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Insect fauna of Korugöl Natural Park, Düzce

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ABSTRACT **Research Article**

Background and aims This study aimed to conduct a preliminary survey of insect species in Korugöl Natural Park from August to November 2024. The study area was located in Düzce province of the Western Black Sea Region of Türkiye.
Methods Trap trees and visual inspection methods were used, then adult, nymph, and larvae samples were collected by hand and photographed on host plants.
Results In total, 5 orders, 21 families, and 31 species were identified in this study.
Conclusions These species include exotic alien species, economically important pests, predators, and parasitoid species.

Key Words: Insect, Natural areas, Taxonomy, Türkiye

Düzce, Korugöl Tabiat Parkı böcek faunası

ÖZ

Giriş ve Hedefler Bu çalışmanın amacı, 2024 yılı Ağustos - Kasım tarihleri arasında Korugöl Tabiat Parkı'ndaki böcek türlerinin ön sörveyini yapmaktır. Çalışma alanı Türkiye'nin Batı Karadeniz Bölgesi'nin Düzce ilinde yer almaktadır.
Yöntemler Tuzak ağaçları ve görsel inceleme yöntemleri kullanılmış, ardından ergin, nimf ve larva örneklerinin konukçu bitkiler üzerinde fotoğrafları çekilerek elle toplanmıştır.
Bulgular Bu çalışmada toplamda 5 takım, 21 familya ve 31 tür tespit edilmiştir.
Sonuçlar Bu türler arasında egzotik yabancı, ekonomik açıdan önemli zararlı, predatör ve parazitoid türler bulunmaktadır.

Anahtar Kelimeler: Böcek, Doğal alanlar, Taksonomi, Türkiye

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1. Introduction

Insects are the largest, most diverse, and dominant group animal of the phylum Arthropoda, with approximately 1.11–1.7 million described species (Roskov et al., 2021; Hébert, 2023; Redak, 2023; Gebremariam, 2024). The Class Insecta is known to account for 75% - 80% of animal species on earth and has existed for at least 400 million years (Hébert, 2023; Gebremariam, 2024). However, it is reported that climate change and several factors have resulted in the decline of insect diversity (Settele and Kühn, 2009; Dicks, et al., 2021; Outhwaite et al., 2022; Jain et al., 2024). Therefore, the insect populations that play a significant role in ecosystem functions need to be monitored regularly. It is also reported that less than 0.5% of the total number of known insect species are considered pests, and these can be a serious threat to people (Sallam, 2000).

Insect species can colonize many habitats, harm the environment, damage vegetables, animals, and disturb people (Belluco et al., 2023). These harmful organisms can cause direct damage to different plant parts, such as leaves, young shoots, flowers, branches, stems, roots, and fruits. In addition, some insect species can indirectly affect plant health by transmitting plant pathogens from infected plants to healthy hosts (Islam et al., 2020).

It has been reported that know little about the ecology, taxonomy, and diversity of insects in natural environments (Rega-Brodsky et al., 202). In Türkiye, a few studies have been conducted on the insect fauna of National Parks (Oğurlu et al., 2005; Aslan et al., 2008; Sert and Kabalak, 2010; Aslan and Karaca, 2012; Sert et al., 2013; Özdan, 2014; Bostan 2019).

This study aimed to show the richness of Korugöl Natural Park's insect fauna and to contribute to the current knowledge of the Düzce fauna with new data.

2. Materials And Methods

2.1 Study area

The study was carried out in a Natural Park in Düzce province of the Western Black Sea Region (40°48'22"N 31°17'36"E) Korugöl Natural Park, located within the borders of Kaynaşlı District of Düzce province, covers an area of 30.78 hectares. The area was registered as a Natural Park on 11.07.2011. It was changed to "Korugöl Natural Park" with the numbered 3489508 consent of the Ministry on 07.12.2021 (Anonymous, 2024a).

2.2 Field studies

The study materials were collected using trap trees and a visual inspection method during August - November 2024. In the current study, plant materials were examined visually and photographed. Dried, weakened, and felled trees were also used as trap trees. Then all the samples were placed in plastic collecting jars and transported to the laboratory.

2.3 Laboratory studies

The identification and classification of insect samples were examined based on the relevant literature under an Olympus SZ-51 (Olympus, Japan) stereo microscope (Spencer, 1966; Yaşar and Kasap, 1994; Eroğlu, 1995; Aslan, 1997; Bense, 1995; Ortego et al., 1999; Tozlu, 2001; Zenner et al., 2005; Tomanović et al., 2009; Wieczorek, et al., 2011; Kot and Kmieć, 2012; Scott and Yack, 2012; Clymans, 2014; Riba-Flinch, 2014; Sourakov and Paris, 2014; Boone et al., 2015; Li et al., 2016; Xiang et al., 2016; Prous et al., 2019; Seung and Lee, 2019; Boluanger et al., 2019; Mirumian and Skuhravá, 2022; Novoselsky and Rittner, 2023; Anonymous, 2024b; Öztürk et al., 2024).

Table 1. The information on the beetles found at Korugöl Natural Park

Taxonomic level				Host species/*Stage		**M.C.	Date of Collection
Order	**Family**	**Genus**	**Species**				
Coleoptera	Cerambycidae	*Monochamus*	*Monochamus galloprovincialis*	*Pinus nigra*	A	TT	08-09.11.2024
		Rhagium	*Rhagium inquisitor*	*Pinus nigra*	A	TT	08-09.11.2024
	Chrysomelidae	*Phratora*	*Phratora vitellinae*	*Populus tremula*	A	VI	20.08.2024
	Coccinellidae	*Exochomus*	*Exochomus nigromaculatus*	*Populus tremula*	A	VI	18.09.2024
		Coccinella	*Coccinella septempunctata*	*Populus tremula*	A	VI	18.09.2024
	Histeridae	*Paromalus*	*Paromalus parallelepipedus*	*Pinus nigra*	A	TT	09.11.2024
Diptera	Agromyzidae	*Hexomyza*	*Hexomyza schineri*	*Populus tremula*	A	VI	18.09.2024
	Cecidomyiidae	*Aphidoltes*	*Aphidoltes aphidimyza*	*Populus tremula*	L	VI	18.09.2024
		Harmandiola	*Harmandiola tremulae*	*Populus tremula*	A	VI	18.09.2024
		Hartigiola	*Hartigiola annulipes*	*Fagus orientalis*	A/L	VI	18.09.2024
		Mikiola	*Mikiola fagi*	*Fagus orientalis*	A	VI	18.09.2024
	Tachinidae	*Compsiluroides*	*Compsilura concinnata*	*Populus tremula*	A	VI	18.09.2024
Hemiptera	Anthocoridae	*Anthocoris*	*Anthocoris nemoralis*	*Fagus orientalis*	A	VI	18.09.2024
	Aphididae	*Chaitophorus*	*Chaitophorus leucomelas*	*Populus tremula*	A	VI	18.09.2024
			Chaitophorus tremulae	*Populus tremula*	A	VI	18.09.2024
		Phyllaphis	*Phyllaphis fagi*	*Populus tremula*	A	VI	18.09.2024
	Cicadellidae	*Penthimia*	*Penthimia nigra*	*Populus tremula*	A	VI	18.09.2024
	Diktyopharidae	*Diktyophara*	*Dictyophara asiatica*	*Populus tremula*	A	VI	19.08.2024
	Pentatomidae	*Halyomorpha*	*Halyomorpha halys*	*Carpinus betulus*/ *Corylus avellana*	A/N	VI	08.11.2024

Table 2. Continued The information on the beetles found at Korugöl Natural Park

Taxonomic level				Host species/*Stage		**M.C.	Date of Collection
Order	Family	Genus	Species				
	Cynipidae	*Dryocosmus*	*Dryocosmus kuriphilus*	*Castanea sativa*	L	VI	03.11.2024
Hymenoptera	Formicidae	*Dolichoderus*	*Dolichoderus quadripunctatus*	*Populus tremula*	A	VI	18.09.2024
	Tenthredinidae	*Stauronematus*	*Stauronematus platycerus*	*Populus tremula*	A	VI	18.09.2024
	Drepanidae	*Tethea*	*Tethea or*	*Populus tremula*	L	VI	19.08.2024
	Erebidae	*Hyphantria*	*Hyphantria cunea*	*Populus tremula*	A	VI	07-18.09.2024
		Orgyia	*Orgyia antiqua*	*Populus tremula*	A	VI	07.09.2024
	Gracillariidae	*Phyllonorycter*	*Phyllonorycter comparella*	*Populus tremula*	A	VI	18.09.2024
Lepidoptera			*Phyllonorycter sagitella*	*Populus tremula*	L	VI	07.09.2024
	Geometridae	*Scopula*	*Scopula floslactata*	*Populus tremula*	L	VI	19.08.2024
	Notodontidae	*Clostera*	*Clostera pigra*	*Populus tremula*	A	VI	18.09.2024
	Tortricidae	*Ancylis*	*Ancylis laetana*	*Populus tremula*	A	VI	07.09.2024
		Eulia	*Eulia ministrana*	*Fagus orientalis*	A	VI	18.09.2024

* Abbreviation A: Adult, L: Larvae, N: Nymph; ** M.C.: Method of Collection, TT: Trap Tree, VI: Visual Inspection

3. Results and Discussion

In total, 31 species in 21 families of the 5 orders were identified in Korugöl Natural Park. The information on the beetles found in Korugöl Natural Park is given in Table 1. The most abundant order was Lepidoptera (9 species), followed by Hemiptera (7 species), Coleoptera (6 species), Diptera (6 species), and Hymenoptera (3 species) (Figure 1). A total of 28 species were captured with visual inspection, and 3 species were captured in trap tress. Among these species *Hyphantria cunea* Drury, 1773, *Halyomorpha halys* Stal, 1855, and *Dryocosmus kuriphilus* Yasumatsu, 1951 were considered exotic alien species for Türkiye.

The above-mentioned species, *Phratora vitellinae* Linnaeus, 1758 is considered an economically important pest of young willows and poplars (Urban, 2006). *Phyllaphis fagi* Richards, 1973 is a serious pest in European beech forests (Kot and Kmieć, 2012). *Chaitophorus tremulae* Koch, 1854, and *Chaitophorus leucomelas* Koch, 1854, are important pests of poplar trees (Yaşar and Kasap, 1994; Tozlu, 2001). The main host plants of both *Stauronematus platycerus* Hartig, 1840, and *Phyllonorycter comparella* Duponchel, 1843 are *Populus* spp. (Szőcs et al., 2015; Prous et al., 2019). *Clostera pigra* Hufnagel, 1766, is also known to be a forest pest (Şimşek et al., 2010).

Exochomus nigromaculatus Goeze, 1777 has been recorded as a predator against the globose scale (Karacaoğlu et al., 2024). *Paromalus parallelepipedus* Herbst, 1791 is known as a predator of bark beetles (Coleoptera: Curculionidae: Scolytinae) (Sarıkaya and Avcı, 2009; Cebeci and Baydemir, 2018). *Aphidoletes aphidimyza* Rondani, 1847 is used as a pest control in commercial greenhouse crops (Turanlı and Yoldaş, 2002; Boluanger et al., 2019). *Compsilura concinnata* Meigen, 1824 is one of the most commonly used exotic parasitoids against to *Leucoma salicis* L., *Euproctis chrysorrhoea* L., and *Lymantria dispar* L. (Eroğlu, 1995). *Anthocoris nemoralis* Fabricius, 1794 is one of the most important predators of Psyllidae (Hemiptera: Sternorrhyncha) (Yanık and Uğur, 2005).

3. Conclusions

This study is a preliminary detective survey aimed at rapid sampling of the insect fauna of Korugöl Nature Park in the Düzce province of Türkiye. In the current study, two collecting methods, including trap trees, and visual inspection method were used. The insect fauna of this region was previously unknown, but the survey revealed the presence of 31 species belonging to 5 orders. The insect biodiversity of Korugöl Nature Park can be revealed by periodic sampling and different collection methods in future insect research studies.

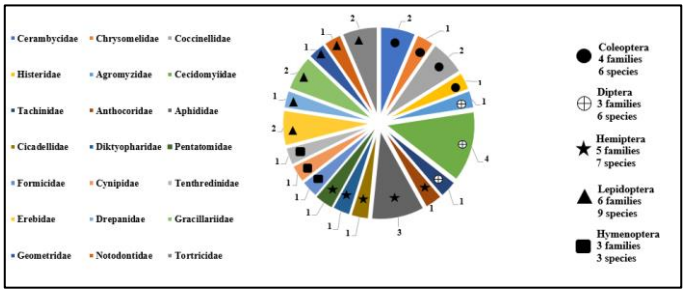

Figure 1. Number of insect species, insect orders, and families at the study area

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