



Original article (Orijinal araştırma)

Caterpillar (Lepidoptera) communities on oak (*Quercus pubescens*) in Ankara Province (Turkey)¹

Ankara ilinde (Türkiye) meşe üstündeki (*Quercus pubescens*) tırtıl (Lepidoptera) komuniteleri

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Summary

Lepidopteran larval communities feeding on *Quercus pubescens* (Willdenow) in Turkey were examined. A total of 190 larval specimens were collected from trees within Ankara Province between the months April and September in both 2013 and 2014 and were further fed under laboratory conditions. Twenty-five taxa belonging to 14 families were identified as follows; seven Geometridae, four Noctuidae, two Tortricidae, two Thyatiridae and one species for each of the Gelechiidae, Arctiidae, Gracillariidae, Lasiocampidae, Lymantriidae, Oecophoridae, Pyralidae, Yponomeutidae, Pterophoridae and Lycaenidae families. Four species are new records for Ankara Province and two species are new for the fauna of Turkey. The Geometridae family was the most represented family feeding on oak trees. *Tortrix viridana* (L., 1758) (Tortricidae) was the most abundant species with 37 individuals. Feeding activity of both *Eupithecia dodoneata* Guenée, 1858 and *Cosmia trapezina* L., 1758 at the larval stage on *Q. pubescens* is a new finding.

Key words: Larva, Lepidoptera, *Quercus*, new record, Turkey

Özet

Çalışmada *Quercus pubescens* (Willdenow, 1796)'te beslenen lepidoptera takımına ait larva komuniteleri incelenmiştir. Ankara il sınırları içinde bulunan meşe ağaçları üstünden 190 larva örneği 2013 ve 2014 yılları Nisan-Eylül ayları arasında toplanmış ve laboratuvar ortamında beslenmiştir. 14 familyaya ait 25 taksa şu şekilde teşhis edilmiştir: Geometridae 7, Noctuidae 4, Tortricidae ve Thyatiridae 2, Gelechiidae, Arctiidae, Gracillariidae, Lasiocampidae, Lymantriidae, Oecophoridae, Pyralidae, Yponomeutidae, Pterophoridae ve Lycaenidae'den ise 1'er tür olmak üzere toplam 25 taksa tespit edilmiştir. 4 tür Ankara, 2 tür ise Türkiye faunası için yeni kayıttır. Geometridae familyası tür sayısı ile meşede beslenen en kalabalık familya olarak belirlenmiştir. Familyalara ait birey sayıları değerlendirildiğinde ise Tortricidae familyasında yer alan *Tortrix viridana* (L., 1758) 37 birey ile ilk sırada yer alır. *Eupithecia dodoneata* Guenée, 1858 ve *Cosmia trapezina* L., 1758 larvalarının *Q. pubescens* ile beslenmesi yeni bir bulgudur.

Anahtar sözcükler: Larva, Lepidoptera, *Quercus*, yeni kayıt, Türkiye

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Introduction

Food plants for butterfly larvae are important in the biology of the species since spatial and temporal distribution, abundance and sometimes the color pattern of adults are directly dependent on food plants. Thus, one of the keys to understanding the biology of butterflies is the precise identification of larval food plants (Oakley et al., 1969).

Oaks belong to the woody plants that host the richest insect assemblages in Central Europe (Patočka et al., 1999). Lepidoptera larvae have been shown to be the most important group of oak defoliators (Patočka et al., 1962, 1999; Milka & Medarevic, 2010). About 308 Lepidoptera species are known to damage the leaves of oaks in Europe (Patočka, 1954, 1980; Patočka et al., 1999; Reiprich, 2001; Csóka & Szabóky, 2005). Lepidoptera fauna of some oak species in Central Europe have been adequately studied (Patočka et al., 1962, 1999; Csóka, 1991, 1998; Kulfan, 1992, 1997, 2002; Kulfan et al., 1997, 2006; Kulfan & Degma, 1999; Harapin & Jurc, 2000; Turčáni et al., 2009; Kalapanida & Petrakis, 2012; Parák et al., 2012). In Bulgaria, Zlatanov (1971) discovered 67 lepidopteran species feeding on *Quercus robur* L., 49 species feeding on *Quercus cerris* L. and 29 species feeding on *Quercus rubra* L. In a study of forest trees in Israel, 236 Lepidoptera species were determined and *Quercus* was established as the most preferred food plant for 91 Lepidoptera species (Halperin & Sauter, 1992).

Studies focusing on Lepidoptera that damage oak forests are limited in Turkey (Kansu, 1963; Baş, 1980; Avcı, 1997; Çanakçıoğlu & Mol, 1998). In studies conducted by Şimşek & Özdemir (2000) and Şimşek (2002), Lepidoptera species in mixed forest areas in Çankırı were studied and six Lepidoptera species were shown to be damaging to oak. A study on damaging species of oak in Kahramanmaraş indicated that seven out of 20 harmful insects belonged to Lepidoptera (Kanat & Akbulut, 2005). Kemal & Koçak (2008) recorded *Orthosia rubricosa* (Esper) in an oak woodland.

The main aim of this paper is to investigate the structure of communities of lepidopteran larvae on oak, *Quercus pubescens* (Willdenow), in Ankara province.

Material and Methods

Field studies were conducted in oak forests in Şereflikoçhisar, Kızılcahamam, Güdül, Kazan, Beypazarı counties and localities with oak trees in Etimesgut, Yenimahalle, Keçiören counties in Ankara Province, between the months April and September in both 2013 and 2014. Larva specimens were collected from trees with clamps or by hand together with plant samples. A shaking method was also used (Kıyak, 2000). Specimens were fed with nutritional plants to obtain pupa and imago stages under laboratory conditions. Larva and pupal stage samples were photographed with a Leica Z16 APO microscope and imago samples were photographed with a Canon EOS 550D camera. Larva, pupa and imago photos of species are given in Figures 1 to 3. Dispersion data for the species was based on Koçak & Kemal (2009).

Larvae identification was based on the keys of Blaschke (1914), Meyer (1919), Gerasimov (1952), Patočka (1954, 1980), Koch (1984), Treadwell (1996), Patočka et al. (1999), Beck (2002) and Turčáni et al. (2009).

Results

In this study, 56 imago specimens were obtained from 190 larvae collected when feeding on *Q. pubescens*. Twenty-five taxa from 14 families were determined (Table 1). *Anacamptis timidella* (Wocke, 1887), *Eupithecia dodoneata* Guenée, 1858, *Operophtera brumata* (L., 1758) and *Conobathra tumidana* (Denis & Schiffermüller, 1775) are new records for the Ankara and *Diurnea lipsiella* (Denis & Schiffermüller, 1775) and *Polyploca ridens* (Fabricius, 1787) are new records for the fauna of Turkey.



Figure 1. Larval stages of the Lepidoptera species feeding on *Quercus pubescens* in the Ankara Province, Turkey.

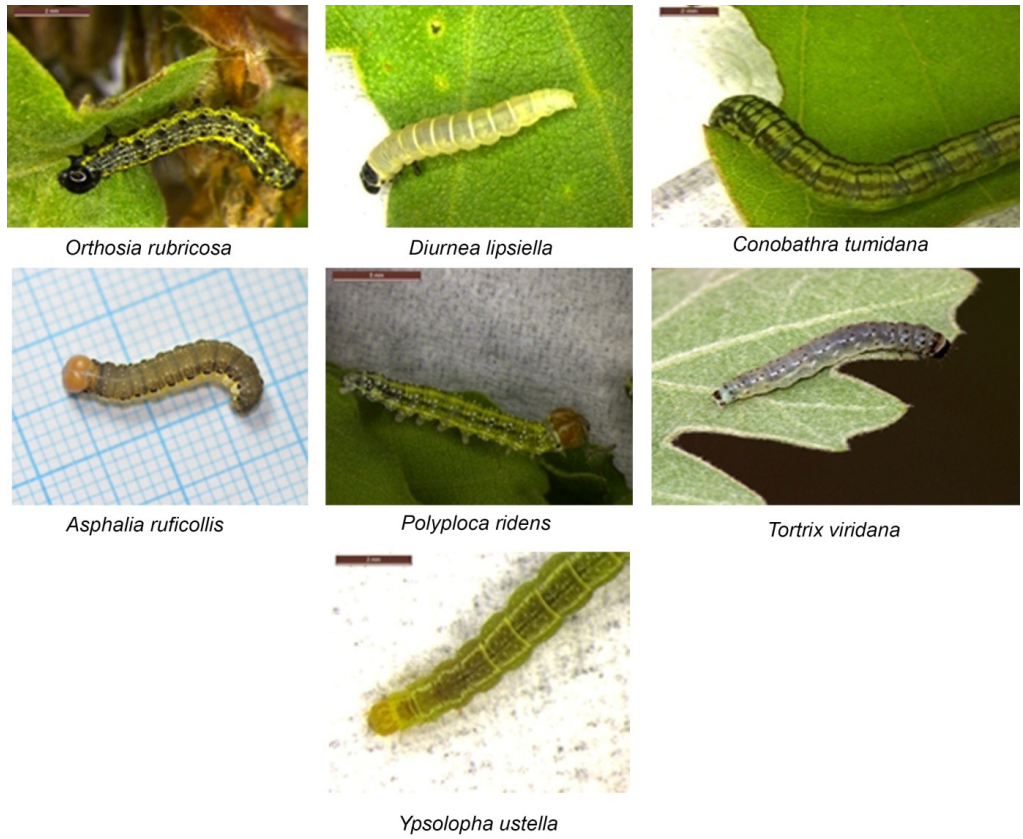


Figure 1 (continue). Larval stages of the Lepidoptera species feeding on *Quercus pubescens* in the Ankara Province, Turkey.

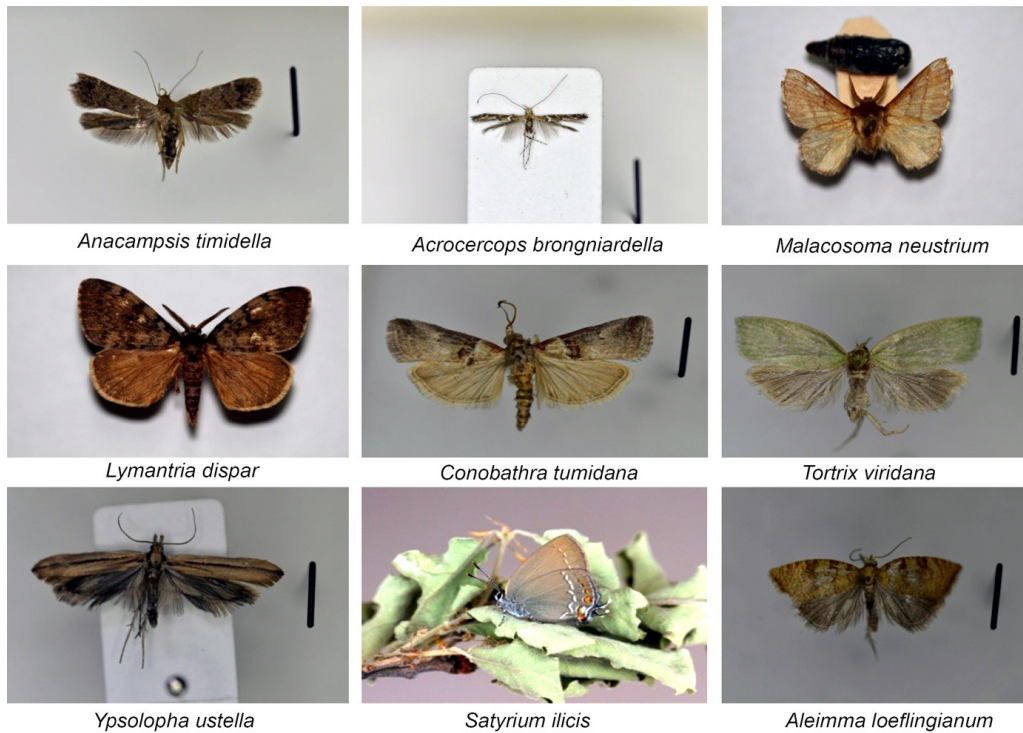


Figure 2. Imagos of the Lepidoptera species collected on *Quercus pubescens* in the Ankara Province, Turkey.



Figure 3. Pupal stages of the Lepidoptera species collected on *Quercus pubescens* in the Ankara Province, Turkey.

Table 1. Caterpillar (Lepidoptera) communities collected on *Quercus pubescens* in the Ankara Province, Turkey. PSD: pupa starting date, AED: adolescence ending dates

Family	Taxa	Larvae	Images	Location and date of sampling	PSD	AED
Lycaenidae	<i>Satyrrium ilicis</i> (Esper, 1779)	1	1	Güdül, 01.05.2014	07.05.2014	18.05.2014
Arctiidae	<i>Eilema complana</i> (L., 1758)	1	-	Kızılcahamam, Kargasekmez, 01.06.2013	-	-
Gelechiidae	<i>Anacampsis timidella</i> (Wocke, 1887)	5	3	Beypazarı, 03.05.2014	11-14.05.2014	24-25.05.2014
	<i>Alsophila hirsutaria</i> (Fab., 1781)	5	-	Kızılcahamam, Kurtboğazi, 07.05.2013	12-14.05.2013	-
	<i>Apocheima hispidarium</i> (Denis & Schiffermüller, 1775)	1	-	Şereflikoçhisar, 01.05.2013	20.05.2013	-
	<i>Colotois pennaria</i> (L., 1761)	1	-	Kızılcahamam- Güdül, 07.05.2014	29.05.2014	-
	<i>Erannis defoliaria</i> (L., 1761)	1	-	Kızılcahamam- Güdül, 07.05.2014	20.05.2014	-
Geometridae	<i>Eupithecia dodoneata</i> Guenée, 1858	3	-	Kurtboğazi, 07.05.2013, Beypazarı, 03.05.2014, Kızılcahamam-Güdül, 08.05.2014	-	-
	<i>Operophtera brumata</i> (L., 1758)	17	-	Beypazarı, 03.05.2014, Kızılcahamam-Güdül, 07.05.2014, Güdül,01.05.2014, Kazan,04.05.2014	10-15.05.2014	-
	<i>Phigalia pedaria</i> (Fab., 1787)	1	-	Şereflikoçhisar, 01.05.2013	-	-
Gracillariidae	<i>Acrocercops brongniardella</i> (Fab., 1798)	3	1	Beypazarı, 03.05.2014	13.05.2014	27.05.2014
Lasiocampidae	<i>Malacosoma neustrium</i> (L., 1758)	4	3	Kızılcahamam, Soğuksu, 01.06.2013	15-16.06.2013	26-27.06.2013
Lymantriidae	<i>Lymantria dispar</i> (L., 1758)	13	6	Kızılcahamam, Kargasekmez, 01.06.2013, Beypazarı, 03.05.2014, Kızılcahamam- Güdül, 07.05.2014	09-11.06.2014	20-21.06.2014
	<i>Conistra</i> sp.	2	-	Beypazarı, 03.05.2014	-	-
	<i>Cosmia trapezina</i> (L., 1758)	1	-	Kızılcahamam, Kurtboğazi, 07.05.2013	-	-
Noctuidae	<i>Orthosia pulverulenta</i> (Esper, 1786)	7	1	Kızılcahamam, Kurtboğazi, 07.05.2013	16- 17.05.2013	15.02.2014
	<i>Orthosia rubricosa</i> (Esper, 1786)	20	-	Kızılcahamam- Güdül, 08.05.2014	-	-

Table 1. (continued)

Family	Taxa	Larvae	Images	Location and date of sampling	PSD	AED
Oecophoridae	<i>Diurnea lipsiella</i> (Denis & Schiffermüller, 1775)	2	-	Güdül, 01.05.2014	-	-
Pterophoridae	<i>Agdistis</i> sp.	1	1	Kızılcahamam, Kurtboğazi, 1♂, 07.05.2013	-	-
Pyralidae	<i>Conobathra tumidana</i> (Denis & Schiffermüller, 1775)	13	11	Kazan, 03.05.2014	13-14.05.2014	07-12.06.2014
Thyatiridae	<i>Asphalia ruficollis</i> (Fab., 1787)	6	-	Kızılcahamam, Kurtboğazi, 07.05.2013	11.05.2013	
	<i>Polyphoca ridens</i> (Fab., 1787)	2	2	Beypazarı, 03.05.2014	24.05.2014	20.04.2015
Tortricidae	<i>Aleimma loeflingianum</i> (L., 1758)	4	2	Kızılcahamam, Kurtboğazi, 07.05.2013, Beypazarı, 03.05.2014	09.05.2014	16.05.2014
	<i>Tortrix viridana</i> (L., 1758)	37	20	Şereflikoçhisar, 01.05.2013, Kızılcahamam, Kurtboğazi, 07.05.2013, Güdül, 01-08.05.2014, Beypazarı, 03.05.2014, Kazan, 04.05.2014.	12-15.05.2014	20-25.05.2014
Yponomeutidae	<i>Ypsolopha ustella</i> (Clerck, 1759)	8	7	Beypazarı, 03.05.2014	05-15.05.2014	20-30.05.2014

Geometridae was found to be the most represented family feeding on oak trees with seven species (29% of the total number of species collected) (Figure 4). Depending on the population density of this family, it is considered to be a potentially harmful for *Q. pubescens*.

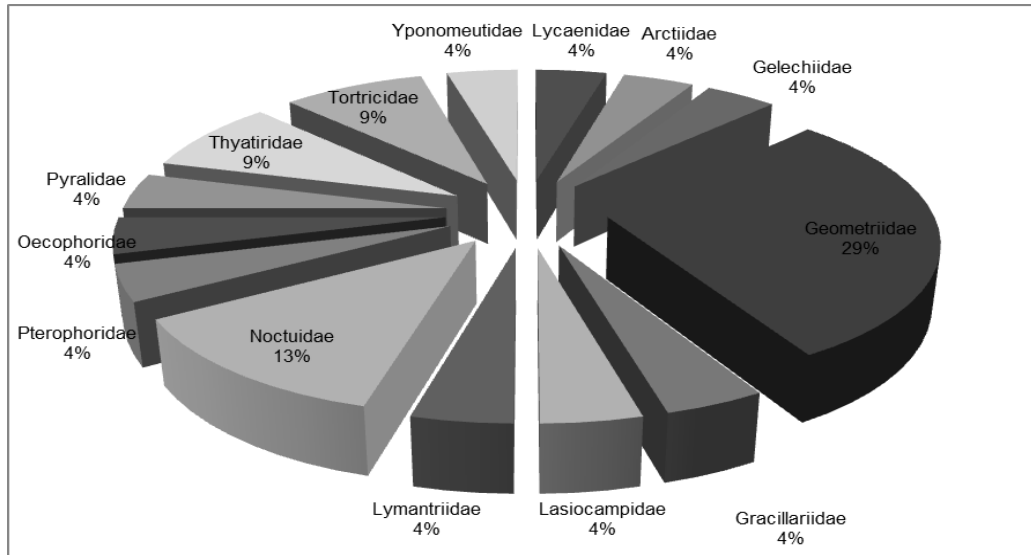


Figure 4. Relative proportions of the Lepidoptera families identified in caterpillar communities feeding on *Quercus pubescens*, in the Ankara Province, Turkey.

Discussion

Ovcharov et al. (2000), studied the preferences of some important oak-damaging Lepidoptera species and determined that *Q. cerris* was more durable than *Quercus petraea* (Mattuschka) Liebl., which was mostly damaged by Geometrids, and than *Quercus frainetto* Ten., which was damaged by Tortricids. Our results were consistent with these findings, as we found that Geometrids were the most diverse group on *Q. pubescens* in Ankara Province. We also found that the Noctuidae family had the second highest prevalence with four species (13% of the total number of species collected), which was consistent with the findings of Kulfan et al. (2013) for *Quercus dalechampii* Ten.

According to Patočka et al. (1999), *O. brumata* and *Tortrix viridana* L. are adapted to xerothermic habitats and prefer *Q. cerris* over other oak species. Consistent with the findings of Parák et al. (2012), our study confirmed that these two species had the highest larval densities.

Eupithecia dodoneata Guenée, 1858 has commonly been reported to feed on *Q. robur* and *Quercus ilex* L. during the larval stage (Petersen, 1909; Allan, 1949; Kulfan, 1997), as well as *C. trapezina* on different oak species (Csóka, 1991; Kulfan, 1997; Kulfan et al., 2006). Our study provides the first report of larval herbivory by these two species on *Q. pubescens*. Parák et al. (2012) reported collection of *D. lipsiella* larvae from *Q. pubescens*. Larvae of this species were also discovered on oak in our study, which represents a new record for the fauna of Turkey.

In Turkey, *Acrocercops brongniardella* (Fabricius, 1798), is only known from Ankara and Bursa, and was obtained from galleries in oak leaves (Koçak & Kemal, 2009). In a study conducted in Croatia, this species was discovered on oak seedlings and found to affect photosynthesis of oak leaves, when it occurred in high density (Matošević et al., 2008). In this study, they were found on *Q. pubescens* and observed with low population density.

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