SHILAP Revista de lepidopterología, 47 (188) diciembre 2019: 673-684 eISSN: 2340-4078 ISSN: 0300-5267
https://doi.org/10.57065/shilap.496

Habitat preference of Geometridae species in Western Black Sea region of Turkey (Lepidoptera: Geometridae)

M. Özdemir

Abstract

In this study, 3399 specimens belonging to 188 species of the Geometridae (Lepidoptera) family were examined. Species composition and abundance rates of Geometridae communities were analyzed with respect to the plant formations of the region as deciduous forests, dry coniferous-oak forests, humid coniferous forests, pseudomaquis and farmlands. The results also indicates that 26 species in deciduous forests, 23 species in coniferous-oak forests, 20 species in humid coniferous forests, 20 in pseudomaquis and 20 species in farmlands have high abundance rate. The highest rates of abundance in deciduous forests and dry coniferous-oak forests belong to *Cyclophora linearia* (Hübner, [1799]) with 14,7% and *Peribatodes rhomboidaria* ([Denis & Schiffermüller], 1775) 13,1%, respectively. Also, the highest rates of abundance in humid coniferous forests and pseudomaquis belong to *Scotopteryx moeniata* (Scopoli, 1763) with 23,46% and *Cyclophora puppillaria* (Hübner, [1799]) with 19,83%. Species richness is much higher in deciduous forests than it is in other habitats. Faunal similarities between the Geometridae communities are reported below 50% among all habitats. The highest faunal similarity was found to be between dry coniferous-oak forests followed by the second highest similarity between pseudomaquis and deciduous forests.
KEY WORDS: Lepidoptera, Geometridae, habitat, similarity, Black Sea, Turkey.

Preferencia de hábitat de las especies de Geometridae en la región occidental del Mar Negro de Turquía (Lepidoptera: Geometridae)

Resumen

En este estudio, fueron revisados 3.399 ejemplares que pertenecían a 188 especies de la familia de Geometridae (Lepidoptera). Fueron analizadas y evaluadas la composición de los Geometridae con respecto a las formaciones de plantas de la región como bosques de hojas caducas, bosques conífero-robles secos, bosques coníferos húmedos, bosques de hoja perenne y arbustos de hoja caduca y tierras de cultivo. Los resultados también indican, que las 26 especies en bosques de hojas caducas, 23 especies en bosques conífero-roble, las 20 especies en bosques coníferos húmedos, 20 en bosques de hoja perenne y arbustos de hoja caduca y las 20 especies en tierras de cultivo, tienen ratio de abundancia. Los ratios más altos de la alta abundancia en bosques de hojas caducas y los bosques conífero-roble secos, pertenecen a *Cyclophora linearia* (Hübner, [1799]) con 14,7 % y *Peribatodes rhomboidaria* ([D. & Schiff.], 1775) 13,1 %, respectivamente. También, los ratios más altos de la abundancia en bosques coníferos húmedos y bosques de hoja perenne y arbustos de hoja caduca, pertenecen a *Scotopteryx moeniata* (Scopoli1763) con 23,46 % y *Cyclophora puppillaria* (Hübner, [1799]) con 19,83 %. La abundancia de las especies es mucho más alta en los bosques de hojas caducas que en otros hábitats. Las semejanzas de Fauna entre las comunidades de Geometridae están por debajo del 50 % entre todos hábitats. La similitud de fauna más alta se ha encontrado en los bosques conífero-roble secos, seguida por la segunda similitud más alta entre los bosques de hoja perenne y arbustos de hoja caduca y los bosques de hojas caducas.
PALABRAS CLAVE: Lepidoptera, Geometridae, hábitat, semejanza, Mar Negro, Turquía.

Introduction

The Geometridae is the most species-rich family of Lepidoptera apart from Noctuidae and Pyralidae. There are over 23000 decrypted species known in worldwide (SCOBLE & HAUSMANN, 2007), 900 in Europe (HAUSMANN, 2001) and 608 in Turkey (KOÇAK & KEMAL, 2009). Geometridae is a valuable Lepidoptera family as an indicator group to monitor environmental changes due to its characteristics such as richness in species number, ability to adapt to different habitats, and sensitivity to environmental or human-driven changes in the ecosystem (HAUSMANN, 2001; BREHM, 2002). More importantly, a decrease in the diversity of Geometridae species in an ecosystem is attributed to the environmental changes driven by human factors (BECK *et al*., 2002).

The study area is located in the western part of the Black Sea of Turkey has a more rugged terrain. In the north, parallel to the sea, the western Black Sea Mountains lie. The Küre Mountains extending parallel to the coast and the Ilgaz Mountains in the south determine the topographic structure of the region. Bartin and Kastamonu provinces in the study area extend along the Black Sea coast. Karabük, another province, is located inside and neighbor to others. All Provinces are located within the borders of the Euro-Siberian region biogeographically. Depending on the climatic changes Oceanic, sub-Mediterranean and Mediterranean, different types of vegetation become dominant from the north to the south of the area. Oceanic climate, which is characterized in low altitudes by humid deciduous forests dominated by *Fagus* and in high altitudes by humid coniferous forests dominated by *Abies* and *Pinus*. Additionally, pseudomaqui regions are discontinuously encountered along the coast of Black Sea. The less oceanic Southern side of the mountains are dominated by relatively dryer forests dominated by *Pinus* and *Quercus* and by meadows in clearings (AKMAN, 1990, 1993; DEMIRÖRS & KURT, 2005; AYDINÖZÜ, 2008). The study area, as a whole, encompasses Küre Mountains and Yenice Mountains, which were recognized as forest hot spots by World Wild Fund (WWF) in 1999.

Studies of Geometridae diversity in the western Black Sea Region has been limited. KOÇAK & KEMAL (2009) have reported only ten species from the locations that the present study investigates. Subsequently, AKBULUT *et al*. (2003), CAN (2008), TOPER KAYGIN *et al*. (2009), OKYAR (2012) and AKKUZU *et al*. (2015) have added some new species to the list on top of KOÇAK & KEMAL (2009). SEVEN & ÖZDEMIR (2007) investigated relation between some Butterflies and plant association in eastern part of Black Sea Region of Turkey. OKYAR *et al*. (2009) have evaluated Heterocera species' stability in different habitats in the Western Black Sea region using Shannon-Wiener diversity index. Moreover, SEVEN (2017) has examined habitat preferences of diurnal Lepidoptera species around the Salt Lake in Central Anatolia region using Jaccard Similarity analysis.

This study examines diversity and habitat preferences of Geometridae species in the Western Black Sea Region. Farmlands and natural habitats were compared. In this study, for the first time, analyzes faunal similarities and species transition of Geometridae family across different habitats in this region.

Material and methods

This study was conducted in Bartın, Karabük and Kastamonu provinces in the Western Black Sea region of Turkey. The fieldwork was carried out from May to September between 2008-2012. The samples were collected during periods of no moonlight by means of 8W "black light" fluorescent lamp in farmlands and four other selected areas each displaying separate plant formations. Through the fieldwork, samplings were conducted in five different habitat types four times each month between May and September. A total of 20 samplings for each of the five habitats resulted in 100 samplings in total (Fig. 1). Habitats were characterized based on GÜNAL (2013) and ATALAY (1994). Additionally, HAUSMANN (2001, 2004), MIRONOV (2003), VIIDALEPP (2007), HAUSMANN & VIIDALEPP (2012) and SKOU & SIHVONEN (2015) were consulted during the identification of Geometridae species.

Species whose specimen rate is equal to or greater than 1% were considered to have high abundance rates (DAPKUS, 2004). The species composition of communities were compared using the

Bray-Curtis similarity index. Biodiversity Pro 2 software was used for the calculation of species richens, similarity and for forming the diagrams (MCALEECE, 1997) (Fig. 3).

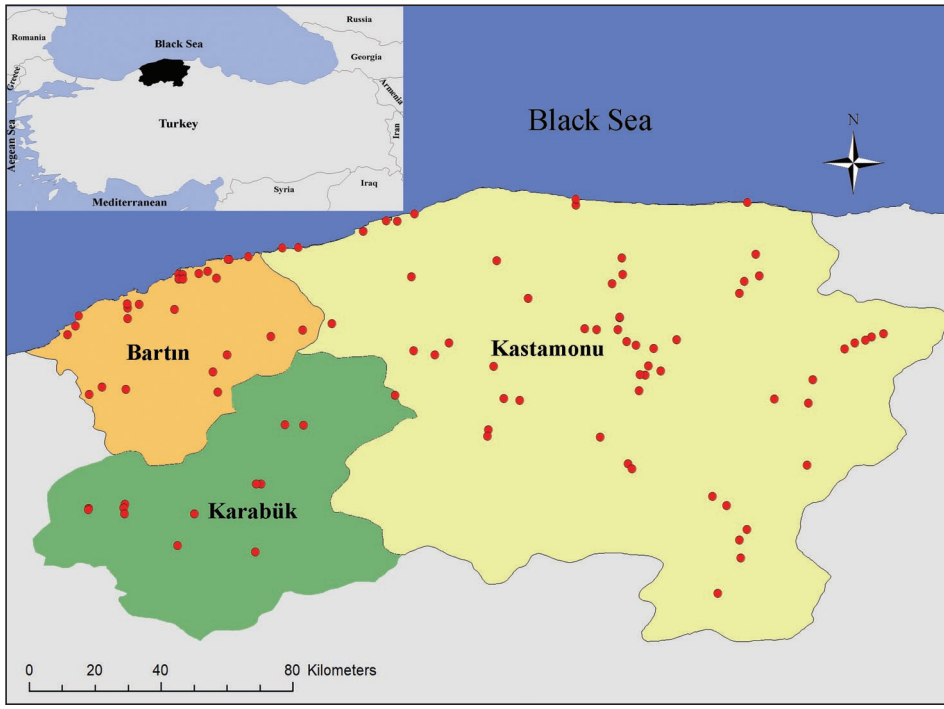

Fig. 1.– Study area and sampling stations.

Description of the study sites

1. Deciduous forest: Hygrophilous forests that cover the Northern side of the Black Sea Mountains. The dominant species along the piedmont is *Fagus orientalis* Lipsky, *Carpinus betulus* L., *C. orientalis* Mill., *Alnus glutinosa* (L.) Gaertn., *Castanea sativa* Mill., *Quercus hartwissiana* Steven., *Q. petraea* (Matt.) Lebl., *Q. robur* L., *Acer* sp., *Tilia* sp., *Fraxinus* sp., *Ulmus* sp., *Corylus avellane* L., *Salix* sp., *Populus tremula* L., are also encountered among the forests. The forest ground is covered with *Rhododendron ponticum* L., *R. luteum* Sweet, *Ilex* sp., *Vaccinium Arctostaphylos* L., *Prunus laurocerasus* L., *Polypodiun vulgare* L. and *Hedera helix* L.
2. Dry Coniferous-oak forests: Forests formed by continental climate enforced by precipitation and temperature trends on the Southern side of Black Sea Mountains. The dominant species in these forests are *Pinus Sylvestris* L., *Pinus nigra* J. F. Arnold, *Quercus infectoria* Olivier, *Q. pubescens* Willd. and *Q. cerris* L. There also exist *Juniperus* sp., *Berberis crataegyna* DC, *Paliurus spina-cristi* Mill., *Pyrus elaeagnifolia* Pall., *P. amygdaliformis* Vill., *Prunus microcarpa* C. A. Mey, and *Crataegus orientalis* M. Bied. among the forests.
3. Humid coniferous forests: Forests of coniferous trees that consist of *Pinus nigra* J. F. Arnold, *Abies nordmanniana equi-trojani* (Arsch. & Sint. Ex Boiss.) Coode & Cullen and *Pinus sylvestris* L.
4. Pseudomaquis: Brush formations that extend from the sea level to altitudes of 200-250 m.

Pseudomaquis is also seen in areas of 750 m. altitude due to the effect of Black Sea climate that can penetrate through river valleys. The pseudomaquis formation consists of maquis species such as *Erica arborea* L., *Arbutus unedo* L., *A. andrachne* L., *Pistacia terebinthus* L., *Phillyrea latifolia* L., *Laurus nobilis* L., *Juniperus oxycedrus* L., *Cistus salviifolius* L., *Spartium junceum* L., *Myrtus communis* L., and non-evergreen shrubs such as *Cornus sanguinea* L., *C. mas* L., *Corylus avellane* L., *Mespilus germanica* L., *Crataegus monogyna* Jacq., *Ligustrum vulgare* L. There also exists hygrophilous species indigenous to the Black Sea region such as *Rhododendron ponticum* L., *Daphne pontica* L., *Laurocerasus officinalis* L., *Sorbus torminalis* (L.) Crantz, among the pseudomaquis formation.

5. Farmlands: Agricultural lands for cereal, sugar beet, rice and garlic cultivation along with orchards and vegetable gardens among residential areas.

Results and discussion

In the present study, 188 Geometridae species are identified from the Western Black Sea region. Distribution of species with respect to habitats: 109 species in deciduous forest (1343 specimens), 96 species in dry coniferous-oak forests (442 specimens), 82 species in humid coniferous forests (520 specimens), 90 species in pseudomaquis (802 specimens) and 65 species in farmlands (292 specimens) (Fig. 2). The deciduous forest is found to be the most species-rich site.

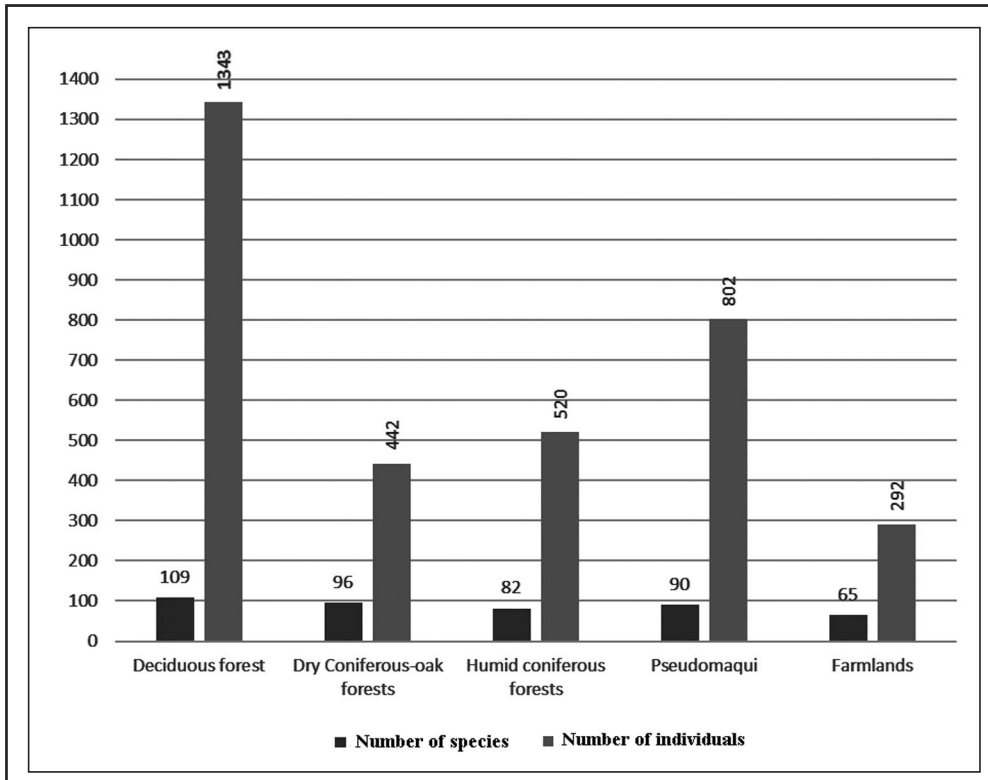

Fig. 2.– Species-richness comparison of Geometridae communities of the Western Black Sea region according to habitat categorization (**i.** deciduous forest; **ii.** dry coniferous-oak forests; **iii.** humid coniferous forests; **iv.** pseudomaquis; and v.farmlands).

When all specimens collected from the sampling stations are considered, abundance rates of 21 species are found to be equal to or greater than 1% (Table 1). The most dominant species within the study area is *Peribatodes rhomboidaria* (11,06%), which is known as the most widespread species among Lepidoptera communities. Skou (1986) lists forest fringes, brush, field hedges and gardens as the habitat of *Peribatodes rhomboidaria*. It feeds on various trees and bushes and is prevalent in Europe, Central Asia, the Caucasus, Iran, Turkey, and North Africa. Hence, the reason of the species' high abundance rate in the study field dominated by forests is thought to be its eurytopic characteristic.

Another dominant species of the region is *Cyclophora linearia* (6,12%), which displays high abundance rate only in deciduous forest. This species is monophagous on *Fagus sylvatica* L., or oligophagous (2-3), but clearly preferring *Fagus* (Fagaceae) (HAUSMANN, 2004). Thus, the reason of the species' high abundance rate is thought to be the species' feed preference toward Fagus, which is widely found in the deciduous forests located in Western Black Sea region.

When all Geometridae communities are considered, abundance rate of 26 species is found to be equal to or greater than 1% in deciduous forests. Only 13 species among them are dominant in this habitat (*Asthena albulata* (4,5%), *Cabera pusaria* (2%), *Campaea margaritata* (4,9%), *Catarhoe rubidata* (1,2%), *Cyclophora annularia* (1,9%), *C. linearia* (14,7%), *Ectropis crepuscularia* (1,1%), *Ennomos quercinaria* (1,9%), *Hydriomena furcata* (3,1%), *Hypomecis roboraria* (1,9%), *Macaria notata* (5,7%), *Plagodis dolabraria* (1,6%) and *Selenia dentaria* (1,8%)).

Subsequently, 24 species are found to be abundant species in the dry coniferous-oak forests (Table 1). Among these species, *P. rhomboidaria* (13,1%), *Scotopteryx luridata* (Hufnagel, 1767) (7,2%), *Rhodostrophia discopunctata* Amsel, 1935 (6,1%), *Idaea rufaria* (Hübner, [1799]) (6,1%) also prefer other habitats while they have high abundance rates only in dry coniferous-oak forests. *Charissa certhiata*, *Eupithecia intricata, E. semigraphata Scotopteryx coarctaria* are reported to be the species that prefer only dry coniferous-oak habitat. It is known that *C. certhiata* shows prevalence in dry limestone habitats (BESHKOV, 2013). The studied habitat also shows similar characteristics. *E. intricata* generally feeds on *Juniperus* sp. (MIRONOV, 2003), which belongs to the species composition of dry coniferous-oak habitat. MIRONOV (2003) also describes the preferred habitat of *E. semigraphata* as warm and dry, preferably stony slopes, rocks and screes areas, which fits only to the dry coniferous-oak forests studied in the present study. As a xerothermophilous species (HAUSMANN & VIIDALEPP, 2012), *S. coarctaria*, is recorded from an area fitting to the habitat requirements of the species.

When it comes to humid coniferous forests, 20 Geometridae species are reported to display dominance. *Scotopteryx moeniata* is found to be the most abundant species with 23,46% abundance rate respectively and only prefer humid coniferous forests among other studied habitats. These species are xerothermophilous according to HAUSMANN & VIIDALEPP (2012). Based on the results of the present study, however, these two species are thought to have high abundance rates because they have been supported by Fabaceae species grown in areas of low tree density and small clearings in coniferous forests. Due to the fact that *Scotopteryx moeniata* have not been encountered in other habitats, it is inferred that they show high habitat selectivity in favor of coniferous forests. Moreover, *Eupithecia tantillaria* and *Pungeleria capreolaria* are found to be other selective and dominant species that prefers only coniferous forests. *E. tantillaria* is an oligophagous species that feeds on *Abies* and *Pinus* during larval stage (MIRONOV, 2003). *P. capreolaria*, on the other hand, is a sylvicolours species. This species occurs in coniferous and mixed forest with conifers as well as in more open woodland with conifers (SKOU & SIHVONEN, 2015). The results of the present study are, thus, consistent with previous insights about the specified species.

Furthermore, a total of 20 species display abundance rates greater than 1% in pseudomaquis

areas. Among these, *C. puppillaria* (Hübner, [1799]) is the most widespread species that lives in the Mediterranean maquis and in sparse oak forests (*Quercus pubbescens*, *Q. ilex*). It could be seen from 0 m. up to 1000 m. above the sea level in southern Europe, and up to 1500 m. in Turkey (HAUSMANN, 2004). The reason why *C. puppillaria* reaches an abundance rate of 5,59% is its high abundance rate (19,83%) observed in pseudomaquis areas. This concludes that Geometridae species that generally exist in maquis could also prefer pseudomaquis areas located in the coastal part of the Black Sea. Lastly, *Gnophos sartatus* (1,12%) and *Phaiogramma etruscaria* (1,12%) are found to be the dominant species that only prefer pseudomaquis habitat.

Next, farmlands are dominated by 25 Geometridae species in which *Peribatodes rhomboidaria* (15,41%) and *Idaea rufaria* (15,07%) display the highest dominance rates. As mentioned before, *P. rhomboidaria* is reported to have high specimen numbers in all habitats sampled in this study. Moreover, *I. rufaria* is a xerothermophilous species of open habitats, often on dry, low-nutrient grassland, sun-exposed slops, preferring sandy soils and limestone (HUSMANN, 2004). While forests cover most of the study area, open areas provided by farmlands may cause *I. rufaria* population to increase.

Overall, deciduous forest is the preferred habitat for most of the species (109 species) examined for this study while, at the same time, many of them having high abundance rates. This indicates that any loss of deciduous forest caused by climate change or anthropogenic factors will most probably affect species' richness and composition in the region. In turn, the conservation efforts become extremely important in the Western Black Sea region that encompasses two of the Turkey's nine forest hot spots recognized by WWF.

Subsequently, similarity of Geometridae communities among habitats is below 50% (Table 2). The highest similarity rate is observed between farmlands and dry coniferous-oak forests (44,14%). This is because farmlands, for most of the time, are located discontinuously within dry coniferous forests. The second highest similarity rate is reported between deciduous forests and pseudomaquis areas (37,20%,) followed by the third highest between dry coniferous-oak forests and humid coniferous forests (32,02%). Finally, the lowest similarity rate prevails between deciduous forests and farmlands (14,92%). Figure 2 shows that the region could be segregated into two sub-regions with respect to habitats that dominate them: 1. Sub-region dominated by deciduous forest and pseudomaquis; 2. Sub region dominated by dry coniferous-oak forests, humid coniferous forests and farmlands whereas humid coniferous forests display characteristics different than the other two habitats. The reason of humid coniferous forests being in the second sub-region is because dry coniferous-oak forests of pine forest type. While the Northern side of the mountains are dominated by pseudomaquis, deciduous forests and humid coniferous forests starting from the sea level, the Southern side of mountains are dominated by dry coniferous-oak forests in the Western Black Sea region. Clearings of dry coniferous-oak forests are also suitable for steppe development. This study shows that species composition of Geometridae communities in the Western Black Sea region is shaped by plant formations found in humid areas on the Northern side of mountains where Oceanic climate is in effect.

Table 2.– Similarity rates between habitats of Geometridae communities of Western Black Sea region based on Bray-Curtis Similarity Index.

	Deciduous forest	**Dry Coniferous-oak forests**	**Humid coniferous forests**	**Pseudomaquis**	**Farmlands**
Deciduous forest	*	23,19	19,86	**37,20**	14,92
Dry Coniferous-oak forests	*	*	**32,02**	29,90	**44,14**
Humid coniferous forests	*	*	*	14,98	22,41
Pseudomaquis	*	*	*	*	23,03
Farmlands	*	*	*	*	*

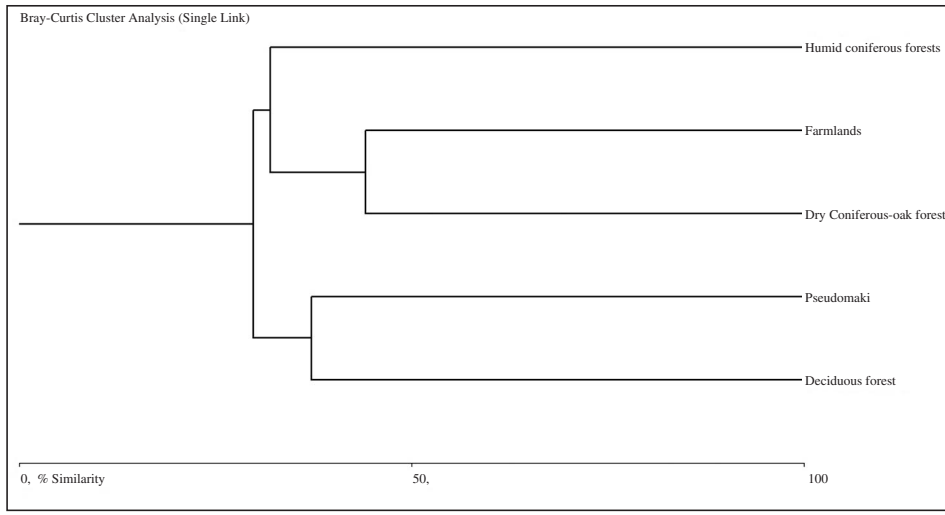

Fig. 3.– Similarity diagram of studied habitats according to Bray-Curtis (Cluster analysis).

Acknowledgement

Thanks to Republic of Turkey Ministry of Agriculture and Forestry, General Directorate of Agricultural Research and Policies for supporting this project.

BIBLIOGRAPHY

AKBULUT, S., YÜKSEL, B. & KETEN, A., 2003.– The Lepidoptera (Insecta) fauna of Düzce province, Turkey.– *Turkish Journal of Zoology*, **27**: 257-268.

AKKUZU, E., EROL, S., DINGILOĞLU, E., ÖZDIKMENLI, G. & AYBERK, H., 2015.– Lepidoptera Fauna of the Forest Enterprise Directorate of Kastamonu.– *Kastamonu University Journal of Forestry Faculty*, **15**(2) 308-318.

AKMAN, Y., 1990.– *Climate and Bioclimate*: 320 pp. Palme Press, Ankara.

AKMAN, Y., 1993.– *Biogeography*: 380 pp. Palme Press, Ankara.

ATALAY, I., 1994.– *Vegetation Geography of Turkey*: 352 pp. Ege University Press, Bornova, İzmir.

AYDINÖZÜ D., 2008.– An investigation on the distribution areas of the maquis formation in Turkey.– *Kastamonu Education Journal,* **16**(1): 207-220.

BECK, J., SCHULZE, C., LINSENMAIR, K. E. & FIEDLER, K., 2002.– From forest to farmland: diversity of geometrid moths along two habitat gradients on Borneo.– *Journal of Tropical Ecology,* **17**: 33-51.

BESHKOV, S., 2013.– Treasures of the Congress center and its surroundings-species and habitats.– *XVIII European Congress of Lepidopterology*: 26-27. Blagoevgrad.

BREHM, G., 2002.– *Diversity of geometrid moths in a montane rainforest in Ecuador* (Doctoral dissertation). University of Bayreuth, Bayreuth. Available from http://opus.ub.uni-bayreuth.de/volltexte/2003/20 (accessed 22th June 2011).

CAN, F., 2008.– The Geometrid Moths (Lepidoptera) from the Middle and Eastern Black Sea regions of Turkey.– *Turkish Journal of Zoology*, **32**: 351-358.

DAPKUS, D., 2004.– Lepidoptera of a raised bog and adjacent forest in Lithuania.– *European Journal of Entomology,* **101**: 63-67.

DEMİRÖRS, M. & KURT, F., 2005.– Contrubutions to the flora of the region among Zonguldak - Karabük and Bartın.– *Kastamonu Education Journal*, **13**(2) 555-560.

GÜNAL, N., 2013.– The Effects of the Climate on the Natural Vegetation in Turkey.– *Acta Turcıca, Online Thematic Journal of Turkic Studies*, **5**(1): 1-22.

HAUSMANN, A. & VIIDALEPP, J., 2012.– Larentiinae I.– *In* A. HAUSMANN. *The Geometrid Moths of Europe,* **3**: 743 pp. Apollo Books, Stenstrup.

HAUSMANN, A., 2001.– Introduction, Archiearinae, Orthostixinae, Desmobathrinae, Alsophilinae, Geometrinae.– *In* A. HAUSMANN. *The Geometrid Moths of Europe,* **1**: 282 pp. Apollo Books, Stentrup.

HAUSMANN, A., 2004.– Sterrhinae.– *In* A. HAUSMANN. *The Geometrid Moths of Europe,* **2**: 600 pp. Apollo Books, Stenstrup.

MCALEECE, N., 1997.– *BioDiversity Pro: Free Statistics Software for Ecology*. The Natural History Museum and Scottish Association for Marine Science, London.

MIRONOV, V., 2003.– Larentiinae II. Perizomini and Eupitheciini.– *In* A. HAUSMANN. *The Geometrid Moths of Europe,* **4**: 664 pp. Appollo Books, Stenstrup.

OKYAR, Z., 2012.– Heteroceran (Lepidoptera) fauna of western black sea region.– *Trakya University Jounal of Natural Sciences*, **13**(1): 1-14.

OKYAR, Z., YURTSEVER, S., AKTAÇ, N. & ÇAKAN, G., 2009.– Some Aspects of the moth (Lepidoptera, Heterocera) species diversity in Western Black Sea Region of Turkey.– *North-Western Journal of Zoology,* **5**(1): 104-120.

ÖZDEMİR, M. & SEVEN, S., 2007.– Interrelation Between Some Butterflies and Plant Associations (Turkey).– *Pakistan Journal of Biological Sciences,* **10**(1): 112-116.

SCOBLE, M. & HAUSMANN, A., 2007.– *Online list of valid and available names of the Geometridae of the World.* Available from http://lepbarcoding.org/geometridae/species_checklists.php (accessed 5th March 2019).

SEVEN, S., 2017.– Comparative Analysis of Habitat Preferences of the Diurnal Lepidoptera of Tuz Lake, Turkey.– *Acta Zoologica Bulgarica*, **69**(1): 49-54.

SKOU, P. & SIHVONEN, P., 2015.– Ennominae I. *In* A. HAUSMANN. *The Geometrid Moths of Europe,* **5**: 657 pp. Brill, Leiden.

SKOU, P., 1986.– The Geometroid moths of North Europe (Lepidoptera: Drepanidae and Geometridae).– *Entomonograph,* **6**: 348 pp. E. J. Brill, Scandinavian Science Press, Leiden.

TOPER KAYGIN, A., YILDIZ, Y. & AVCI, M., 2009.– Lepidoptera fauna in Bartin province, in western black sea region of Turkey.– *African Journal of Agricultural Research*, **4**(9): 815-822.

M. Ö.
Plant Protection Central Research Institute
Gayret Mah.
Fatih Sultan Mehmet Bul. No: 66
TR-06172 Yenimahalle /Ankara
TURQUÍA / *TURKEY*
E-mail: mustafa_ozdemir@zmmae.gov.tr
https://orcid.org/0000-0002-7232-0594

(Recibido para publicación / *Received for publication* 10-VII-2019)
(Revisado y aceptado / *Revised and acepted* 20-VIII-2019)
(Publicado / *Published* 30-XII-2019)

Table 1.– Distribution ratios of Geometridae species identified from the Western Black Sea region according to habitat categorization.

Species	Deciduous forest	Dry Coniferous-oak forests	Humid coniferous forests	Pseudomaqui	Farmlands	Total
	No. İnd. (%)	No. İnd. (%)	No. İnd. (%)	No. İnd. (%)	No. İnd. (%)	No. İnd. (%)
Abraxas sylvata (Scopoli, 1763)	0 (0)	0 (0)	1 (0,19)	0 (0)	0 (0)	1 (0,03)
Alcis repandatus (Linnaeus, 1758)	33 **(2,5)**	2 (0,5)	34 **(6,54)**	0 (0)	0 (0)	69 **(2,03)**
Apeira syringaria (Linnaeus, 1758)	4 (0,3)	0 (0)	0 (0)	1 (0,12)	0 (0)	5 (0,15)
Aplasta ononaria (Fuessly, 1783)	2 (0,1)	0 (0)	0 (0)	1 (0,12)	0 (0)	3 (0,09)
Aplocera efformata (Guenée, [1858])	1 (0,1)	0 (0)	1 (0,19)	8 **(1)**	10 **(3,42)**	20 (0,59)
Aplocera fraudulentata (Herrich-Schäffer, 1861)	0 (0)	0 (0)	1 (0,19)	0 (0)	0 (0)	1 (0,03)
Aplocera plagiata (Linnaeus, 1758)	0 (0)	3 (0,7)	1 (0,19)	0 (0)	3 **(1,03)**	7 (0,21)
Aplocera uniformata (Urbahn, 1971)	0 (0)	0 (0)	20 **(3,85)**	0 (0)	1 (0,34)	21 (0,62)
Ascotis selenaria ([D. & Schiff.], 1775)	10 (0,7)	2 (0,5)	1 (0,19)	33 **(4,11)**	0 (0)	46 **(1,35)**
Asovia maeoticaria (Alpheraky, 1876)	25 **(1,9)**	1 (0,2)	1 (0,19)	0 (0)	6 **(2,05)**	33 (0,97)
Aspitates ochreraria (Rossi, 1794)	0 (0)	0 (0)	0 (0)	1 (0,12)	3 **(1,03)**	4 (0,12)
Asthena albulata (Hufnagel, 1767)	60 **(4,5)**	0 (0)	3 (0,58)	6 (0,75)	0 (0)	69 **(2,03)**
Biston betularius (Linnaeus, 1758)	3 (0,2)	0 (0)	0 (0)	0 (0)	0 (0)	3 (0,09)
Cabera exanthemata (Scopoli, 1763)	7 (0,5)	0 (0)	0 (0)	0 (0)	0 (0)	7 (0,21)
Cabera pusaria (Linnaeus, 1758)	27 **(2)**	1 (0,2)	1 (0,19)	2 (0,25)	0 (0)	31 (0,91)
Campaea margaritata (Linnaeus, 1761)	66 **(4,9)**	1 (0,2)	1 (0,19)	2 (0,25)	0 (0)	70 **(2,06)**
Camptogramma bilineata (Linnaeus, 1758)	1 (0,1)	3 (0,7)	3 (0,58)	2 (0,25)	1 (0,34)	10 (0,29)
Cataclysme riguata (Hübner, [1813])	0 (0)	13 **(2,9)**	0 (0)	0 (0)	5 **(1,71)**	18 (0,53)
Catarhoe cuculata (Hufnagel, 1767)	7 (0,5)	1 (0,2)	0 (0)	0 (0)	0 (0)	8 (0,24)
Catarhoe rubidata ([D. & Schiff.], 1775)	16 **(1,2)**	0 (0)	2 (0,38)	3 (0,37)	0 (0)	21 (0,62)
Charissa certhiata (Rebel & Zerny, 1931)	0 (0)	8 **(1,8)**	0 (0)	0 (0)	0 (0)	8 (0,24)
Charissa mutilata (Staudinger, 1879)	0 (0)	1 (0,2)	0 (0)	0 (0)	0 (0)	1 (0,03)
Charissa obscurata ([D. & Schiff.], 1775)	3 (0,2)	3 (0,7)	11 **(2,12)**	0 (0)	20 **(6,85)**	37 **(1,09)**
Charissa zeitunaria (Staudinger, 1901)	0 (0)	0 (0)	0 (0)	0 (0)	18 **(6,16)**	18 (0,53)
Chiasmia clathrata (Linnaeus, 1758)	3 (0,2)	2 (0,5)	10 **(1,92)**	0 (0)	5 **(1,71)**	20 (0,59)
Chlorissa cloraria (Hübner, [1813])	3 (0,2)	0 (0)	0 (0)	3 (0,37)	1 (0,34)	7 (0,21)
Chlorissa viridata (Linnaeus, 1758)	5 (0,4)	0 (0)	0 (0)	3 (0,37)	0 (0)	8 (0,24)
Chloroclysta siterata (Hufnagel, 1767)	0 (0)	2 (0,5)	0 (0)	0 (0)	0 (0)	2 (0,06)
Chloroclystis v-ata (Haworth, 1809)	16 **(1,2)**	0 (0)	0 (0)	9 **(1,12)**	0 (0)	25 (0,74)
Cidaria fulvata (Forster, 1771)	1 (0,1)	6 **(1,4)**	9 **(1,73)**	0 (0)	0 (0)	16 (0,47)
Cleora cinctaria ([D. & Schiff.], 1775)	0 (0)	0 (0)	1 (0,19)	0 (0)	0 (0)	1 (0,03)
Cleorodes lichenarius (Hufnagel, 1767)	11 (0,8)	7 **(1,6)**	1 (0,19)	0 (0)	2 (0,68)	21 (0,62)
Cleta filacearia (Herrich-Schäffer, 1847)	0 (0)	0 (0)	2 (0,38)	0 (0)	0 (0)	2 (0,06)
Coenotephria ablutaria hangayi (Vojnıts, 1986)	0 (0)	0 (0)	1 (0,19)	8 **(1)**	1 (0,34)	10 (0,29)
Colostygia fezae Hausmann, 2011	0 (0)	0 (0)	2 (0,38)	0 (0)	0 (0)	2 (0,06)
Colostygia pectinataria (Knoch, 1781)	0 (0)	0 (0)	3 (0,58)	0 (0)	1 (0,34)	4 (0,12)
Cosmorhoe ocellata (Linnaeus, 1758)	34 **(2,5)**	9 **(2)**	12 **(2,31)**	7 (0,87)	2 (0,68)	64 **(1,88)**
Costaconvexa polygrammata (Borkhausen, 1794)	0 (0)	1 (0,2)	0 (0)	0 (0)	0 (0)	1 (0,03)
Crocallis elinguaria (Linnaeus, 1758)	2 (0,1)	1 (0,2)	3 (0,58)	2 (0,25)	0 (0)	8 (0,24)
Cyclophora albiocellaria (Hübner, 1789)	4 (0,3)	1 (0,2)	0 (0)	1 (0,12)	0 (0)	6 (0,18)
Cyclophora annularia (Fabricius, 1775)	25 **(1,9)**	0 (0)	0 (0)	3 (0,37)	0 (0)	28 (0,82)
Cyclophora linearia (Hübner, [1799])	198 **(14,7)**	1 (0,2)	2 (0,38)	5 (0,62	2 (0,68)	208 **(6,12)**
Cyclophora porata (Linnaeus, 1767)	0 (0)	0 (0)	1 (0,19)	0 (0)	0 (0)	1 (0,03)

Cyclophora punctaria fritzae Hausmann, 2003	14 **(1)**	1 (0,2)	0 (0)	3 (0,37)	0 (0)	18 (0,53)
Cyclophora puppillaria (Hübner, [1799])	24 **(1,8)**	5 **(1,1)**	1 (0,19)	159 **(19,83)**	1 (0,34)	190 **(5,59)**
Cyclophora quercimontaria (Bastelberger, 1897)	10 (0,7)	1 (0,2)	4 (0,77)	11 **(1,37)**	0 (0)	26 (0,76)
Cyclophora suppunctaria (Zeller, 1847)	0 (0)	1 (0,2)	0 (0)	0 (0)	2 (0,68)	3 (0,09)
Dyscia conspersaria ([D. & Schiff.], 1775)	0 (0)	4 (0,9)	0 (0)	0 (0)	0 (0)	4 (0,12)
Dyscia innocentaria (Christoph, 1885)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0,34)	1 (0,03)
Dysstroma truncata (Hufnagel, 1767)	1 (0,1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0,03)
Ecliptopera silaceata ([D. & Schiff.], 1775)	4 (0,3)	0 (0)	2 (0,38)	0 (0)	0 (0)	6 (0,18)
Ectropis crepuscularia ([D. & Schiff.], 1775)	15 **(1,1)**	2 (0,5)	0 (0)	0 (0)	0 (0)	17 (0,5)
Ematurga atomaria (Linnaeus, 1758)	1 (0,1)	0 (0)	0 (0)	12 **(1,5)**	0 (0)	13 (0,38)
Ennomos erosarius (Hübner, 1790)	1 (0,1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0,03)
Ennomos fuscantaria (Haworth, 1809)	1 (0,1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0,03)
Ennomos quercaria (Hübner, [1813])	0 (0)	1 (0,2)	0 (0)	0 (0)	0 (0)	1 (0,03)
Ennomos quercinaria (Hufnagel, 1767)	26 **(1,9)**	1 (0,2)	0 (0)	0 (0)	0 (0)	27 (0,79)
Epione repandaria (Hufnagel, 1767)	3 (0,2)	0 (0)	1 (0,19)	0 (0)	0 (0)	4 (0,12)
Epione vespertaria (Linnaeus, 1767)	1 (0,1)	0 (0)	4 (0,77)	0 (0)	0 (0)	5 (0,15)
Epirrhoe alternata (Müller, 1764)	0 (0)	1 (0,2)	0 (0)	0 (0)	1 (0,34)	2 (0,06)
Epirrhoe galiata ([D. & Schiff.], 1775)	18 **(1,3)**	12 **(2,7)**	4 (0,77)	17 **(2,12)**	2 (0,68)	53 **(1,56)**
Epirrhoe molluginata (Hübner, [1813]	0 (0)	0 (0)	3 (0,58)	0 (0)	0 (0)	3 (0,09)
Eucrostes indigenata (Villers, 1789)	0 (0)	0 (0)	0 (0)	2 (0,25)	0 (0)	2 (0,06)
Eumannia oppositaria (Mann, 1864)	0 (0)	3 (0,7)	0 (0)	5 (0,62	2 (0,68)	10 (0,29)
Euphyia biangulata (Haworth, [1809])	6 (0,4)	2 (0,5)	0 (0)	0 (0)	0 (0)	8 (0,24)
Euphyia frustata (Treitschke, 1828)	0 (0)	2 (0,5)	0 (0)	0 (0)	0 (0)	2 (0,06)
Eupithecia alliaria Staudinger, 1870	1 (0,1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0,03)
Eupithecia breviculata (Donzel, 1837)	5 (0,4)	3 (0,7)	0 (0)	2 (0,25)	0 (0)	10 (0,29)
Eupithecia centaureata ([D. & Schiff.], 1775)	0 (0)	1 (0,2)	0 (0)	0 (0)	0 (0)	1 (0,03)
Eupithecia denotata (Hübner, [1813])	2 (0,1)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0,06)
Eupithecia denticulata (Treitschke, 1828)	0 (0)	8 **(1,8)**	0 (0)	1 (0,12)	0 (0)	9 (0,26)
Eupithecia ericeata (Rambur, 1833)	0 (0)	1 (0,2)	0 (0)	0 (0)	0 (0)	1 (0,03)
Eupithecia haworthiata Doubleday, 1856	2 (0,1)	0 (0)	0 (0)	3 (0,37)	0 (0)	5 (0,15)
Eupithecia intricata Zetterstedt, [1839]	0 (0)	8 **(1,8)**	0 (0)	0 (0)	0 (0)	8 (0,24)
Eupithecia limbata Staudinger, 1879	0 (0)	2 (0,5)	0 (0)	0 (0)	0 (0)	2 (0,06)
Eupithecia marginata Staudinger, 1892	0 (0)	0 (0)	0 (0)	0 (0)	1 (0,34)	1 (0,03)
Eupithecia orphnata Petersen, 1909	0 (0)	0 (0)	1 (0,19)	0 (0)	0 (0)	1 (0,03)
Eupithecia oxycedrata (Rambur, 1833)	0 (0)	2 (0,5)	0 (0)	0 (0)	0 (0)	2 (0,06)
Eupithecia pimpinellata (Hübner, [1813])	0 (0)	5 **(1,1)**	5 (0,96)	0 (0)	0 (0)	10 (0,29)
Eupithecia pulchellata Stephens, 1831	3 (0,2)	0 (0)	0 (0)	0 (0)	0 (0)	3 (0,09)
Eupithecia pusillata (Fabricius, 1787)	0 (0)	0 (0)	1 (0,19)	1 (0,12)	0 (0)	2 (0,06)
Eupithecia pyreneata Mabille, 1871	5 (0,4)	0 (0)	0 (0)	0 (0)	0 (0)	5 (0,15)
Eupithecia selinata Herrich-Schäffer, 1861	1 (0,1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0,03)
Eupithecia semigraphata Bruand, [1847]	0 (0)	8 **(1,8)**	0 (0)	0 (0)	0 (0)	8 (0,24)
Eupithecia sp.	0 (0)	1 (0,2)	0 (0)	0 (0)	0 (0)	1 (0,03)
Eupithecia subfuscata (Haworth, [1809])	0 (0)	0 (0)	0 (0)	0 (0)	1 (0,34)	1 (0,03)
Eupithecia succenturiata (Linnaeus, 1758)	3 (0,2)	0 (0)	0 (0)	0 (0)	0 (0)	3 (0,09)
Eupithecia tantillaria Boisduval, 1840	0 (0)	0 (0)	19 **(3,65)**	0 (0)	0 (0)	19 (0,56)
Eupithecia vulgata (Haworth, [1809])	0 (0)	0 (0)	1 (0,19)	0 (0)	0 (0)	1 (0,03)
Gnophos sartatus (Treitschke, 1827)	0 (0)	0 (0)	0 (0)	9 **(1,12)**	0 (0)	9 (0,26)
Gymnoscelis rufifasciata (Haworth, [1809])	5 (0,4)	1 (0,2)	1 (0,19)	9 **(1,12)**	3 **(1,03)**	19 (0,56)
Heliomata glarearia (Brahm, 1791)	0 (0)	17 **(3,8)**	0 (0)	0 (0)	15 **(5,14)**	32 (0,94)

Hemistola chrysoprasaria (Esper, [1794])	1 (0,1)	2 (0,5)	1 (0,19)	1 (0,12)	0 (0)	5 (0,15)
Hemithea aestivaria (Hübner, 1789)	4 (0,3)	0 (0)	0 (0)	3 (0,37)	0 (0)	7 (0,21)
Heterolocha laminaria (Herrich-Schäffer, [1852])	1 (0,1)	0 (0)	2 (0,38)	0 (0)	0 (0)	3 (0,09)
Horisme corticata (Treitschke, 1835)	9 (0,7)	1 (0,2)	1 (0,19)	7 (0,87)	4 **(1,37)**	22 (0,65)
Horisme tersata ([D. & Schiff.], 1775)	2 (0,1)	4 (0,9)	2 (0,38)	7 (0,87)	3 **(1,03)**	18 (0,53)
Hydriomena furcata (Thunberg, 1784)	42 **(3,1)**	0 (0)	2 (0,38)	0 (0)	0 (0)	44 **(1,29)**
Hylaea fasciaria (Linnaeus, 1758)	0 (0)	0 (0)	3 (0,58)	1 (0,12)	1 (0,34)	5 (0,15)
Hypomecis punctinalis (Scopoli, 1763)	9 (0,7)	0 (0)	0 (0)	3 (0,37)	0 (0)	12 (0,35)
Hypomecis roboraria (Fabricius, 1787)	25 **(1,9)**	0 (0)	0 (0)	5 (0,62	0 (0)	30 (0,88)
Idaea albitorquata (Püngeler, 1909)	0 (0)	2 (0,5)	0 (0)	0 (0)	0 (0)	2 (0,06)
Idaea aversata (Linnaeus, 1758)	41 **(3,1)**	6 **(1,4)**	6 **(1,15)**	2 (0,25)	0 (0)	55 **(1,62)**
Idaea biselata (Hufnagel, 1767)	4 (0,3)	0 (0)	0 (0)	0 (0)	0 (0)	4 (0,12)
Idaea consolidata (Lederer, 1853)	5 (0,4)	0 (0)	0 (0)	1 (0,12)	0 (0)	6 (0,18)
Idaea degeneraria (Hübner, [1799])	9 (0,7)	3 (0,7)	0 (0)	22 **(2,74)**	1 (0,34)	35 **(1,03)**
Idaea deversaria (Herrıch-Schäffer, 1847)	15 **(1,1)**	16 **(3,6)**	1 (0,19)	24 **(2,99)**	1 (0,34)	57 **(1,68)**
Idaea dilutaria (Hübner, [1799])	8 (0,6)	1 (0,2)	0 (0)	0 (0)	0 (0)	9 (0,26)
Idaea dimidiata (Hufnagel, 1767)	2 (0,1)	0 (0)	0 (0)	5 (0,62)	0 (0)	7 (0,21)
Idaea filicata (Hübner, [1799])	5 (0,4)	3 (0,7)	0 (0)	4 (0,5)	4 **(1,37)**	16 (0,47)
Idaea humiliata (Hufnagel, 1767)	0 (0)	1 (0,2)	0 (0)	1 (0,12)	1 (0,34)	3 (0,09)
Idaea infirmaria (Rambur, 1833)	0 (0)	1 (0,2)	0 (0)	4 (0,5)	4 **(1,37)**	9 (0,26)
Idaea metohiensis (Rebel, 1900)	0 (0)	1 (0,2)	0 (0)	2 (0,25)	0 (0)	3 (0,09)
Idaea moniliata ([D. & Schiff.], 1775)	2 (0,1)	3 (0,7)	0 (0)	0 (0)	0 (0)	5 (0,15)
Idaea obsoletaria (Rambur, 1833)	0 (0)	4 (0,9)	0 (0)	2 (0,25)	0 (0)	6 (0,18)
Idaea ochrata (Scopoli, 1763)	2 (0,1)	1 (0,2)	1 (0,19)	0 (0)	7 **(2,4)**	11 (0,32)
Idaea ossiculata (Lederer, 1871)	0 (0)	2 (0,5)	0 (0)	2 (0,25)	0 (0)	4 (0,12)
Idaea ostrinaria (Hübner, [1813])	0 (0)	0 (0)	0 (0)	1 (0,12)	2 (0,68)	3 (0,09)
Idaea politaria (Hübner, [1799])	4 (0,3)	0 (0)	0 (0)	2 (0,25)	0 (0)	6 (0,18)
Idaea rubraria (Staudinger, 1901)	1 (0,1)	2 (0,5)	0 (0)	7 (0,87)	5 **(1,71)**	15 (0,44)
Idaea rufaria (Hübner, [1799])	3 (0,2)	27 **(6,1)**	2 (0,38)	0 (0)	44 **(15,07)**	76 (2,24)
Idaea straminata (Borkhausen, 1794)	2 (0,1)	0 (0)	2 (0,38)	0 (0)	0 (0)	4 (0,12)
Idaea subsericeata (Haworth, [1809])	9 (0,7)	3 (0,7)	0 (0)	9 **(1,12)**	1 (0,34)	22 (0,65)
Idaea trigeminata (Haworth, [1809])	1 (0,1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0,03)
Jodis lactearia (Linnaeus, 1758)	1 (0,1)	0 (0)	1 (0,19)	0 (0)	0 (0)	2 (0,06)
Lampropteryx suffumata ([D. & Schiff.], 1775)	0 (0)	0 (0)	1 (0,19)	0 (0)	0 (0)	1 (0,03)
Ligdia adustata (Fabricius, 1787)	1 (0,1)	1 (0,2)	2 (0,38)	6 (0,75	1 (0,34)	11 (0,32)
Lomaspilis bithynica Wehrli, 1939	11 (0,8)	2 (0,5)	5 (0,96)	7 (0,87)	4 **(1,37)**	29 (0,85)
Lomographa temerata ([D. & Schiff.], 1775)	12 (0,9)	0 (0)	0 (0)	4 (0,5)	0 (0)	16 (0,47)
Lythria purpuraria (Linnaeus, 1758)	0 (0)	2 (0,5)	0 (0)	0 (0)	0 (0)	2 (0,06)
Macaria alternata ([D. & Schiff.],1775)	4 (0,3)	0 (0)	0 (0)	6 (0,75)	1 (0,34)	11 (0,32)
Macaria liturata (Linnaeus, 1761)	8 (0,6)	1 (0,2)	16 **(3,08)**	0 (0)	7 **(2,4)**	32 (0,94)
Macaria notata (Linnaeus, 1758)	76 **(5,7)**	0 (0)	1 (0,19)	4 (0,5)	0 (0)	81 (2,38)
Melanthia procellata ([D. & Schiff.], 1775)	9 (0,7)	0 (0)	0 (0)	3 (0,37)	0 (0)	12 (0,35)
Minoa murinata (Scopoli, 1763)	5 (0,4)	1 (0,2)	6 **(1,15)**	1 (0,12)	0 (0)	13 (0,38)
Neognopharmia stevenaria (Boisduval, 1840)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0,34)	1 (0,03)
Nychiodes waltheri Wagner, 1919	0 (0)	6 **(1,4)**	0 (0)	4 (0,5)	3 **(1,03)**	13 (0,38)
Odontopera bidentata (Linnaeus, 1761)	0 (0)	0 (0)	3 (0,58)	0 (0)	0 (0)	3 (0,09)
Opisthograptis luteolata (Linnaeus, 1758)	13 (0,9)	2 (0,5)	4 (0,77)	1 (0,12)	1 (0,34)	21 (0,62)
Orthostixis cribraria (Hübner, [1799])	1 (0,1)	5 **(1,1)**	0 (0)	0 (0)	0 (0)	6 (0,18)
Pachycnemia hippocastanaria (Hübner, [1799])	16 **(1,2)**	0 (0)	0 (0)	20 **(2,49)**	0 (0)	36 **(1,06)**

Pachycnemia tibiaria (Rambur, 1829)	1 (0,1)	0 (0)	0 (0)	3 (0,37)	0 (0)	4 (0,12)
Parectropis similaria (Hufnagel, 1767)	6 (0,4)	0 (0)	0 (0)	1 (0,12)	0 (0)	7 (0,21)
Pareulype berberata (Fabricius, 1787)	0 (0)	1 (0,2)	0 (0)	0 (0)	0 (0)	1 (0,03)
Pasiphila rectangulata (Linnaeus, 1758)	2 (0,1)	0 (0)	0 (0)	1 (0,12)	0 (0)	3 (0,09)
Pennithera firmata (Hübner, [1822])	0 (0)	2 (0,5)	3 (0,58)	2 (0,25)	0 (0)	7 (0,21)
Perconia strigillaria (Hübner, 1787)	0 (0)	0 (0)	2 (0,38)	0 (0)	0 (0)	2 (0,06)
Peribatodes rhomboidaria ([D. & Schiff.], 1775)	102 (**7,6**)	58 (**13,1**)	25 (**4,81**)	146 (**18,2**)	45 (**15,41**)	376 (**11,06**)
Peribatodes umbrarius (Hübner, [1809])	0 (0)	3 (0,7)	0 (0)	0 (0)	0 (0)	3 (0,09)
Petrophora chlorosata (Scopoli, 1763)	0 (0)	0 (0)	0 (0)	3 (0,37)	0 (0)	3 (0,09)
Phaiogramma etruscaria (Zeller, 1849)	0 (0)	0 (0)	0 (0)	9 (**1,12**)	0 (0)	9 (0,26)
Philereme transversata (Hufnagel, 1767)	0 (0)	1 (0,2)	0 (0)	0 (0)	0 (0)	1 (0,03)
Plagodis dolabraria (Linnaeus, 1767)	22 (**1,6**)	0 (0)	0 (0)	3 (0,37)	0 (0)	25 (0,74)
Protorhoe unicata (Guenée, 1857)	0 (0)	1 (0,2)	0 (0)	0 (0)	0 (0)	1 (0,03)
Pseudoterpna pruinata (Hufnagel, 1767)	3 (0,2)	2 (0,5)	9 (**1,73**)	5 (0,62)	1 (0,34)	20 (0,59)
Pungeleria capreolaria (Fabricius, 1787)	0 (0)	0 (0)	7 (**1,35**)	0 (0)	0 (0)	7 (0,21)
Rheumaptera montivagata Duponchel, 1830	0 (0)	0 (0)	3 (0,58)	0 (0)	0 (0)	3 (0,09)
Rhodostrophia discopunctata Amsel, 1935	18 (**1,3**)	27 (**6,1**)	2 (0,38)	12 (**1,5**)	6 (**2,05**)	65 (**1,91**)
Rhodostrophia vibicaria (Clerck, 1759)	1 (0,1)	13 (**2,9**)	17 (**3,27**)	2 (0,25)	1 (0,34)	34 (**1**)
Rhoptria asperaria (Hübner, [1817])	0 (0)	0 (0)	2 (0,38)	13 (**1,62**)	0 (0)	15 (0,44)
Scopula decorata ([D. & Schiff.], 1775)	0 (0)	5 (**1,1**)	0 (0)	0 (0)	1 (0,34)	6 (0,18)
Scopula flaccidaria (Zeller, 1852)	5 (0,4)	1 (0,2)	0 (0)	7 (0,87)	2 (0,68)	15 (0,44)
Scopula imitaria (Hübner, [1799])	7 (0,5)	1 (0,2)	0 (0)	13 (**1,62**)	0 (0)	21 (0,62)
Scopula incanata (Linnaeus, 1758)	0 (0)	2 (0,5)	2 (0,38)	0 (0)	0 (0)	4 (0,12)
Scopula marginepunctata (Goeze, 1781)	1 (0,1)	6 (**1,4**)	0 (0)	7 (0,87)	3 (**1,03**)	17 (0,5)
Scopula nigropunctata (Hufnagel, 1767)	5 (0,4)	0 (0)	0 (0)	2 (0,25)	0 (0)	7 (0,21)
Scopula ornata (Scopoli, 1763)	1 (0,1)	0 (0)	1 (0,19)	15 (**1,87**)	1 (0,34)	18 (0,53)
Scopula rubiginata (Hufnagel, 1767)	2 (0,1)	4 (0,9)	1 (0,19)	3 (0,37)	11 (**3,77**)	21 (0,62)
Scopula submutata (Treitschke, 1828)	1 (0,1)	0 (0)	0 (0)	3 (0,37)	0 (0)	4 (0,12)
Scopula transcaspica Prout, 1935	0 (0)	0 (0)	0 (0)	0 (0)	1 (0,34	1 (0,03)
Scopula turbulentaria (Staudinger, 1870)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0,68	2 (0,06)
Scotopteryx chenopodiata (Linnaeus, 1758)	8 (0,6)	3 (0,7)	6 (**1,15**)	0 (0)	0 (0)	17 (0,5)
Scotopteryx coarctaria ([D. & Schiff.], 1775)	0 (0)	5 (**1,1**)	0 (0)	0 (0)	0 (0)	5 (0,15)
Scotopteryx luridata (Hufnagel, 1767)	0 (0)	32 (**7,2**)	43 (**8,27**)	0 (0)	4 (**1,37**)	79 (**2,32**)
Scotopteryx moeniata (Scopoli, 1763)	0 (0)	0 (0)	122 (**23,46**)	0 (0)	0 (0)	122 (**3,59**)
Scotopteryx mucronata (Scopoli, 1763)	1 (0,1)	0 (0)	8 (**1,54**)	2 (0,25)	0 (0)	11 (0,32)
Selenia dentaria (Fabricius, 1775)	24 (**1,8**)	4 (0,9)	0 (0)	7 (0,87)	1 (0,34)	36 (**1,06**)
Selenia lunularia (Hübner, 1788)	29 (**2,2**)	1 (0,2)	4 (0,77)	13 (**1,62**)	1 (0,34)	48 (**1,41**)
Selidosema plumaria ([D. & Schiff.], 1775)	0 (0)	2 (0,5)	6 (**1,15**)	0 (0)	1 (0,34)	9 (0,26)
Stegania dilectaria (Hübner, 1790)	2 (0,1)	0 (0)	0 (0)	16 (2)	0 (0)	18 (0,53)
Synopsia sociaria (Hübner, [1799])	0 (0)	0 (0)	0 (0)	5 (0,62	1 (0,34)	6 (0,18)
Thalera fimbrialis (Scopoli, 1763)	1 (0,1)	1 (0,2)	1 (0,19)	3 (0,37)	0 (0)	6 (0,18)
Thera britannica (Turner, 1925)	9 (0,7)	0 (0)	9 (**1,73**)	0 (0)	0 (0)	18 (0,53)
Thera obeliscata (Hübner, 1787)	0 (0)	0 (0)	2 (0,38)	0 (0)	1 (0,34)	3 (0,09)
Thera variata ([D. & Schiff.], 1775)	9 (0,7)	2 (0,5)	5 (0,96)	0 (0)	0 (0)	16 (0,47)
Timandra comae Schmidt, 1931	0 (0)	0 (0)	0 (0)	0 (0)	1 (0,34)	1 (0,03)
Xanthorhoe ferrugata (Clerck, 1759)	1 (0,1)	0 (0)	0 (0)	1 (0,12)	2 (0,68)	4 (0,12)
Xanthorhoe montanata ([D. & Schiff.], 1775)	0 (0)	0 (0)	3 (0,58)	0 (0)	0 (0)	3 (0,09)
Total Individual number	**1343**	**442**	**520**	**802**	**292**	**3399**
Total Species number	**109**	**96**	**82**	**90**	**65**	**188**