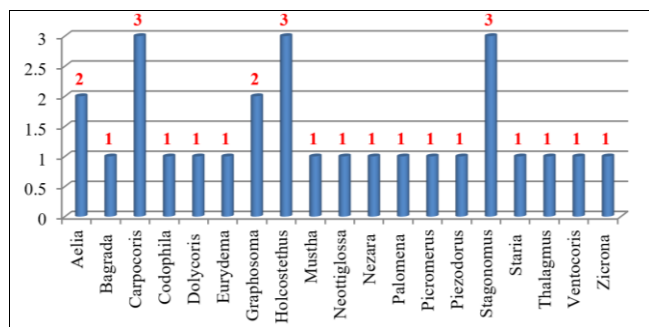
S. No	Scientific name	No. exmp.	Dajt	Ibë	Vorë	Farkë	Ndroq
1	Genus Aelia						
1	<i>A.acuminata</i> Linnaeus, 1758	9	+				+
2	<i>A.rostrata</i> Boheman, 1852	3		+		+	
2	Genus Bagrada						
3	<i>B.abeillei</i> Putoz, 1881-	2	+		+		
3	Genus Carpocoris						
4	<i>C.fuscispinus</i> Boheman, 1853	4		+	+		
5	<i>C.purpureipennis</i> De Geer, 1773	12		+	+		
6	<i>C.melanocerus</i> Mulsant & Rey, 1852	7		+			+
4	Genus Codophila						
7	<i>C.varia</i> Fabricius, 1787	5	+			+	
5	Genus Dolycoris						
8	<i>D.baccarum</i> Linnaeus, 1758	16	+	+		+	
6	Genus Euryderma						
9	<i>E.ornate</i> Linnaeus, 1758	5		+			+
7	Genus Graphosoma						
10	<i>G.lineatum</i> Linnaeus, 1758	8	+				+
11	<i>G.semipunctatum</i> Fabricius, 1775	3		+		+	
8	Genus Holcostethus	3					
12	<i>H. fissiceps</i> Horváth, 1906	4			+	+	
13	<i>H. sphacelatus</i> Fabricius, 1794	3	+				+
14	<i>H. vernalis</i> Wolff, 1804	2			+		
9	Genus Mustha						
15	<i>M.spinosula</i> Lefebvre, 1831	5	+	+			
10	Genus Neottiglossa						
16	<i>N.bifida</i> Costa A, 1847	3			+	+	
11	Genus Nezara						
17	<i>N.viridula</i> Linnaeus, 1758	6		+		+	+
12	Genus Palomena						
18	<i>P. prasina</i> Linnaeus, 1761	2			+		
13	Genus Picromerus						
19	<i>P. conformis</i> Herrich – Schâffer, 1894	5	+		+	+	
14	Genus Piezodorus						
20	<i>P. lituratus</i> Fabricius, 1794	4		+	+		
15	Genus Stagonomus						
21	<i>S. amoenus</i> Brullé, 1832	5	+			+	
22	<i>S. bipunctatus</i> Linnaeus, 1758	1	+		+		+
23	<i>S.pusillus</i> Herrich – Schâffer, 1830	4		+			+
16	Genus Staria						
24	<i>S. lunata</i> Hahn, 1835	5	+	+		+	
17	Genus Thalagnus						
25	<i>Th. flavolineatus</i> Fabricius, 1798	3		+			+
18	Genus Ventocoris						
26	<i>V. trigonus</i> Krynicki, 1871	4	+	+			
19	Genus Zicrona						
27	<i>Z. caerulea</i> Linnaeus, 1758	3				+	

As a result of classifying the 136 Pentatomidae specimens we collected for our study in Tirana ecosystems, we identified 27 species and 19 genera (Table 2, Graph 1). Analysis of these data reveals that, based on distribution, the genera Carpocoris, Holcostethus, and Stagonomus are

represented by more species, with three species each accounting for a frequency of 11.11%. The genera Aelia and Graphosoma are represented by two species each, accounting for a frequency of 7.41%. With a frequency of 3.70%, only one species represents other genera.

Table 2: Number of species by gender

S. No	Scientific name	Number of Species	Species Frequency %
1	<i>Aelia</i>	2	7,41
2	<i>Bagrada</i>	1	3,70
3	<i>Carpocoris</i>	3	11,11
4	<i>Codophila</i>	1	3,70
5	<i>Dolycoris</i>	1	3,70
6	<i>Eurydema</i>	1	3,70
7	<i>Graphosoma</i>	2	7,41
8	<i>Holcostethus</i>	3	11,11
9	<i>Mustha</i>	1	3,70
10	<i>Neottiglossa</i>	1	3,70
11	<i>Nezara</i>	1	3,70
12	<i>Palomena</i>	1	3,70
13	<i>Picromerus</i>	1	3,70
14	<i>Piezodorus</i>	1	3,70
15	<i>Stagonomus</i>	3	11,11
16	<i>Staria</i>	1	3,70
17	<i>Thalagmus</i>	1	3,70
18	<i>Ventocoris</i>	1	3,70
19	<i>Zicrona</i>	1	3,70
	Total	27	100

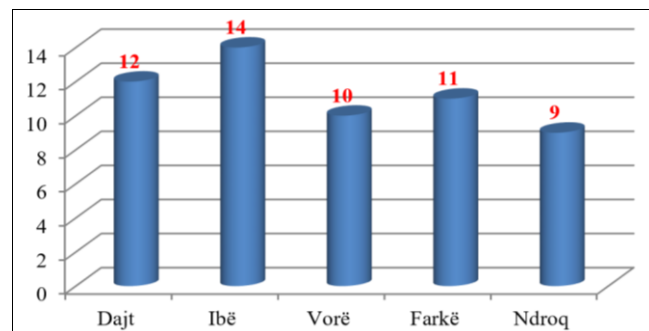


Graph 1: Distribution of the number of species by gender

Regarding species distribution, the Ibe station has 14 species, making up 51.85% of the total. The Dajt station is next with 12 species (44.44%), the Fark's station with 11 species (40.74%), and the Ndroq station with nine species (33.33%) (Table 3, Graph 2).

Table 3: Number of species by stations

Stacioni	Nr. Llojeve	Frekuenca Llojore
Dajt	12	44.44
Ibë	14	51.85
Vorë	10	37.04
Farkë	11	40.74
Ndroq	9	33.33



Graph 2: Distribution of the number of species by stations

From the analysis, the highest coefficient of species similarity between stations is observed between Farkë and

Dajt and between Farkë and Ndroq, both with 27.77% similarity and 5 common species. The similarity between Ibe and Farkë stations is 25% with 5 species in common; between Dajt and Ndroq, it is 23.52% with 4 common species; and the lowest similarity is between Dajt and Ibe with 18.18% and 4 common species. The coefficients between Vora and Dajt, Ibe and Vora, and Vora and Farkë are 15.78%, 14.28%, and 10.52%, respectively, with varying numbers of common species. Additionally, between Vora and Ndroq stations and between Farkë and Ndroq, the similarity coefficients are 5.55% and 5.26%, respectively, with only one common species.

Table 4: Number of common species and similarity coefficient by stations

	Ibë	Vorë	Farkë	Ndroq
Dajt	C = 4 C _J = 18.18%	C = 3 C _J = 15.78%	C = 5 C _J = 27.77%	C = 4 C _J = 23.52%
Ibë		C = 3 C _J = 14.28%	C = 5 C _J = 25%	C = 5 C _J = 27.77%
Vorë			C = 2 C _J = 10.52%	C = 1 C _J = 5.55%
Farkë				C = 1 C _J = 5.26%

Analysis of species composition similarity demonstrates the affinity of species composition among these stations, indicating the influence of ecological factors overall as well as the specific influence of anthropogenic factors.

Conclusion

The study presents the distribution of species within the Pentatomidae family in the ecosystems of Tirana, represented by 19 genera and 27 species.

Among the diverse genera, *Carpocoris*, *Stagonomus*, and *Holcostethus* stand out, each comprising three species with a frequency of 11.11%. Ibe exhibits the highest species richness, with 14 species, representing 51.85%, while Ndroq has the fewest species, with 9 species, accounting for 33.33%.

The highest coefficient of similarity between stations is observed between Farkë and Dajt, as well as between Farkë and Ndroq, both with a similarity of 27.77% and 5 common species. Conversely, the lowest coefficients are found between Vora and Ndroq stations and between Farkë and Ndroq, with similarity coefficients of 5.55% and 5.26%, respectively, each sharing only one common species.

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