

## PRELIMINARY STUDY ON BIODIVERSITY OF BUTTERFLIES IN BEYKOZ GROVE OF ISTANBUL, TURKEY

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**Abstract.** In this study, Lepidoptera species collected by sweep net in Beykoz grove, Istanbul province, Turkey during the years of 2017–2018 was evaluated. A total of 182 specimens were collected in Beykoz. According to identification results, 57 species belonging to 12 families were recorded. The family Noctuidae was represented by the highest number of species (19), followed by Geometridae (16) and Notodontidae (6).

**Keywords:** *sweep net, butterflies, biodiversity, fauna, Beykoz*

### Introduction

Lepidoptera, butterflies and moths, are very common insects and well known because of their very attractive colours and patterns on their wings. This order is recognized as one of the largest order of insects (Romoser and Stoffolana, 1994). Adults of the majority of extant species feed on nectar, the juice of overripe fruit or other liquids. Larvae of almost all species are phytophagous, and no parts of plants remain unexploited. Because of their phytophagous habits and high reproductive rate, many species are important pests (Gillott, 2005). The ecological-faunistic complex situation of butterflies is important for biodiversity.

There are several regional studies to determine the Lepidoptera fauna in Turkey (Akbulut et al., 2003; Akkuzu et al., 2007; Avci, 1997; Beskardes, 2002; Can, 2008; Cebeci, 2003; De Lattin, 1950, 1951; Graves, 1925, 1926; Hakyemez, 1994; Hesselbarth et al., 1995; Kansu, 1963; Kaygin et al., 2009; Kornosor, 1987; Mathew, 1881; Mol, 1977; Okyar and Aktac, 1998, 1999; Rebel, 1903).

With the new records published on butterfly observation sites of Butterfly Turkish (kelebek-turk.com) by butterfly observers, the number of butterfly species in the province of Istanbul is 125. In order to determine the butterfly species diversity of Beykoz grove of Istanbul, a field study was carried out in 2017–2018.

### Materials and methods

The study was conducted between the years of 2017 and 2018 in Beykoz grove located within Istanbul region (*Fig. 1*). Beykoz is a small holiday town on the Marmara Sea coasts in the city of Istanbul. Beykoz grove (located at 41° 07' 59"N, 29° 05' 54"E) covers in the form of deciduous forests, composed of various tree species and tall shrubs. In the forested area dominant trees are *Platanus* sp., *Quercus* spp., *Alnus glutinosa*, *Acer campestre*, *Fraxinus excelsior*, *Carpinus betulus*, *Castanea sativa*, *Tilia tomentosa* and *Pouulus tremula*. Having rich flora and suitable climate conditions enabled Beykoz owning rich and divergent Biodiversity.

Specimens were collected using a sweep net. Captured specimens were put into tightly closed killing jars immediately and brought to the laboratory for preparation and identification. Ethyl acetate was used as a killing agent. The collecting dates and locations concerning each specimen were recorded in the field note book. Specimens were pinned using insect pins (mostly, 3 - 4 - 5 sized) and were mounted on spreading boards. For identification, different studies (Fibiger, 1993; Forster and Wohlfahrt, 1971; Marini and Trentini, 1986; NHM, 2009; Savela, 2001; Spuler, 1910) were used. The Lepidoptera collections of Forest Entomology and Protection Department of Istanbul University, Faculty of Forestry were also used.



**Figure 1.** Location of study area

## Results and discussion

A total of 182 specimens were collected from this location in Beykoz region of Istanbul. 57 species belonging to 12 families of the order Lepidoptera were identified and listed as follows. Family names and species in each family were listed as arranged alphabetically:

Order **LEPIDOPTERA** Linnaeus, 1758

Family **COSSIDAE** Leach, [1815]

*Cossus cossus* (Linnaeus, 1758)

*Zeuzera pyrina* (Linnaeus, 1761)

Family **CRAMBIDAE** Leach, [1815]

*Cydalima perspectalis* (Walker, 1859)

Family **TORTRICIDAE** Latreille, [1803]

*Tortrix viridana* (Linnaeus, 1758)

Family **PYRALIDAE** Latreille, 1809

*Dioryctria abietella* (Denis & Schiffermüller, 1775)

*Nomophila noctuella* (Denis & Schiffermüller, 1775)

Family **LASIOCAMPIDAE** Harris, 1841

*Lasiocampa quercus* (Linnaeus, 1758)

Family **SATURNIIDAE** Boisduval, 1837

*Saturnia pavonia* (Linnaeus, 1758)

Family **GEOMETRIDAE** Leach, [1815]

*Alcis repandata* (Linnaeus, 1758)  
*Ascotis selenaria* (Denis & Schiffermüller, 1775)  
*Campaea margaritata* (Linnaeus, 1767)  
*Cosmorhoe ocellata* (Linnaeus, 1758)  
*Geometra papilionaria* (Linnaeus, 1758)  
*Gnophos sartata* (Treitschke, 1827)  
*Hemistola chrysoprasaria* (Esper, 1795)  
*Hemithea aestivaria* (Hübner, 1789)  
*Idaea aversata* (Linnaeus, 1758)  
*Idaea ochrata* (Scopoli, 1763)  
*Melanthia procellata* (Denis & Schiffermüller, 1775)  
*Opisthograptis luteolata* (Linnaeus, 1758)  
*Peribatodes rhomboidaria* (Denis & Schiffermüller, 1775)  
*Plagodis dolabraria* (Linnaeus, 1767)  
*Scopula nigropunctata* (Hufnagel, 1767)  
*Selenia lunaria* (Hübner, 1788)  
Family **NOTODONTIDAE** Stephens, 1828  
*Drymonia dodonaea* (Denis & Schiffermüller, 1775)  
*Phalera bucephala* (Linnaeus, 1758)  
*Pheosia tremula* (Clerck, 1759)]  
*Pterostoma palpina* (Clerck, 1759)  
*Spatialia argentina* (Denis & Schiffermüller, 1775)  
*Stauropus fagi* (Linnaeus, 1758)  
Family **THAUMETOPOEIDAE** Aurivillus, 1889  
*Thaumetopoea pityocampa* (Denis & Schiffermüller, 1775)  
Family **LYMANTRIIDAE** Hampson, [1893]  
*Calliteara pudibunda* (Linnaeus, 1758)  
*Euproctis chrysorrhoea* (Linnaeus, 1758)  
*Lymantria dispar* (Linnaeus, 1758)  
Family **ARCTIIDAE** Leach, [1815]  
*Arctia villica* (Linnaeus, 1758)  
*Miltochrista miniata* (Forster, 1771)  
*Phragmatobia fuliginosa* (Linnaeus, 1758)  
*Spilosoma lubricipeda* (Linnaeus, 1758)  
Family **NOCTUIDAE** (Latreille, 1809)  
*Agrotis cinerea* (Denis & Schiffermüller, 1775)  
*Agrotis ipsilon* (Hufnagel, 1766)  
*Amphipyra pyramidea* (Linnaeus, 1758)  
*Autographa gamma* (Linnaeus, 1758)  
*Callopietria juvenina* (Stoll, 1782)  
*Chersotis margaritacea* (Villers, 1789)  
*Chloantha hyperici* (Denis & Schiffermüller, 1775)  
*Conistra rubiginea* (Denis & Schiffermüller, 1775)  
*Dysgonia algira* (Linnaeus, 1758)  
*Emmelia trabealis* (Scopoli, 1763)  
*Epilecta linogrisea* (Denis & Schiffermüller, 1775)  
*Euplexia lucipara* (Linnaeus, 1758)  
*Heliothis peltigera* (Denis & Schiffermüller, 1775)

*Herminia tarsipennalis* Treitschke, 1835  
*Melanchnra persicariae* (Linnaeus, 1761)  
*Mythimna vitellina* (Hübner, 1808)  
*Noctua orbona* (Hufnagel, 1766)  
*Noctua pronuba* (Linnaeus, 1758)  
*Xestia castanea* (Esper, 1798)

A total of 182 individuals with 57 species belonging to 12 families were identified in Beykoz grove. Nymphalidae family was dominant, whereas Riodinidae had the least number of individuals. The highest number of species belongs to Noctuidae (19, 33.3%), followed by Geometridae (16, 28.1%) and Notodontidae (6, 10%). The number of species in each family (Figs. 2 and 3) and their ratios to the families were given in Table 1. In Table 2, the data concerning the capturing dates and the collecting locations about each specimen were given.

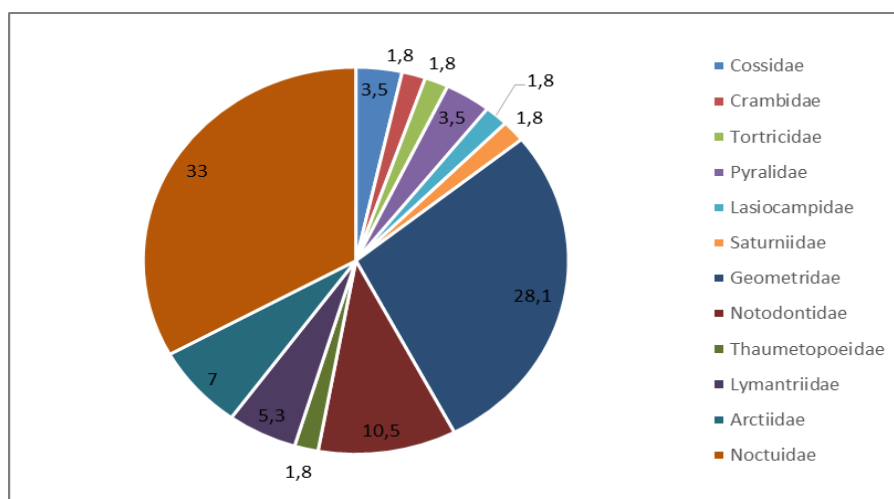


Figure 2. Percentage of species into each family

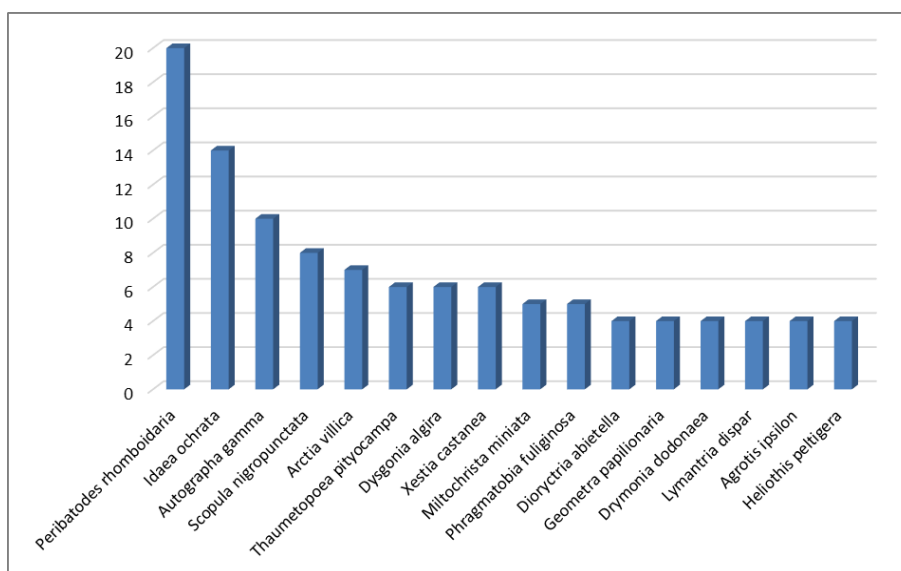


Figure 3. The total number of collected species

**Table 1.** Number of species and rates of families

Family	Number of species	Rate (%)
Cossidae	2	3.5
Crambidae	1	1.8
Tortricidae	1	1.8
Pyralidae	2	3.5
Lasiocampidae	1	1.8
Saturniidae	1	1.8
Geometridae	16	28.1
Notodontidae	6	10.5
Thaumetopoeidae	1	1.8
Lymantriidae	3	5.3
Arctiidae	4	7.0
Noctuidae	19	33.0
<b>Total</b>	<b>57</b>	<b>100</b>

**Table 2.** The capturing dates about each specimen in Beykoz region

Species	Date
<i>Cossus cossus</i>	10.06.2017 (3). Totally 3 specimens
<i>Zeuzera pyrina</i>	14.07.2017 (2); 28.06.2018 (1). Totally 3 specimens
<i>Tortrix viridana</i>	20.07.2018 (1). Totally 1 specimen
<i>Dioryctria abietella</i>	17.06.2018 (2); 19.06.2018 (2). Totally 4 specimens
<i>Nomophila noctuella</i>	20.06.2017 (1). Totally 1 specimen
<i>Lasiocampa quercus</i>	13.08.2018 (3). Totally 3 specimens
<i>Saturnia pavonia</i>	20.04.2018 (2). Totally 2 specimens
<i>Alcis repandata</i>	17.06.2017 (2). Totally 2 specimens
<i>Ascotis selenaria</i>	25.08.2018 (1). Totally 1 specimen
<i>Campaea margaritata</i>	20.07.2017 (1); 28.07.2017 (2). Totally 3 specimens
<i>Cosmorhoe ocellata</i>	18.07.2017 (1). Totally 1 specimen
<i>Geometra papilionaria</i>	15.06.2017 (4). Totally 4 specimens
<i>Gnophos sartata</i>	07.08.2018 (3). Totally 3 specimens
<i>Hemistola chrysoprasaria</i>	08.06.2018 (1). Totally 1 specimen
<i>Hemithea aestivaria</i>	28.06.2017 (1); 06.07.2018 (1). Totally 2 specimens
<i>Idaea aversata</i>	29.06.2017 (1). Totally 1 specimen
<i>Idaea ochrata</i>	29.06.2017 (2); 17.07.2017 (2); 15.07.2018 (3); 23.07.2018 (3). Totally 14 specimens
<i>Melanthia procellata</i>	22.06.2017 (1). Totally 1 specimen
<i>Opisthograptis luteolata</i>	24.05.2017 (1). Totally 1 specimen
<i>Peribatodes rhomboidaria</i>	10.05.2017 (4); 16.06.2017 (5); 22.06.2017 (2); 25.07.2018 (4); 22.06.2018 (2); 23.06.2018 (3). Totally 20 specimens
<i>Plagodis dolabraria</i>	19.05.2017 (1); 15.06.2017 (1); 18.06.2018 (1). Totally 3 specimens
<i>Scopula nigropunctata</i>	14.06.2017 (2); 17.06.2017 (1); 22.06.2018 (1); 17.07.2018 (1); 05.08.2018 (3). Totally 8 specimens
<i>Selenia lunaria</i>	28.05.2017 (1). Totally 1 specimen
<i>Drymonia dodonaea</i>	20.05.2018 (1); 22.05.2018 (1); 24.05.2018 (2). Totally 4 specimens
<i>Phalera bucephala</i>	28.06.2017 (3). Totally 3 specimens
<i>Pheosia tremula</i>	25.09.2018 (1). Totally 1 specimen
<i>Pterostoma palpina</i>	30.08.2018 (3). Totally 3 specimens
<i>Spatalia argentina</i>	30.06.2018 (3). Totally 3 specimens
<i>Stauropus fagi</i>	20.08.2018 (2); 23.08.2018 (1). Totally 3 specimens
<i>Thaumetopoea pityocampa</i>	18.07.2017 (6). Totally 6 specimens
<i>Calliteara pudibunda</i>	16.05.2017 (2). Totally 2 specimens
<i>Euproctis chrysorrhoea</i>	03.07.2017 (1). Totally 1 specimen
<i>Lymantria dispar</i>	03.08.2018 Avcikoru (4). Totally 4 specimens
<i>Arctia villica</i>	17.06.2017 (2); 09.05.2018 (2); 15.06.2018 (3). Totally 7 specimens

<i>Miltochrista miniata</i>	17.07.2017 (3); 18.07.2017 (2). Totally 5 specimens
<i>Phragmatobia fuliginosa</i>	20.07.2017 (3); 27.07.2017 (2). Totally 5 specimens
<i>Spilosoma lubricipeda</i>	28.06.2017 (2). Totally 2 specimens
<i>Agrotis cinerea</i>	10.08.2018 (1). Totally 1 specimen
<i>Agrotis ipsilon</i>	05.08.2018 (1); 10.08.2018 (2); 15.08.2018 (1)). Totally 4 specimens
<i>Amphipyra pyramidea</i>	15.07.2018 (1) Totally 1 specimen
<i>Autographa gamma</i>	13.06.2017 (1); 17.06.2017 (2); 10.08.2018 (2); 12.08.2018 (2); 14.08.2018 (3). Totally 10 specimens
<i>Callopietria juvenina</i>	10.06.2017 (2). Totally 2 specimens
<i>Chersotis margaritacea</i>	23.05.2017 (1). Totally 1 specimen
<i>Chloantha hyperici</i>	22.06.2017 (1). Totally 1 specimen
<i>Conistra rubiginea</i>	10.08.2017 (1). Totally 1 specimen
<i>Dysgonia algira</i>	17.06.2017 (2); 05.07.2017 (4). Totally 6 specimens
<i>Emmelia trabealis</i>	07.07.2017 (1). Totally 1 specimens
<i>Epilecta linogrisea</i>	23.07.2017 (1). Totally 1 specimen
<i>Euplexia lucipara</i>	20.08.2018 (1). Totally 1 specimen
<i>Heliothis peltigera</i>	10.05.2017 (1); 12.06.2017 (2); 15.08.2018 (1).
<i>Herminia tarsipennalis</i>	15.06.2017 (1). Totally 1 specimen
<i>Lacanobia w-latinum</i>	02.07.2018 (1). Totally 1 specimen
<i>Melanchra persicariae</i>	20.06.2017 (1). Totally 1 specimen
<i>Mythimna vitellina</i>	20.07.2018 (1). Totally 1 specimens
<i>Noctua orbona</i>	05.08.2018 (3). Totally 3 specimens
<i>Noctua pronuba</i>	10.06.2017 (1); 22.06.2018 (2). Totally 3 specimens
<i>Xestia castanea</i>	10.07.2017 (2); 15.08.2018 (4). Totally 6 specimens
<b>Totally 57 species</b>	<b>Totally 182 specimens</b>

## Conclusions

In this research, 57 species belonging to 12 families of suborder Heterocera were captured and identified in Beykoz region of Istanbul. Most of the species were from three families: Noctuidae (19, 33.0%), followed by Geometridae (16, 28.1%) and Notodontidae (6, 10.5%). Among the lepidopteran species collected, 33 were considered pests for forest trees: *C. cossus*, *Z. pyrina*, *T. viridana*, *D. abietella*, *L. quercus*, *S. pavonia*, *A. repandata*, *C. margaritata*, *G. papilionaria*, *H. aestivaria*, *P. dolabraria*, *S. lunaria*, *H. pyritoides*, *D. dodonaea*, *P. bucephala*, *P. tremula*, *P. palpina*, *S. argentina*, *S. fagi*, *T. processionea*, *C. pudibunda*, *E. chrysorrhoea*, *L. dispar*, *L. monacha*, *P. fuliginosa*, *S. lubricipeda*, *A. psi*, *A. pyramidea*, *B. bicolorana*, *C. rubiginea*, *L. w-latinum*, *M. lunaris* and *M. alpium* (Kimber, 2009; Savela, 2001). Oak (*Quercus* spp.) is the dominant tree in the region and according to the literature (Kimber, 2009; Savela, 2001), *C. cossus*, *T. viridana*, *L. quercus*, *S. pavonia*, *C. margaritata*, *H. aestivaria*, *S. lunaria*, *D. dodonaea*, *P. bucephala*, *S. argentina*, *T. processionea*, *C. pudibunda*, *E. chrysorrhoea*, *L. dispar*, *L. monacha*, *A. psi*, *A. pyramidea*, *B. bicolorana*, *C. rubiginea*, *L. w-latinum*, *M. lunaris* and *M. alpium* caterpillars prefer oak leaves as their food plants.

*Z. pyrina* differs from these species as its larvae food regimes. The adults of *Z. pyrina* fly during June and July were collected in the end of July and in the beginning of August. *L. monacha* adults are different from *L. dispar* adults by means of morphological appearances. They often show traces of bright pink colour on the body, especially the abdomen, which however is normally concealed when at rest. *L. monacha* was regarded as the first record for the region.

Most of the species obtained were collected in summer months. This was because summer is the most suitable season for the mating and regeneration activities of Lepidopteran adults.

As Kaygin et al. (2009) said: the habitats, where the butterfly and moth species have been abundantly observed should be protected and these particular locations should be preserved as butterfly protection areas. Beykoz is one of the potential butterfly protection areas.

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