



First Record of Insect species from the Families Scarabidae and Glaphyridae Feeding on the Kenger Plant in Diyarbakır, Şanlıurfa and Mardin Provinces, Türkiye

Türkiye'nin Diyarbakır, Şanlıurfa ve Mardin İllerinden Scarabaeidae ve Glaphyridae Familyalarına Ait Kenger Bitkisiyle Beslenen Türlerle İlişkin İlk Kayıt

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Abstract: As a result of this study conducted in 2021 in the Karacadağ area within the borders of Diyarbakır (Bağlar, Ergani and Çınar districts), Şanlıurfa (Siverek and Viranşehir districts) and Mardin (Derik district) provinces, two insect species from the Scarabaeidae family and one insect species from the Glaphyridae family of the Coleoptera order that feed on the flowers of the Kenger plant were identified. These species are *Oxythyrea cinctella*, *Blitopertha nigripennis* (Scarabaeidae) and *Eulasia pareyssei* (Glaphyridae). This is the first study to report that these species feed on the Kenger plant. While the distributions of the three species identified in the study were similar, their densities differed. *E. pareyssei* was seen fewer than other two species.

Keywords: *Blitopertha nigripennis*, *Eulasia pareyssei*, Kenger plants, *Oxythyrea cinctella*, Türkiye

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Öz: 2021 yılında Diyarbakır (Bağlar, Ergani ve Çınar ilçeleri), Şanlıurfa (Siverek ve Viranşehir ilçeleri) ve Mardin (Derik ilçesi) illeri sınırları içerisinde yer alan Karacadağ bölgesinde yürütülen bu çalışma sonucunda, Coleoptera takımına ait Scarabaeidae familyasından iki ve Glaphyridae familyasından bir olmak üzere toplam üç böcek türünün Kenger bitkisinin çiçekleriyle beslendiği tespit edilmiştir. Bu türler; *Oxythyrea cinctella*, *Blitopertha nigripennis* (Scarabaeidae) ve *Eulasia pareyssei* (Glaphyridae) olarak belirlenmiştir. Bu çalışma, söz konusu türlerin Kenger bitkisiyle beslendiğinin ilk kez raporlandığı çalışmadır. Çalışmada tespit edilen üç türün bölgedeki yayılışları benzerlik göstermekte olup, yoğunlukları farklılık arz etmektedir. *E. pareyssei*, diğer iki türe göre daha az sayıda gözlemlenmiştir.

Anahtar Kelimeler: *Blitopertha nigripennis*, *Eulasia pareyssei*, Kenger plants, *Oxythyrea cinctella*, Türkiye

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INTRODUCTION

The Kenger plant, which is widely found in our country, is used in many ways in many areas. As chewing gum: Chewing gum derived from the plant is reported to relieve toothaches, treat gum diseases, and Whiten teeth. It is also believed to help with inflamed or ruptured eardrums, in the elimination of gallbladder stones, in stomach pain and bloating, as an appetite stimulant and indigestion disorders, and for patients with hypertension, facial paralysis and diabetes. In Eastern and Southeastern Anatolia regions, after the artichoke-like head and stem of the kenger (*Gundelia spp.*) are collected, they are eaten as vegetables. In Central Anatolia and the Mediterranean regions, after the seeds are roasted, the product obtained by pounding them with stone mortars and sifting them is consumed as kenger coffee (Polat et al., 2012).

Gundelia tournefortii chemical composition has positive effects on human health, especially due to its high phenolic content, which includes flavonoids such as caffeoliquinic acid derivatives (cynarin and chlorogenic acid), vanillic acid, fumaric acid, gallic acid and other components such as lemonene, cinnabaren and saponins, which are responsible for the biological activity of the plant (Haghi et al., 2011). When we look at the uses of kenger in daily life, it is reported that it can be used to coagulate milk, as a stabiliser in ice cream production, and that the kenger plant is used to increase the quality of yogurt by turning it into pulp. (Say and Güzeler, 2016; Demir, 2013).

Gundelia tournefortii has been used as a food product by many societies throughout history. It is said to be a cure for many diseases and is used for treatment purposes in traditional medicine. It has been reported that it is used especially in the treatment of liver disease, diabetes, cramp reliever, indigestion, bronchitis, mumps, stomach ache, diarrhea, mouth sores, migraine, heart stroke, stomach ache, vitiligo, strengthening the nerves, and purifying the blood (Azeez and Kheder, 2012; Samani et al., 2013). It has also been reported to have positive effects on bile duct inflammation, cirrhosis and chronic liver diseases caused by excessive alcohol and drug consumption (Tabibian et al., 2013). Apart from these, it has been stated that it has hypoglycemic, anti-inflammatory, anti-parasitic, antibacterial and hepatoprotective effects (Çoruh et al., 2007; Polat et al., 2012). The kenger plant is a perennial wild plant. Kenger, which is widely found in the Karacadağ region, is widely collected and sold by people. The kenger plant is a very important source of income for the local people and contributes significantly to the economy of the surrounding provinces/districts. Therefore, the productivity of the kenger plant is important for the villagers here. For this reason, it is important to determine the harmful insect species that affect the productivity of the kenger plant and cause product loss. The leaves are leathery, veined and whitish hairy, and the ones on the stem are stemless. The root underground has a very thick and woody structure. The perennial kenger plant produces seeds every year. Its seeds are thorny and have a very hard structure. Since kenger is a perennial plant, it has a strong root system. During development, it forms a rosette trunk that thickens every year a monophagous found. Only some of the studies conducted in Iran were reached. Saeidi (2012) stated that *Euxoa agricola* Boisduval, 1829 (Lepidoptera: Noctuidae) is the most important Kenger pest in Iran and determined that its larvae cause significant damage by feeding on the leaves of the Kenger plant. For these reasons, in this study; the damage caused by harmful insect species on the Kenger plant was determined and the biology of these insect species and pest-host relationships were examined.

MATERIAL AND METHOD

The method of the study consists of two parts: field and laboratory studies.

Materyal

The main material of the study is the kenger plant and insects that grow naturally on the skirts of Karacadağ (extinct volcanic mountain) in Diyarbakır, Şanlıurfa and Mardin provinces (Figures 1, 2, 3). The materials used during the collection and preservation of insect species found in these areas were composed of killing bottles, mouth aspirator, ethyl acetate, 70% alcohol, petri dishes, ice trays, eppendorf tubes, soft-tipped brushes, transparent polyethylene bags, paper bags, GPS, plastic jars, culture containers and other laboratory materials.



Figure 1. Kenger plant.
Şekil 1. Kenger bitkisi.



Figure 2. Flowering period of the kenger plant.
Şekil 2. Kenger bitkisinin çiçeklenme periyodu.



Figure 3. The state of the kenger plant after the flower has fallen.
Şekil 3. Çiçeklenmeden sonra kenger bitkisinin görünümü.

Methods

The study method consists of two parts: nature and laboratory studies. As a result of the preliminary studies, it is known that the vegetation period of the kenger plant blooms as of April. With this foresight, field studies were started as of the second week of March 2021, taking into account the weather conditions.

Field Studies

Visual Inspection Method

In each village where the survey was conducted, visual inspections were made on 25 randomly selected plants in the areas where kenger grew. The insects on the plants were collected with a suction bottle or soft

forceps and killed by placing them in killing bottles containing ethyl acetate. The killed insects were transferred to petri dishes containing blotting paper and brought to the laboratory.

Plant Sampling Method

To determine the insect species in the roots, stems, shoots, leaves, flowers and seeds of 5 randomly selected kenger plants located in the same area where the visual inspection method was performed, they were completely dismantled, cut into appropriate sizes, placed in plastic containers and brought to the laboratory for examination. During the survey, the samples were recorded on labels, indicating where they were collected, on what date, where on the host plant they were damaged, and in what biological period they were at that time.

Field work started in mid-March and continued weekly until the last week of June.

Laboratory Studies

Adult insects collected in the field and brought to the laboratory were first grouped roughly according to their morphological similarities, then numbered, and information was noted including where and when they were collected, where on the host plant they caused damage, in what biological period they were at that moment, their rough identification, and what treatments they were subjected to later. In addition, all adult specimens were pinned by the procedure, and small species were glued to triangular or rectangular cardboards that were placed on pins. The specimens were made ready for identification and placed in collection boxes, and after the necessary correspondence was made, they were sent to experts on the subject.

The pre-adult samples collected by visual inspection methods and the samples brought to the laboratory with the plant parts they were found in were cultured separately in plastic containers of different sizes covered with tightly woven cloth in a climate room set at 26 ± 1 °C, 65% $\pm 5\%$ humidity and 3500 lux 16:8 hour light/dark period. The samples that became adults were prepared for identification by the technique and sent to the experts on the subject.

The coordinate and altitude information of the area where the samples were collected were recorded via GPS and transferred to the computer environment. At the same time, the species were photographed in the area where they caused damage.

Field Area

This study was carried out on the skirts of Karacadağ within the borders of Diyarbakır (Bağlar, Ergani, Çınar districts), Şanlıurfa (Siverek, Viranşehir districts) and Mardin (Derik district). Karacadağ is an extinct volcanic mountain located in the southeast of Turkey. Diyarbakır surrounded to Karacadağ the northeast, Şanlıurfa (Siverek-Viranşehir) to the west and south, Mardin (Derik) to the east and the Southeastern Taurus Mountains to the north. The Karacadağ region has a rich flora, including hundreds of plants at different and a rich insect fauna. It is known that some insect species prefer Karacadağ for wintering. It has been reported that insects are found in cracks in stone and soil, especially under perennial vegetation such as *Acantholimon acerosum* (Willd.) Boiss. var. *Acerosum*), *Astragalus echinops* Auch. ex Boiss., *Astragalus sp.*, *Noea spinosissima* Moq. and *Verbascum sp.* during wintering. (Lodos, 1961; Yüksel, 1968).

Due to the geological structure of the Karacadağ region, the vast majority of the areas are covered with volcanic rocks. According to Erinç (1971), Karacadağ is spread over an area of 120 km in diameter, almost circular in shape. The part of Karacadağ, spread over an area of approximately 7200 km², towards Diyarbakır is suitable for plant production. (Alp, 2010).

Karacadağ is not very high and does not appear as a majestic mountain. The highest point of Karacadağ is Mergimir Hill (1981 m) (Ertekin, 2002). Some of the important streams are: Sultan Stream, Esirkul Stream, Çapa Stream, Mazıpınar Stream, Gözün Stream, Şekerpınarı Stream, Kara Stream, Hüre Stream, Gazal Stream, Ziyaret Stream, Simo and Nevalmaz Streams (Ertekin, 2002). Therefore, Karacadağ has a unique ecology.

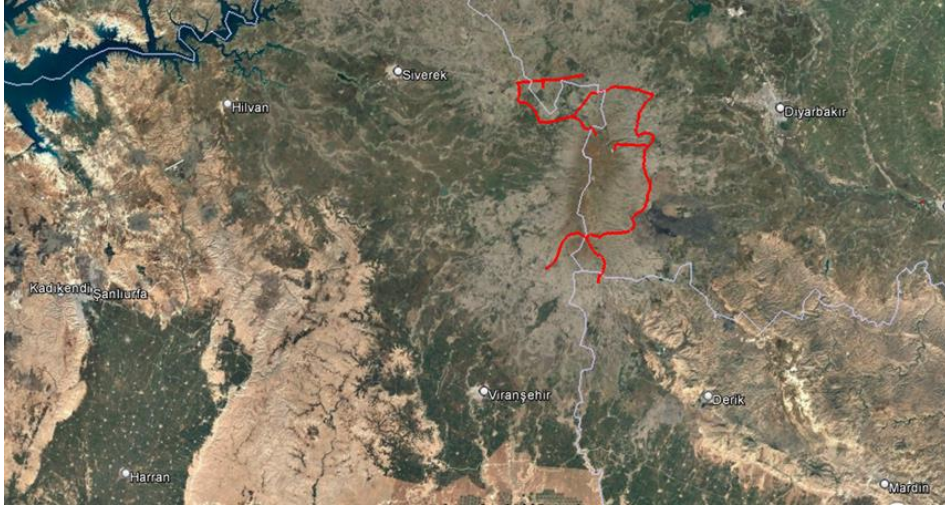


Figure 4. Karacadağ region within the borders of Diyarbakır, Mardin and Şanlıurfa provinces.
Şekil 4. Diyarbakır, Mardin ve Şanlıurfa il sınırları içindeki Karacadağ bölgesi.



Figure 5. The skirts of Karacadağ within the borders of Diyarbakır (Bağlar district).
Şekil 5. Diyarbakır (Bağlar ilçesi) sınırları içindeki Karacadağ etekleri.

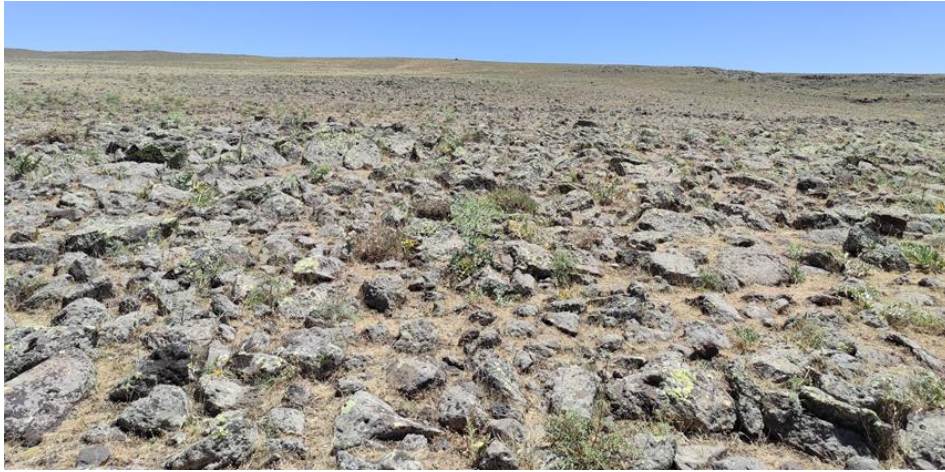


Figure 6. Siverek and Bağlar, a region where the district borders intersect.
Şekil 6. İlçe sınırlarının kesiştiği bölge olan Siverek ve Bağlar.



Figure 7. A region between Diyarbakır and Siverek.

Şekil 7. Diyarbakır-Siverek arası bölge.



Figure 8. Karacadağ in spring.

Şekil 8. İlkbaharda Karacadağ.

RESULTS AND DISCUSSION

As a result of this study conducted on the Kenger plant in the Karacadağ area, where Diyarbakır, Mardin and Şanlıurfa provinces intersect, in 2021, 2 harmful insect species from the Scarabaeidae family and 1 from the Glaphyridae family of the Coleoptera order, which are harmful to the plant during the flowering period, were identified.

Ordo: Coleoptera

Superfamily: Scarabaeoidea Latreille, 1802

Family: Scarabaeidae Latreille, 1802

Subfamily: Cetoniinae Leach, 1815

Genus: *Oxythyrea* Mulsant, 1842

Species: *Oxythyrea cinctella* (Schaum, 1841) (Figure 12)

Material Examined: Diyarbakır Prov.: Bağlar district, 37°45'11"N, 39°52'37"E, 1630 m., 14.V.2021, 20 specimens; Bağlar district, 37°45'02"N, 39°52'29"E, 1655 m., 16.V.2021, 34 specimens; Bağlar district, 37°46'18"N, 39°48'53"E, 1630 m., 16.V.2021, 18 specimens; Ergani district, 37°50'37"N, 39°42'03"E, 1051 m.,

16.V.2021, 20 specimens; Bağlar district, 37°46'00'N, 39°56'41'E, 1097 m., 22.V.2021, 7 specimens; Şanlıurfa Prov.: Siverek district, 37°46'35'N, 39°44'35'E, 1239 m., 16.V.2021, 24 specimens; Siverek district, 37°50'21'N, 39°47'17'E, 1254 m., 16.V.2021, 15 specimens; Siverek district, 37°45'59'N, 39°43'11'E, 1195 m., 23.V.2021, 4 specimens.

Distribution Areas in the Southeastern Anatolia Region: Adıyaman, Batman, Diyarbakır, Gaziantep, Mardin, Siirt, Şanlıurfa, Şırnak (Pehlivan et al., 1995).

This study was the first to determine that *Oxythyrea cinctella* feeds on the kenger plant (*Gundelia spp.*). It was observed that *O. cinctella* adults fed intensively on the flower parts of the kenger plant (Figures 13, 14).



Figure 9. *Oxythyrea cinctella* adult stage.
Şekil 9. *Oxythyrea cinctella* ergin dönemi.



Figure 10. Adult stage of *O. cinctella* feeding on the flowers of the kenger plant.
Şekil 10. Kenger bitkisinin çiçekleriyle beslenen *O. cinctella*'nın ergin dönemi.



Figure 11. Adult stage of *O. cinctella* feeding on the kenger plant.

Şekil 11. Kenger bitkisiyle beslenen *O. cinctella*'nın ergin dönemi.

Subfamily: Rutelinae MacLeay, 1819

Genus: *Blitopertha* Stephens, 1830

Species: *Blitopertha nigripennis* (Reitter, 1888) (Figure 12)

Material Examined: Diyarbakır Prov.: Bağlar district, 37°45'11"N, 39°52'37"E, 1630 m., 14.V.2021, 34 Specimens; Bağlar district, 37°45'02"N, 39°52'29"E, 1655 m., 16.V.2021, 27 Specimens; Bağlar district, 37°46'18"N, 39°48'53"E, 1630 m., 16.V.2021, 35 Specimens; Ergani district, 37°50'37"N, 39°42'03"E, 1051 m., 16.V.2021, 28 Specimens; Bağlar district, 37°46'00"N, 39°56'41"E, 1097 m., 22/05/2021, 3 Specimens; Şanlıurfa Prov.: Siverek district, 37°46'35"N, 39°44'35"E, 1239 m., 16.V.2021, 32 Specimens; Siverek district, 37°50'21"N, 39°47'17"E, 1254 m., 16.V.2021, 26 Specimens; Siverek district, 37°45'59"N, 39°43'11"E, 1195 m., 23.V.2021, 6 Specimens.

This study determined for the first time that *Blitopertha nigripennis* was found on kenger (*Gundelia spp.*) (Figure 13). In addition, *B. nigripennis* was recorded for the first time in the Diyarbakır insect fauna with this study.



Figure 12. Adult stage of *Blitopertha nigripennis*.

Şekil 12. *Blitopertha nigripennis* ergin dönemi.



Figure 13. Adult stage of *B. nigripennis* feeding on the kenger plant and flowers.

Şekil 13. Kenger bitkisi ve çiçekleriyle beslenen *B. nigripennis*'in ergin dönemi.

It was observed that *B. nigripennis* adults fed intensively on the flower parts of the kenger plant (Figure 16).

Family: Glaphyridae

Genus: *Eulasia*

Species: *Eulasia pareyssei* (Brullé, 1832) (Figure 15, 16)

Material Examined: Diyarbakır Prov.: Bağlar district, 37°45'11"N, 39°52'37"E, 1630 m., 14.V.2021, 8 Specimens; Bağlar district, 37°45'02"N, 39°52'29"E, 1655 m., 16.V.2021, 4 Specimens; Bağlar district, 37°46'18"N, 39°48'53"E, 1630 m., 16.V.2021, 4 Specimens; Ergani district, 37°50'37"N, 39°42'03"E, 1051 m., 16.V.2021, 3 Specimens; Şanlıurfa Prov.: Siverek district, 37°46'35"N, 39°44'35"E, 1239 m., 16.V.2021, 5 Specimens; Siverek district, 37°50'21"N, 39°47'17"E, 1254 m., 16.V.2021, 2 Specimens; Siverek district, 37°45'59"N, 39°43'11"E, 1195 m., 23.V.2021, 2 Specimens.



Figure 14. Dorsal and ventral views of the adult stage of *Eulasia pareyssei*.

Şekil 14. *Eulasia pareyssei*'nin ergin döneminin dorsal ve ventral görünüşleri.



Figure 15. Lateral view of the adult stage of *Eulasia pareyssei*.

Şekil 15. *Eulasia pareyssei*'nin ergin döneminin yandan görünümü.

This study is the first to report that *Eulasia pareyssei* feeds on the *Gundelia* plant (*Gundelia* spp.) (Figures 15, 16). Additionally, *E. pareyssei* was recorded for the first time as part of the insect fauna of Diyarbakır.

Fieldwork conducted in 2021 within the Karacadağ region—covering the districts of Bağlar, Ergani, and Çınar in Diyarbakır; Siverek and Viranşehir in Şanlıurfa; and Derik in Mardin—resulted in the identification of two pest species from the family Scarabaeidae (order: Coleoptera) and one pest species from the family Glaphyridae.

The identified species were *Oxythyrea cinctella* and *Blitopertha nigripennis* (Scarabaeidae), and *Eulasia pareyssei* (Glaphyridae). This study also constitutes the first record of these species feeding on the *Gundelia* plant. Although the distribution patterns of the three species were similar across study sites, their population densities varied. *Eulasia pareyssei* was recorded in significantly lower numbers compared to the other two species (see Table 1).

It was further observed that *B. nigripennis* and *E. pareyssei* formed a mixed population and were frequently encountered in high densities on the same floral structures (Figures 16, 17).

Table 1. Regional distribution of three Coleoptera species in Diyarbakır and Şanlıurfa.

Tablo 1. Diyarbakır ve Şanlıurfa'da üç Coleoptera türünün bölgesel dağılımı.

Species	Diyarbakır (Bağlar + Ergani)	Şanlıurfa (Siverek)	Total number of samples
<i>Oxythyrea cinctella</i>	99	43	142
<i>Blitopertha nigripennis</i>	127	64	191
<i>Eulasia pareyssei</i>	19	9	28



Figure 16. Mixed population of *B. nigripennis* and *E. pareyssei*.

Şekil 16. *B. nigripennis* ve *E. pareyssei*'nin karışık popülasyonu.



Figure 17. Mixed population of *B. nigripennis* and *E. pareyssei*.

Şekil 17. *B. nigripennis* ve *E. pareyssei*'nin karışık popülasyonu.

CONCLUSION

Kenger plant is an important plant that does not require input and grows naturally, contributing to the economy of the local people. The Study concludes that it is essential to develop environmentally friendly control methods against *O. cinctella* and *B. nigripennis* species, which are seen intensively in the study area.

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CONFLICT OF INTEREST

The author (s) must report under this title that there are no conflicts of interest.

DECLARATION OF AUTHOR CONTRIBUTION

The author (s) must report under this title that there are no conflicts of interest.

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