

RESEARCH ARTICLE /ARASTIRMA MAKALESİ

**GROUND BEETLES (*COLEOPTERA, CARABOIDEA*) OF THE ECOLOGICALLY MANAGED
CHERRY ORCHARDS OF WESTERN ANATOLIA (TURKEY) ALONG WITH SOME NEW
ADDITIONAL DATA**

Serdar TEZCAN¹, Claude JEANNE², Bekir KESKİN³

ABSTRACT

Fortyone species belonging to ten families of Caraboidea were recorded in ecologically managed cherry orchards (*Cerasus avium*)(Linnaeus) located in Muradiye (Manisa), Ören and Armutlu (İzmir), western Turkey. Totally, 1627 specimens were collected mainly by pitfall traps, by yellow sticky traps and by bait traps and a few specimens by beating and by sweeping of the vegetation. Additional data belonging to material collected from different parts of Turkey were also included in this paper.

Keywords : Caraboidea, *Cerasus avium*, Cherry orchards, Fauna, Turkey.

**BATI ANADOLU EKOLOJİK KIRAZ BAHÇELERİNİN CARABOIDEA (COLEOPTERA)
FAUNASI VE YENİ EK NOTLAR**

ÖZ

Muradiye (Manisa), Ören ve Armutlu (İzmir)'daki ekolojik üretim yapılan kiraz (*Cerasus avium*) (Linnaeus) bahçelerinde gerçekleştirilen bu çalışmada, Caraboidea üstfamilyasının 10 familyasına bağlı 41 türün bulunduğu belirlenmiştir. Toplam 1627 örnek başta çukur tuzaklar olmak üzere, sarı yapışkan tuzaklar, besin tuzaklar, çırpma ve atrap yöntemleriyle toplanmış ve değerlendirilmiştir. Ayrıca incelenen türlerin Türkiye'deki yayılışlarına ilişkin ek bilgiler de verilmiştir.

Anahtar Kelimeler: Caraboidea, *Cerasus avium*, Kiraz bahçeleri, Fauna, Türkiye.

¹Department of Plant Protection, Faculty of Agriculture, Ege University, 35100 Bornova, İzmir, TURKEY.

E-mail: serdar.tezcan@ege.edu.tr **Fax:** +90-232-3744848

²37, Cours du Général Leclerc, 33210 Langon, FRANCE.

³Department of Biology, Faculty of Science, Ege University, 35100, Bornova, İzmir, TURKEY.

E-mail: bekir.keskin@ege.edu.tr

1. INTRODUCTION

Ground beetle fauna of Turkey has been studied for a long period. The most important faunistic studies have been carried out by Bodemeyer (1900), Sahlberg (1912-1913), Winkler (1924-1932), Gadeau de Kerville (1939), Bytinski-Salz (1956), Gül-Zümreoğlu (1972), Lodos (1989), and Moravec and Zieris (1998).

In recent studies (Ulu et al., 1995; Özbek et al., 1996; Ulusoy et al., 1999 and Özder, 1999) the insect fauna of Turkish cherry orchards [*Cerasus avium* (Linnaeus) Moench., Rosaceae] has been evaluated. The works mentioned above contain no records of Caraboidea.

The aim of this study was to monitor the occurrence of Caraboidea in ecologically managed cherry orchards of western Turkey. The material collected or determined from different parts of Turkey have also been added into this research.

2. MATERIAL AND METHODS

The beetles were collected in three ecologically managed cherry orchards in western Turkey: Muradiye (Manisa-Central province, 38°39'N 27°20'E) having 550 cherry trees, Ören (Izmir-Kemalpaşa, 38°28'N 27°36'E) having 160 trees, and Armutlu (Izmir-Kemalpaşa, 38°25'N 27°32'E) having 165 trees (Tezcan et al., 2001). The insects were collected between the years 1998 and 1999. They were collected by beating (A), by sweeping (B) of the vegetation in one-week periods; or using traps (pitfall trap (C), bait trap (D), and yellow sticky trap (E)). Pitfall traps consisted of 250 ml cups buried in the soil in such a way that the lip of the trap would be at ground level. They were half filled with ethylen glycol and water mixture as 1:1 ratio. Three traps were used in each orchard during the period between 1 April 1998 and 20 December 1999. The beetles were collected and the traps were cleared in two weeks intervals from the beginning of April up to the end of October in 1998 and 1999, and in three weeks intervals from the beginning of November 1998 to the end of March 1999. In each orchard a total of 9 bait traps were placed. The traps were charged by a mixture containing wine (100 ml), water (900 ml), sugar (25 g), and vinegar (25 ml) (Ulu et al., 1995). The traps were checked in two-week intervals starting from mid-April until the end of December. In each orchard a total of 12 yellow sticky traps (15x20 cm) were hung to the cherry trees. They were checked in one-week period starting from mid-April until the end of December.

All insects were determined / confirmed by the second author. Material evaluated in this work is deposited in the collection of Prof. Dr. Niyazi Lodos Museum (LEMT), Plant Protection Department, Faculty of Agriculture, Ege University, Izmir, Turkey and in the collection of C. Jeanne. Other material collected from Turkey and unpublished and deposited

in the collection of C. Jeanne or checked by himself in various collections were also included in this paper and the names of localities of these material were given with asterisk.

Biological notes obtained from literature have been given in the related species. If there has not any find based on literature or observation, in this case, in the related species any biological note has not been given.

In this paper classification and nomenclature of ground beetles suggested by Zaballo and Jeanne (1994) has been followed. Some recent revisions of taxa have also been taken into account.

3. RESULTS

Material evaluated in this study is listed below according to the family, subfamily, genera and species level.

Carabidae, Carabinae

Pachystus graecus morio (MANNERHEIM, 1830)

Distribution in Turkey: Ankara, Izmir (Gadeau de Kerville, 1939). Afyon (Sultandağı*), Amasya (Merzifon*), Aydın (Güdüşlü*, Priene*), Bolu (Akyarma Geçidi*), Çankırı (Çankırı*, Çubucuk Geçidi*), Erzurum (Ispir*), Giresun (Eğribel Geçidi*), Gümüşhane (Kop Geçidi*), İçel (Sertavul Geçidi*), Izmir (Izmir*, Efes*, Küçükkemerdere*, Pamucak*, Selçuk*), Kastamonu (Yaralığöz Dağı*), Konya (Beyşehir*), Manisa (Soma*), Nevşehir (Ürgüp*), Ordu (Gölköy*), Samsun (Karadağ*, Ladik*), Sivas (Karabayır Geçidi*), Tokat (Tokat*). Endemic species.

Material: Muradiye, 31.5.99, C, (1); Ören, 23.11.98, C, (2); 14.12.98, C, (1); Armutlu, 1.6.98, C, (2); 3.7.98, C, (1); 14.12.98, C, (11); 26.3.99, C, (1); 1.6.99, C, (2); 1.6.99, D, (2); 12.10.99, C, (1). 24 specimens.

Procrustes coriaceus cerisyi DEJEAN, 1826

Distribution in Turkey: Izmir (Gadeau de Kerville, 1939), Izmir (Bornova) (Gül-Zümreoğlu, 1972). Aydın (Güdüşlü*, Milet*, Priene*), Izmir (Bozdağ*, Doğanbey*, Seferihisar*, Selçuk*), Muğla (Bodrum*, Kavaklıdere*). Endemic species.

Material: Muradiye, 6.5.98, C, (2); 21.5.98, C, (3); 1.6.98, C, (2); 17.7.98, C, (1); 12.10.98, C, (3); 26.10.98, C, (5); 23.11.98, C, (3); 14.12.98, C, (4); 31.1.99, C, (4); 26.2.99, C, (10); 27.4.99, C, (2); 17.5.99, C, (3); 31.5.99, C, (17); 14.6.99, C, (1); 25.10.99, C, (6); 8.11.99, C, (1); 22.11.99, C, (5); 6.12.99, C, (2); 20.12.99, C, (1); Ören, 6.5.98, C, (6); 21.5.98, C, (11); 12.10.98, C, (3); 23.11.98, C, (6);

14.12.98, C, (1); 26.2.99, C, (2); Armutlu, 21.4.98, C, (1); 6.5.98, C, (7); 21.5.98, C, (36); 13.6.98, C, (3); 3.7.98, D, (1); 3.7.98, C, (4); 14.8.98, C, (2); 12.10.98, C, (3); 26.10.98, C, (6); 14.12.98, C, (17); 31.1.99, C, (3); 26.2.99, C, (5); 18.5.99, C, (4); 1.6.99, C, (14); 1.6.99, D, (2); 22.11.99, C, (1). 213 specimens.

Biological note: This species preys upon slugs, insect larvae and carrions (Wachmann et al., 1995).

Nebriidae, Nebriinae

Leistus fulvibarbis (DEJEAN, 1826)

Distribution in Turkey: Izmir (Küçükkemerdere*, Kuş Cenneti Milli Parkı*), Nevşehir (Ürgüp*).

Material: Armutlu, 27.4.99, C, (1). 1 specimen.

Biological note: Species belonging to this genus preys upon Collembolan species (Wachmann et al., 1995).

Nebria brevicollis FABRICIUS, 1792

Distribution in Turkey: Turkey (Csiki, 1927), Bolu (Bytinski-Salz, 1956), Izmir (Bornova) (Gül-Zümreoğlu, 1972). Antalya (Alanya*, Manavgat*, Yarpuz*), Artvin (Yalnızçam Dağı*), Aydın (Germencik*), Denizli (Bozkurt*), İstanbul (Büyükdere*), Izmir (Bozdağ*, Somak*, Torbalı*), Kastamonu (Ilgazdağı Geçidi*), Ordu (Akkuş*).

Material: Muradiye, 21.4.98, C, (3); 9.11.98, C, (1); 23.11.98, C, (1); 14.12.98, C, (3); 10.5.99, C, (3); 25.10.99, D, (1); Ören, 6.5.98, C, (1); 26.10.98, C, (2); 9.11.98, C, (3); 23.11.98, C, (3); 14.12.98, C, (8); 31.1.99, C, (2); 27.4.99, C, (2); 6.12.99, C, (1); Armutlu, 23.11.98, C, (9); 27.4.99, C, (1); 18.5.99, C, (2). 46 specimens.

Biological note: Species belonging to this genus preys upon Collembolan species (Wachmann et al., 1995).

Trechidae, Trechinae

Trechus austriacus DEJEAN, 1831

Distribution in Turkey: Moravec and Zieris (1998) among many others reported this species from Izmir and Manisa provinces; Western and Southwestern Anatolia and from Izmir (Pawłowski, 1979). Antalya (Sağırın*, Saklıkent*, Söğütcük*, Taşkesiği*), Aydın (Aydın Dağı*, Gündüslü*, Ulukonak*), Izmir (Bozdağ*), Manisa (Manisa*, Gözlü Baba Dağı*), Muğla (Kavaklıdere*, Çakmak*).

Material: Muradiye, 17.5.99, E, (1); 31.5.99, E, (1); Ören, 23.11.98, E, (1); 27.4.99, E, (1); Armutlu, 4.5.99, E, (2); 8.6.99, E, (1). 7 specimens.

Trechus quadristriatus (SCHRANK, 1781)

Distribution in Turkey: Anatolien (Csiki, 1928). Many localities including Izmir from Anatolia (Pawłowski, 1979). Moravec and Zieris (1998) among many others reported this species from Izmir and Manisa provinces. Adana (Yumurtalık*), Adıyaman (Nemrut Dağı*), Antalya (Finike*, Gündoğmuş*, Irmasan Geçidi*, Kemer*, Lara Plajı*, Sağırın*, Side*, Sinekçibeli Geçidi*, Termessos*, Yarpuz*), Aydın (Gündüslü*), Bilecik (Bilecik*), Bolu (Abant*, Bolu Dağı Geçidi*), Burdur (Kızılkaya*), Bursa (Bursa*, Inegöl*, Uludağ*), Erzincan (Erzincan*), Erzurum (Erzurum*), Giresun (Şebinkarahisar*), Hatay (Yeniceköy*), Içel (Erdemli*), Izmir (Küçükkemerdere*, Teos*), Manisa (Manisa*), Muğla (Kemer*), Osmaniye (Osmaniye*), Sakarya (Kocaali*).

Material: Muradiye, 10.5.99, E, (1); 17.5.99, E, (4); 24.5.99, E, (1); 31.5.99, E, (2); Armutlu, 21.4.98, E, (1); 1.6.98, E, (1); 4.5.99, E, (1); 18.5.99, E, (2). 13 specimens.

Biological note: This species preys upon *Aphis fabae* (Lodos, 1989) and the eggs of *Mamestra brassicae* (Wachmann et al., 1995).

Bembidiidae, Bembidiinae

Metallina leucoscelis (CHAUDOIR, 1850)

Distribution in Turkey: Antalya (Fersin*, Manavgat*, Sağırın*, Taşkesiği*), Izmir (Seferihisar*), Manisa (Manisa*).

Material: Muradiye, 31.5.99, E, (1). 1 specimen.

Metallina properans (STEPHENS, 1828)

Distribution in Turkey: Ankara (Gadeau de Kerville, 1939). Ankara (Çubuk*), Antalya (Incekum*, Yarpuz*), Aydın (Germencik*), Burdur (Çeltikçi Geçidi*), Erzincan (Erzincan*), Erzurum (Erzurum*), Giresun (Şebinkarahisar*), Isparta (Eğirdir*), Izmir (Efes*, Ödemiş*, Pamucak*), Konya (Bakaran*).

Material: Armutlu, 13.6.98, C, (1); 13.4.99, B, (1); 16.6.99, C, (1). 3 specimens.

Phyla tethys NETOLITZKY, 1926

Distribution in Turkey: Western Turkey (Huber and Marggi, 1997).

Material: Muradiye, 31.5.99, E, (1); Armutlu, 18.5.99, E, (1); 8.6.99, E, (2). 4 specimens.

Tachyphanes lucasi DUVAL, 1852

Distribution in Turkey: Adana (Tuzla Gölü*), Antalya (Kemer*, Konyaaltı*, Manavgat*, Sağırın*, Side*), Aydın (Gündüslü*), Gaziantep (Fevzipaşa*),

Hatay (Güvenç*), İçel (Anamur*, Kızıkalesi*), İzmir (Çaybaşı*, Pamukyazı*), Manisa (Manisa*), Muğla (Fethiye*, Hamitköy*, Karaağaç*).

Material: Muradiye, 4.9.98, E, (1). 1 specimen.

Pterostichidae, Pterostichinae

Poecilus cupreus (LINNAEUS, 1758)

Distribution in Turkey: Turkey (Csiki, 1930), Ankara (Gaudeau de Kerville, 1939). Antalya (Avlan Gölü*), Ardahan (Ardahan*), Artvin (Artvin*, Yalnızçam Geçidi*), Aydın (Güdüşlü*), Balıkesir (Bandırma*), Bolu (Mengen*), Çankırı (Çankırı*), Erzurum (Erzurum*, Köprübaşı*, Tortum*, Uzundere*), Kars (Arpaçay*, Dağpınar*, Ilgar Geçidi*, Susuz*), Kastamonu (Kastamonu*), Konya (Yelibel Geçidi*), Ordu (Akkuş*), Sinop (Dranoz Dağı*).

Material: Muradiye, 20.7.99, C, (1); Armutlu, 6.5.98, C, (1). 2 specimens.

Biological note: Species of this genus have phytozoophagous character. They prey upon caterpillars, spiders, ants, aphids and also plant material (Wachmann et al., 1995).

Pterostichidae, Platyninae

Anchomenus dorsalis (PONTOPPIDAN, 1763)

Distribution in Turkey: İzmir (Bornova) (Gül-Zümreoğlu, 1972). Ankara (Ankara*), Antalya (Manavgat*, Yarpuz*), Artvin (Borçka*), Burdur (Kızılkaya*), Erzurum (Kop Geçidi*), Giresun (Şebinkarahisar*), Gümüşhane (Torul*), İstanbul (İstanbul*), Kars (Kızılkoparan*), Kastamonu (Ilgazdağı Geçidi*), Muğla (Kemer*), Trabzon (Yalıköy*).

Material: Muradiye, 21.4.98, C, (1); 20.7.99, C, (1); Ören, 21.4.98, C, (2); 1.6.98, C, (4); 3.7.98, C, (1); 26.3.99, C, (2); 13.4.99, C, (4); 22.11.99, C, (1); Armutlu, 6.5.98, C, (1); 1.6.98, C, (27); 13.6.98, C, (10); 3.7.98, C, (1); 17.7.98, C, (19); 31.7.98, C, (1); 26.3.99, C, (2); 13.4.99, C, (10); 27.4.99, C, (1); 27.4.99, E, (1); 16.6.99, C, (19); 8.11.99, C, (4); 22.11.99, C, (1). 113 specimens.

Biological note: This species preys upon aphids, caterpillars and cantharid larvae (Wachmann et al., 1995).

Olisthopus fuscatus DEJEAN, 1828

Distribution in Turkey: Antalya (Demirtaş*, Geris*, Murtiçi*, Perge*, Sağırın*, Taşkesiği*, Termessos*, Yarpuz*).

Material: Muradiye, 6.5.98, E, (1); 17.7.98, C, (1); 31.7.98, C, (1); 17.5.99, E, (21); 31.5.99, E, (41);

14.6.99, E, (4); Armutlu, 6.5.98, E, (4); 27.5.98, E, (1); 17.5.99, E, (2); 31.5.99, E, (2); 28.6.99, E, (1). 79 specimens.

Olisthopus glabricollis GERMAR, 1817

Distribution in Turkey: Ankara (Gaudeau de Kerville, 1939). Antalya (Akseki*, Elmalı*, Geris*, Kale*, Sağırın*, Taşkesiği*, Yarpuz*), Aydın (Cumalı*), Balıkesir (Balıkesir*), Bursa (Inegöl*, Uludağ*), Gaziantep (İslahiye*), İçel (Namrun*), Tokat (Niksar*).

Material: Muradiye, 17.5.99, E, (1); 31.5.99, E, (3). 4 specimens.

Pterostichidae, Sphodrinae

Calathus leptodactylus PUTZEYS, 1873

Distribution in Turkey: Antalya (Akseki*, Alanya*, Avlanbeli Geçidi*, Çakıllı Gedik*, Çobanisa*, Elmalı*, Saklıkent*, Söğütçük*, Yarpuz*), İçel (Erdemli*, Gülnar*), Isparta (Eğirdir*, Sultan Dağı*), Manisa (Akhisar*), Muğla (Bencik-Yatağan*, Karabel Geçidi*), Nevşehir (Göreme*).

Material: Muradiye, 6.5.98, C, (2); 14.8.98, C, (1); 31.1.99, C, (2); 26.2.99, C, (1); 26.3.99, C, (1); 17.5.99, E, (1); 25.10.99, C, (1); Ören, 12.10.98, C, (1); 14.12.98, C, (6); 31.1.99, C, (5); 26.2.99, C, (34); Armutlu, 13.6.98, C, (3); 17.7.98, C, (2); 21.8.98, C, (1); 16.6.99, C, (1); 31.12.99, C, (3). 65 specimens.

Calathus libanensis PUTZEYS, 1873

Distribution in Turkey: Denizli (Güney*, Kazıkbeli Geçidi*), Eskişehir (Inönü*), Gaziantep (Nurdağı Geçidi*), Isparta (Eğirdir*, Sultan Dağı*, Yukarıgökdere*), İstanbul (Alem Dağı*), İzmir (Çiçekli*), Kahramanmaraş (Göksun*), Kayseri (Pınarbaşı*), Konya (Engilli*), Nevşehir (Topuzdağı*), Osmaniye (Zorkun-Gökbel*), Sivas (Bulucan*).

Material: Muradiye, 26.10.98, C, (3); 9.11.98, C, (1); 14.12.98, C, (2); 8.11.99, C, (1). 7 specimens.

Calathus longicollis (MOTSCHULSKY, 1864)

Distribution in Turkey: From the western, central and southern parts of Turkey including İzmir and Manisa provinces (Battoni and Vereschagina, 1984); İzmir (Öncüler, 1991). In many localities in Central and Western Anatolia such as Adana*, Adapazarı*, Amasya*, Antalya*, Aydın*, Bolu*, Burdur*, Bursa*, Çanakkale*, Çorum*, Edirne*, Erzincan*, Eskişehir*, Giresun*, Gümüşhane*, Isparta*, İçel*, İstanbul*, İzmir*, Kahramanmaraş*, Kars*, Kastamonu*, Kayseri*, Konya*, Kütahya*, Manisa*, Muğla*, Nevşehir*, Niğde*, Ordu*, Rize*, Samsun*, Sinop*, Tokat*, Trabzon*, Yozgat*.

Material: Muradiye, 14.8.98, C, (3); 28.9.98, C, (6); 12.10.98, C, (11); 26.10.98, C, (14); 9.11.98, C, (3); 23.11.98, C, (2); 14.12.98, C, (3); 26.2.99, C, (2); 31.5.99, C, (2); 20.7.99, C, (1); 12.10.99, C, (6); 25.10.99, C, (8); 25.10.99, D, (1); 8.11.99, C, (3); 22.11.99, C, (3); 6.12.99, C, (2); Ören, 1.6.98, C, (1); 23.11.98, C, (11); 14.12.98, C, (1); 26.2.99, C, (3); 12.10.99, D, (2); 6.12.99, C, (3); Armutlu, 28.9.98, C, (1); 23.11.98, C, (2); 14.12.98, C, (7); 16.6.99, C, (1); 3.8.99, C, (1); 14.9.99, C, (1); 12.10.99, C, (3); 8.11.99, C, (2); 19.12.99, C, (3); 26.2.99, C, (2). 114 specimens.

Pristonychus conspicuus (WALTL, 1838)

Distribution in Turkey: Western and Southern Anatolia including Izmir and Manisa provinces (Casale, 1988). Afyon (Sultan Dağı*), Ankara (Elmadag*), Antalya (Akçay*, Korkuteli*), Denizli (Güney*), Içel (Sertavul Geçidi*), Kırşehir (Çiçekdağı*), Konya (Engilli*).

Material: Muradiye, 13.6.98, C, (1); 3.7.98, C, (1); 17.7.98, C, (1); 12.10.98, C, (1); 26.10.98, C, (4); 9.11.98, C, (8); 23.11.98, C, (1); 10.5.99, C, (1); 31.5.99, C, (2); 20.7.99, C, (3); 8.11.99, C, (2); 22.11.99, C, (1); Ören, 3.7.98, C, (1); 12.10.98, C, (1); 23.11.98, C, (5); 20.7.99, D, (1); Armutlu, 1.6.98, C, (2); 13.6.98, C, (1); 3.7.98, C, (2); 12.10.98, C, (5); 26.10.98, C, (16); 14.12.98, C, (2); 25.5.99, D, (1); 1.6.99, C, (5); 16.6.99, C, (5); 20.7.99, C, (2); 17.8.99, C, (1); 28.9.99, C, (1); 26.10.99, C, (1). 78 specimens.

Pterostichidae, Zabrinae

Amara aenea DE GEER, 1774

Distribution in Turkey: Turkey (Sahlberg, 1912-1913), Ankara, Izmir (Gadeau de Kerville, 1939), Bolu (Bytinski-Salz, 1956). Ankara (Şereflikoçhisar*), Antalya (Akseki*, Antalya*, Beşkonak*, Çakıllı Gedik*, Geris*, Irmasan Geçidi*, Kemer*, Manavgat*, Murtiçi*, Perge*, Phaselis*, Sağırın*, Side*, Söğütcük*, Yarpuz*), Ardahan (Ardahan*, Ilgardağı Geçidi*), Artvin (Kaçkar Dağı*, Murgul*, Yalnızçam Dağı*), Aydın (Güdüşlü*), Bitlis (Süphan Dağı*), Bolu (Akyarma Geçidi*, Bolu*, Gerede*), Erzurum (Erzurum*, Uzundere*), Giresun (Eğribel Geçidi*, Şebinkarahisar*), Gümüşhane (Şiran*, Vaudağı Geçidi*), İstanbul (Şile*), Izmir (Bozdağ*), Kastamonu (Ilgaz Dağı*, Kastamonu*), Konya (Akşehir*, Bakaran*), Manisa (Akhisar*), Nevşehir (Ürgüp*), Ordu (Gölköy Geçidi*, Mesudiye*), Rize (Ikizdere*), Sinop (Dranoz Dağı*), Tokat (Tokat*).

Material: Muradiye, 26.6.98, E, (1); 26.2.99, C, (1); 14.6.99, C, (1); Armutlu, 6.5.98, C, (1); 1.6.98, C, (3); 31.7.98, C, (2); 13.4.99, C, (1); 27.4.99, C, (1); 1.6.99, C, (1); 1.6.99, D, (1). 13 specimens.

Biological note: Lodos (1989) noted gramineous plants as host.

Amara anthobia VILLA, 1833

Distribution in Turkey: Ankara (Gadeau de Kerville, 1939). Antalya (Akseki*, Gündoğmuş*), Amasya (Amasya*), Isparta (Yukarıgökdere*).

Material: Ören, 13.4.99, C, (2); Armutlu, 13.4.98, C, (1); 13.6.98, C, (1); 20.7.99, C, (1). 5 specimens.

Amara ovata FABRICIUS, 1792

Distribution in Turkey: Ankara (Gadeau de Kerville, 1939). Antalya (Termessos*), Artvin (Artvin*), Giresun (Kümbet*), Isparta (Yukarıgökdere*), Izmir (Izmir*), Trabzon (Zigana Geçidi*).

Material: Ören, 1.6.99, C, (1). 1 specimen.

Biological note: It is a phytophagous species. Lodos (1989) noted cruciferous plants as host.

Zabrus asiaticus CASTELNAU, 1834

Distribution in Turkey: Kleinasien (Csiki, 1932). Afyon, Ankara, Izmir, Manisa (Lodos, 1983; 1989). Içel (Çamlıyayla*). Endemic species.

Material: Muradiye, 17.5.99, C, (1); 31.5.99, C, (5); 14.6.99, C, (1); 28.6.99, C, (1); 25.10.99, C, (1); Ören, 18.5.99, C, (1); Armutlu, 3.7.98, C, (1). 11 species.

Zabrus orientalis APFELBACK, 1904

Distribution in Turkey: Izmir (Gadeau de Kerville, 1939). Adana (Pozantı*), Antalya (Akçay*, Antalya*, Elmalı*, Geris*, Gündoğmuş*, Korkuteli*, Manavgat*, Sağırın*, Side*, Söğütcük*, Yarpuz*, Yazır*), Aydın (Davutlar*, Didim*, Güdüşlü*, Ulukonak*), Balıkesir (Babaköy*), Burdur (Kızılkaya*, Köroğlu Geçidi*), Denizli (Bozkurt*, Pamukkale*), Içel (Erdemli*, Gülnar*, Sertavul Geçidi*), Izmir (Aydın Dağı*, Bozdağ*, Çiçekli*, Doğanbey*, Efes*, Izmir*, Küçükkemerdere*, Pamucak*, Somak*), Muğla (Karabel Geçidi*, Kavaklıdere*, Sakartepe-Gökova*). Endemic species.

Material: Muradiye, 9.11.98, C, (1); 25.10.99, C, (1); Armutlu, 14.12.98, C, (1). 3 specimens.

Harpalidae, Harpalinae

Cryptophonus litigiousus (DEJEAN, 1829)*

Distribution in Turkey: Içel (Bodemeyer, 1900). Antalya (Akseki*, Finike*, Güzelbağ*, Kaş*, Yarpuz*), Balıkesir (Sarımsaklı*), Erzurum (Rizekent*), Izmir (Bornova*, Çiçekli*), Manisa (Manisa*), Muğla (Fethiye*).

Material: Muradiye, 20.7.99, C, (1). 1 specimen.

***Cryptophonus tenebrosus* (DEJEAN, 1829)**

Distribution in Turkey: Konya (Bodemeyer, 1900). Antalya (Beşkonak*, Sağırın*), Artvin (Artvin*, Yalnızçam Geçidi*).

Material: Ören, 14.8.98, C, (1); Armutlu, 31.7.98, C, (2). 3 specimens.

***Harpalus distinguendus* DUFTSCHMID, 1812**

Distribution in Turkey: İçel, Konya (Bodemeyer, 1900), Turkey (Csiki, 1932), Ankara (Gadeau de Kerville, 1939). Antalya (Alanya*, Beşkonak*, Kızılot*, Manavgat*, Perge*, Sağırın*, Sinekçibeli Geçidi*, Söğüt Gölü*, Termessos*, Yarpuz*), Artvin (Borçka*), Aydın (Kuşadası*), Bayburt (Bayburt*), Burdur (Kızılkaya*), Erzincan (Erzincan*), Erzurum (Çat*, Erzurum*, Ispir Yolu*, Kop Geçidi*, Tortum*), Giresun (Şebinkarahisar*), Gümüşhane (Gümüşhane*, Vaudağı Geçidi*), İçel (Erdemli*), Isparta (Eğirdir*, Keçili*), İstanbul (İstanbul*, Büyükdere*), İzmir (Bergama*, Bozdağ*, Efes*), Kahramanmaraş (Gözcük*), Konya (Ivriz*), Tokat (Niksar*).

Material: Ören, 3.7.98, C, (1); 31.7.98, C, (2); 14.12.98, C, (3); 26.2.99, C, (5); 1.6.99, C, (1); 16.6.99, C, (2); 20.7.99, C, (8); 20.7.99, D, (1); 17.8.99, C, (5); 7.8.99, D, (1); 31.8.99, C, (5); 28.9.99, C, (2); Armutlu, 13.6.98, C, (1); 27.4.99, C, (1); 18.5.99, C, (2); 16.6.99, C, (2); 3.8.99, C, (13); 31.8.99, C, (1). 56 specimens.

Biological note: Known as strawberry pest (Wachmann et al., 1995).

***Harpalus smaragdinus* DUFTSCHMID, 1812**

Distribution in Turkey: Turkey (Csiki, 1932). Antalya (Finike*, Olympos*, Söğüt Gölü*, Yarpuz*), Ardahan (Ardahan*), Artvin (Kaçkar Dağı-Meretet*, Şavşat*, Yalnızçam Dağı*), Bitlis (Süphan Dağı*), Bolu (Akyarın Geçidi*, Gerede*), Çankırı (Ilgaz*), Erzurum (Erzurum*, Ispir Yolu*, Oltu*, Tortum*), Giresun (Kümbet*, Yağlıdere*), Gümüşhane (Vaudağı Geçidi*), Kars (Kars*, Sarıkamış*), Manisa (Manisa*).

Material: Muradiye, 31.8.99, D, (1); Ören, 18.6.98, C, (4); 3.7.98, C, (22); 17.7.98, C, (13); 31.7.98, C, (14); 14.8.98, C, (1); 28.8.98, C, (2); 12.10.98, C, (6); 26.10.98, C, (3); 25.6.99, C, (13); 20.7.99, C, (11); 3.8.99, C, (19); 17.8.99, C, (9); 17.8.99, D, (4); 31.8.99, C, (8); 14.9.99, C, (1); 14.9.99, D, (1); 28.ix.99, C, (3); 12.10.99, C, (3); 26.10.99, C, (1); Armutlu, 31.7.98, C, (2); 16.6.99, C, (1). 142 specimens.

***Pseudophonus griseus* (PANZER, 1797)**

Distribution in Turkey: Turkey (Csiki, 1932), Sakarya (Sapanca) (Bytinski-Salz, 1956). Adana (Kozan*), Antalya (Beşkonak*, Sağırın*, Side*), Artvin (Artvin*, Yalnızçam Dağı*), Balıkesir (Maden*), Erzincan (Erzincan*), Giresun (Yağlıdere*), İçel (Erdemli*), Iğdır (Iğdır*), Malatya (Karakaya*), Samsun (Çarşamba*), Sinop (Kadı*).

Material: Muradiye, 6.5.98, C, (1); 1.6.98, C, (1); Ören, 1.6.98, C, (1); 13.6.98, C, (78); 3.7.98, C, (15); 3.7.98, D, (1); 17.7.98, C, (9); 17.7.98, D, (1); 31.7.98, C, (15); 14.8.98, C, (5); 28.8.98, C, (2); 12.10.98, C, (10); 26.10.98, C, (7); 1.6.99, D, (3); 14.6.99, D, (3); 14.6.99, C, (11); 28.6.99, C, (36); 20.7.99, C, (5); 20.7.99, D, (4); 17.8.99, D, (4); 14.9.99, C, (1); 26.10.99, C, (2); Armutlu, 13.6.98, C, (38); 3.7.98, C, (1); 28.9.99, C, (1); 12.10.99, C, (1). 256 specimens.

***Pseudophonus rufipes* (DE GEER, 1774)**

Distribution in Turkey: Turkey (Csiki, 1932). Adana (Bağtepe*), Antalya (Beşkonak*, Manavgat*, Sağırın*), Ardahan (Ardahan*), Artvin (Borçka*, Kaçkar Dağı-Meretet*, Yalnızçam Dağı*), Aydın (Aydın*, Kızılcaköy*, Kuşadası*), Balıkesir (Sarımsaklı*), Bingöl (Solhan*), Bitlis (Süphan Dağı*), Bolu (Akçakoca*), Burdur (Söğüt Gölü*), Erzurum (Erzurum*), Giresun (Yağlıdere*), İstanbul (İstanbul*), Kastamonu (Ilgaz Dağı*), Kütahya (Kütahya*), Ordu (Akkuş*), Trabzon (Esiroğlu*, Zigana Geçidi*).

Material: Muradiye, 3.7.98, C, (2); 31.5.99, C, (1); 14.6.99, C, (1); 28.6.99, C, (2); 20.7.99, C, (2); Ören, 13.6.98, C, (14); 3.7.98, C, (4); 17.7.98, C, (1); 14.8.98, D, (1); 28.8.98, C, (1); 12.10.98, C, (3); 16.6.99, C, (9); 3.8.99, C, (1); 17.8.99, C, (1); 31.8.99, D, (3); 14.9.99, D, (1); 22.11.99, C, (1); Armutlu, 13.6.98, C, (43); 3.7.98, C, (4); 17.7.98, C, (7); 16.6.99, C, (6); 20.7.99, C, (2); 17.8.99, C, (2); 31.8.99, C, (1); 26.10.99, C, (1). 114 specimens.

Biological note: This species have both zoophagous and phytophagous character. Destructive on strawberries (Lodos, 1989; Wachmann et al., 1995).

Harpalidae, Ditominae***Carterus dama* ROSSI, 1792**

Distribution in Turkey: Antalya (İrmasan Geçidi*, Seklik*, Sinekçibeli Geçidi*, Söğütcük*, Yarpuz*), Çorum (Çorum*), İçel (Erdemli*, Gülnar*), İzmir (Çiçekli*), Manisa (Akhisar*).

Material: Armutlu, 17.7.98, C, (1); 31.7.98, C, (5). 6 specimens.

***Carterus gilvipes* LA BRÛLERIE, 1873**

Distribution in Turkey: Kleinasien (Csiki, 1932). Hatay (Antakya*).

Material: Armutlu, 14.6.99, E, (1). 1 specimen.

Harpalidae, Selenophorinae***Parophonus dia* REITTER, 1900**

Distribution in Turkey: Antalya (Manavgat*, Olympos*), Izmir (Somak*), Osmaniye (Osmaniye*).

Material: Ören, 6.5.98, C, (1); Armutlu, 6.5.98, C, (3); 17.7.98, C, (2); 31.7.98, C, (2); 14.8.98, C, (1); 26.2.99, C, (1); 13.4.99, C, (1); 18.5.99, C, (1); 1.6.99, C, (1); 16.6.99, C, (2); 28.6.99, C, (12); 20.7.99, C, (9); 3.8.99, C, (2); 28.9.99, C, (1). 39 specimens.

***Parophonus planicollis* DEJEAN, 1829**

Distribution in Turkey: Antalya (Seklik*), Aydın (Kızılcaköy*), Balıkesir (Akçay*), İçel (Erdemli*).

Material: Muradiye, 28.6.99, E, (1); Armutlu, 13.6.98, C, (1). 2 specimens.

Licinidae, Licininae***Licinus silphoides* ROSSI, 1790**

Distribution in Turkey: Izmir (Gaudeau de Kerville, 1939). Bursa (Mudanya*), Izmir (Arıkbaşı*, Bornova*).

Material: Muradiye, 9.11.98, C, (1); 6.12.99, C, (1); 22.12.99, C, (1). 3 specimens.

Biological note: Species belonging to this genus prey upon slugs (Wachmann et al., 1995).

Masoreidae, Masoreinae***Aepnidius ruficornis* CHAUDOIR, 1876**

Distribution in Turkey: Kleinasien (Csiki, 1932). Antalya (Beşkonak*).

Material: Ören, 6.5.98, C, (1); 16.6.99, C, (1); Armutlu, 13.6.98, C, (3); 16.6.99, C, (1). 6 specimens.

Lebiidae, Dromiinae***Microlestes sahlbergi* HOLDHAUS, 1912**

Distribution in Turkey: Rare species in Turkey. Antalya (Yarpuz*), Denizli (Çivril*), Konya (Gürağaç*).

Material: Muradiye, 13.6.98, D, (1); 24.5.99, E, (1). 2 specimens.

***Philorhizus notatus* STEPHENS, 1828**

Distribution in Turkey: Antalya (Beşkonak*, Elmalı*, Finike*, Gündoğmuş*, Kaş*, Kemer*, Side*, Yarpuz*), Muğla (Kemer*), Nevşehir (Zelve*).

Material: Armutlu, 28.9.98, A, (1). 1 specimen.

***Syntomus fuscomaculatus* MOTSCHULSKY, 1844**

Distribution in Turkey: Adana (Pozantı*), Antalya (Elmalı*, Kızılağaç*, Korkuteli*, Manavgat*, Side*, Yarpuz*), Bursa (Uludağ*), İçel (Kızkalesi*, Sertavul Geçidi*), Izmir (Gümüldür*), Konya (Karapınar-Acı Göl*), Osmaniye (Osmaniye*), Van (Güzeldere Geçidi*, Karabet Geçidi*).

Material: Muradiye, 7.6.99, E, (1). 1 specimen.

***Syntomus impressus* DEJEAN, 1825**

Distribution in Turkey: Antalya (Gündoğmuş*, Side*, Termessos*, Yarpuz*).

Material: Ören, 13.6.98, D, (1); Armutlu, 25.5.99, E, (1); 14.6.99, E, (1). 3 specimens.

Brachinidae, Brachininae***Brachinus crepitans* (LINNAEUS, 1758)**

Distribution in Turkey: Turkey (Csiki, 1933), Bolu (Abant) (Bytinski-Salz, 1956). Antalya (Avlan Gölü*, Seklik*), Artvin (Şavşat*), Bitlis (Süphan Dağı*), Bolu (Bolu Dağı Geçidi*), Burdur (Kızılkaya*, Söğüt Gölü*), Çankırı (Çubucuk Geçidi*, Ilgaz*), Erzurum (Yumaklı*), Kastamonu (Ilgaz Dağı*), Konya (Yelibel Geçidi*), Sinop (Sinop*).

Material: Ören, 26.10.98, C, (1); 31.1.99, C, (1); 26.2.99, C, (2); 21.3.99, C, (1). 5 specimens.

***Brachinus explodens* (DUFTSCHMID, 1812)**

Distribution in Turkey: Denizli (Sahlberg, 1912-1913), Ankara (Gadeau de Kerville, 1939), Bolu (Abant) (Bytinski-Salz, 1956). Amasya (Amasya*), Antalya (Akseki*, Bakacakbeli Geçidi*, Demirtaş*, Elmalı*, Korkuteli*, Murtiçi*, Söğütçük*, Topraktepe*, Yarpuz*), Aydın (Kuşadası*), Bolu (Akyarma Geçidi*, Bolu Dağı Geçidi*, Gerede*), Burdur (Çeltikçi Geçidi*, Köroğlu Geçidi*), Çanakka- le (Ortaca*), Çankırı (Çubucuk Geçidi*, Ilgaz*), Giresun (Şebinkarahisar*), İçel (Erdemli*, Gülnar*, Ulaş*), İstanbul (İstanbul*), Izmir (Çiçekli*), Kahramanmaraş (Göksun*), Konya (Bakaran*, İvriz*, Yeşildag*), Tokat (Tokat*), Trabzon (Maçka*).

Material: Muradiye, 21.4.98, C, (3); 1.6.98, C, (2); Ören, 21.4.98, C, (3); 6.5.98, C, (7); 1.6.98, C, (5);

3.7.98, C, (3); 27.4.99, C, (3); Armutlu, 21.4.98, C, (4); 6.5.98, C, (7); 1.6.98, C, (25); 13.6.98, C, (8); 3.7.98, C, (8); 17.7.98, C, (24); 31.7.98, C, (1); 13.4.99, C, (1); 27.4.99, C, (4); 18.5.99, C, (5); 1.6.99, C, (8); 16.6.99, C, (46); 20.7.99, C, (4); 2.11.99, C, (1); 22.11.99, C, (2); 13.12.99, C, (3); 26.12.99, C, (1). 178 specimens.

4. DISCUSSION

In this study 41 species of 10 families of Caraboidea were recorded in the ecological cherry orchards (Table 1). Among these *Pachystus graecus morio*, *Procrustes coriaceus cerisyi*, *Zabrus asiaticus* and *Z. orientalis* are endemic. 21 species were recorded for the first time from Izmir and 23 species were recorded for the first time from Manisa provinces.

Table 1. List of Caraboidea species recorded in ecologically cherry orchards in Manisa and Izmir Provinces during 1998 and 1999: A: beating, and B: sweeping of vegetation, C: pitfall trap, D: bait trap, E: yellow sticky trap.

Taxa	A	B	C	D	E	Total
Carabidae, Carabinae						
<i>Pachystus graecus morio</i>			22	2		24
<i>Procrustes coriaceus cerisyi</i>			210	3		213
Nebridae, Nebrinae						
<i>Leistus fulvibarbis</i>			1			1
<i>Nebria brevicollis</i>			45	1		46
Trechidae, Trechinae						
<i>Trechus austriacus</i>					7	7
<i>Trechus quadristriatus</i>					13	13
Bembidiidae, Bembidiinae						
<i>Metallina leucoscelis</i>					1	1
<i>Metallina properans</i>		1	2			3
<i>Phyla tethys</i>					4	4
<i>Tachyphanes lucasi</i>					1	1
Pterostichidae, Pterostichinae						
<i>Poecilus cupreus</i>			2			2
Pterostichidae, Platyninae						
<i>Anchomenus dorsalis</i>			112		1	113
<i>Olisthopus fuscatus</i>			2		77	79
<i>Olisthopus glabricollis</i>					4	4
Pterostichidae, Sphodrinae						
<i>Calathus leptodactylus</i>			64		1	65
<i>Calathus libanensis</i>			7			7
<i>Calathus longicollis</i>			111	3		114
<i>Pristonychus conspicuus</i>			76	2		78
Pterostichidae, Zabrinae						
<i>Amara aenea</i>			11	1	1	13
<i>Amara anthobia</i>			5			5
<i>Amara ovata</i>			1			1
<i>Zabrus asiaticus</i>			11			11
<i>Zabrus orientalis</i>			3			3
Harpalidae, Harpalinae						
<i>Cryptophonus litigiosus</i>			1			1
<i>Cryptophonus tenebrosus</i>			3			3
<i>Harpalus distinguendus</i>			54	2		56
<i>Harpalus smaragdinus</i>			136	6		142
<i>Pseudophonus griseus</i>			240	16		256
<i>Pseudophonus rufipes</i>			109	5		114
Harpalidae, Ditominae						
<i>Carterus dama</i>			6			6
<i>Carterus gilvipes</i>					1	1
Harpalidae, Selenophorinae						
<i>Parophonus dia</i>			39			39
<i>Parophonus planicollis</i>			1		1	2
Licinidae, Licininae						
<i>Licinus silphoides</i>			3			3
Masoreidae, Masoreinae						
<i>Aepheidius ruficornis</i>			6			6
Lebiidae, Dromiinae						
<i>Microlestes sahlbergi</i>				1	1	2
<i>Philorhizus notatus</i>	1					1
<i>Syntomus fuscomaculatus</i>					1	1
<i>Syntomus impressus</i>				1	2	3
Brachinidae, Brachininae						
<i>Brachinus crepitans</i>			5			5
<i>Brachinus explodens</i>			178			178
Total number of specimens	1	1	1466	43	116	1627

Relative abundance (%)	006	006	90.10	264	7.13	100.00
------------------------	-----	-----	-------	-----	------	--------

Table 2. List of Caraboidea species collected in particular orchards in 1998 and 1999. MD: Muradiye, OR: Ören, AR: Armutlu.

Legends:

Taxa	1998				1999			
	MD	OR	AR	Sum	MD	OR	AR	Sum
Carabidae, Carabinae								
<i>Pachystus graecus morio</i> ** / ***		3	14	17	1		6	7
<i>Procrustes coriaceus cerisyi</i> ** / ***	23	27	80	130	52	2	29	83
Nebriidae, Nebriinae								
<i>Leistus fulvibarbis</i>							1	1
<i>Nebria brevicollis</i> **	8	17	9	34	4	5	3	12
Trechidae, Trechinae								
<i>Trechus austriacus</i>		1		1	2	1	3	6
<i>Trechus quadristriatus</i>			2	2	8		3	11
Bembidiidae, Bembidiinae								
<i>Metallina leucoscelis</i> **					1			1
<i>Metallina properans</i> *			1	1			2	2
<i>Phyla tethys</i> * / **					1		3	4
<i>Tachyphanes lucasi</i> **	1			1				
Pterostichidae, Pterostichinae								
<i>Poecilus cupreus</i> * / **			1	1	1			1
Pterostichidae, Platyninae								
<i>Anchomenus dorsalis</i> **	1	7	59	67	1	7	38	46
<i>Olisthopus fuscatus</i> * / **	3		5	8	66		5	71
<i>Olisthopus glabricollis</i> **					4			4
Pterostichidae, Sphodrinae								
<i>Calathus leptodactylus</i> * / **	3	7	6	16	6	39	4	49
<i>Calathus libanensis</i> **	6			6	1			1
<i>Calathus longicollis</i>	42	13	10	65	28	8	13	49
<i>Pristonychus conspicuus</i>	17	7	28	52	9	1	16	26
Pterostichidae, Zabrinae								
<i>Amara aenea</i> **	1		6	7	2		4	6
<i>Amara anthobia</i> *			2	2		2	1	3
<i>Amara ovata</i> *						1		1
<i>Zabrus asiaticus</i> ***			1	1	9	1		10
<i>Zabrus orientalis</i> ** / ***	1		1	2	1			1
Harpalidae, Harpalinae								
<i>Cryptophonus litigiosus</i> **					1			1
<i>Cryptophonus tenebrosus</i> *		1	2	3				
<i>Harpalus distinguendus</i> *		6	1	7		30	19	49
<i>Harpalus smaragdinus</i> * / **		65	2	67	1	73	1	75
<i>Pseudophonus griseus</i> * / **	2	144	39	185		69	2	71
<i>Pseudophonus rufipes</i> * / **	2	24	54	80	6	16	12	34
Harpalidae, Ditominae								
<i>Carterus dama</i> *			6	6				
<i>Carterus gilvipes</i> *							1	1
Harpalidae, Selenophorinae								
<i>Parophonus dia</i> *		1	8	9			30	30
<i>Parophonus planicollis</i> * / **			1	1	1			1
Licinidae, Licininae								
<i>Licinus silphoides</i> **	1			1	2			2
Masoreidae, Masoreinae								
<i>Aephtidius ruficornis</i> *		1	3	4		1	1	2
Lebiidae, Dromiinae								
<i>Microlestes sahlbergi</i> **	1			1	1			1
<i>Philorhizus notatus</i> *			1	1				
<i>Syntomus fuscomaculatus</i> **					1			1
<i>Syntomus impressus</i> *		1		1			2	2
Brachinidae, Brachininae								
<i>Brachinus crepitans</i> *		1		1		4		4
<i>Brachinus explodens</i> * / **	5	18	77	100		3	75	78
Total	117	344	419	880	210	263	274	747

* first record from Izmir province, ** first record from Manisa province, *** endemic to Turkey.

Using pitfall traps 1466 specimens (90.10%) belonging to 30 species were collected, 116

specimens (7.13%) belonging to 15 species were collected by sticky yellow traps, 43 specimens

(2.64%) belonging to 12 species were collected by bait traps, and 1 and 1 specimen of two species (0.06%) were collected by beating and sweeping from vegetation. Between the samples and the number of species a positive correlation ($r=0.882$) has been determined for each way of collection. Pitfall traps proved to be the most effective method for monitoring the beetles of Caraboidea in cherry orchards when the location of the insects in biotope was taken into consideration.

As shown in Table 2, 28 species of Caraboidea were recorded in Muradiye. In Ören the number of recorded species was 21 and in Armutlu 31. Thirteen species were recorded in all three study orchards. 327 specimens (20.10%) were recorded in Muradiye as well as 607 specimens (37.30%) from Ören and 693 specimens (42.60%) from Armutlu. The total number of specimens collected in the study orchards was 880 in 1998 and 747 in 1999. The dominant species in the collected material were *Pseudophonus griseus* (256), *P. coriaceus cerisyi* (213), *Brachinus explodens* (178), *Harpalus smaragdinus* (142), *Pseudophonus rufipes* (114), *Calathus longicollis* (114), *Anchomenus dorsalis* (113), *Olisthopus fuscatus* (79), *Pristonychus conspicuus* (78) and *Calathus leptodactylus* (65). The relative abundance of each species was 15.73, 13.09, 10.94, 8.73, 7.00, 7.00, 6.94, 4.85, 4.79, 3.99, respectively. Those ten species constitute 83.06% of all examined specimens.

Neither those species nor other caraboids have been reported from conventional or integrated cherry orchards up to now by recent studies conducted by Ulu et al. (1995), Özbek et al. (1996), Ulusoy et al. (1999) and Özder (1999). When compared to the above mentioned studies, it is thought that ecological management methods have got positive effects on the abundance of the Caraboid fauna in these cherry orchards.

Some of those species belonging to Harpalidae and Zabrinae are known as consumers of plant material while some of them are known as consumer of both animal and plant material (*Poecilus cupreus*, *P. rufipes*). Among the predator species *P. coriaceus cerisyi*, *Nebria brevicollis*, *Trechus* spp., *A. dorsalis*, *Licinus silphoides* can be listed. Other species cited above probably have got predaceous feeding habit. In this study, there has not been any sort of observation related to the feeding of any of the predator species with their prey.

In the following studies, it is hoped that further studies on the feeding habits of some significant species, their preys and efficiencies and their roles in cherry orchards will be realised and we hope that the above mentioned studies will enrich our knowledge in this field and will lead us to new horizons.

ACKNOWLEDGEMENTS

The authors would like to thank Mr. M. A. Işık, B. Aksoy and H. Sevinay for providing access to their farms during the study. Thanks are also due to Mrs. N. Gülperçin for technical assistance in field and in laboratory. Support for this study was provided by State Planning Organisation grant 98 K 121280 and the Rectorate of Ege University Research Fund.

REFERENCES

- Battoni, F. and Vereschagina, T. (1984). Materiali Per una revisione dei *Calathus* Bonelli del gruppo *fuscipes* (Coleoptera, Carabidae). *G. It. Ent.* 2, 129-162.
- Bodemeyer, E. (1900). *Quer durch Klein-Asien in den Bulghar-Dagh. Eine naturwissenschaftliche studien-reise. -Druck und Verlag, Em-mendingen*, 98-133.
- Bytinski-Salz, H. (1956). Anadolu'da bir seyahatta toplanan Koleopter ve Himenopter'ler 1. *I.Ü. Fen Fakültesi Mecmuası* Ser. B 21 (4), 211-229.
- Casale, A. (1988). Revisione degli *Sphodrina* (Coleoptera, Carabidae, Sphodrini). *Monografie V. Museo Regionale di Scienze Naturali*, Torino, 1-1024.
- Csiki, E. (1927). *Carabidae: Carabinae*. Coleopterorum Catalogus, Ed. Schenkling, S., Partes 91 & 92. Junk Publ., Berlin, 1-621.
- Csiki, E. (1928). *Carabidae: Harpalinae*. Coleopterorum Catalogus, Ed. Schenkling, S., Pars 98. Junk Publ., Berlin, 227-345.
- Csiki, E. (1930). *Carabidae: Harpalinae IV*. Coleopterorum Catalogus, Ed. Schenkling, S., Pars 112. Junk Publ., Berlin, 1-732.
- Csiki, E. (1932). *Carabidae: Harpalinae VI*. Coleopterorum Catalogus, Ed. Schenkling, S., Pars 121. Junk Publ., Berlin, 1-1592.
- Csiki, E. (1933). *Carabidae: Harpalinae VIII*. Coleopterorum Catalogus, Ed. Schenkling, S., Pars 126. Junk Publ., Berlin, 1-1933.
- Gadeau de Kerville, H. G. (1939). Récit sommaire du voyage et liste méthodique des invertébrés et des vertébrés récoltés en Asie-mineure. *Voyage Zoologique Henri Gadeau de Kerville en Asie-Mineure* (Avril-Mai, 1912), Tome I. Paul Le Chevalier, Paris, 1-148.
- Gül-Zümreoğlu, S. (1972). *Izmir Bölge Zirai Mücadele Araştırma Enstitüsü Böcek ve Genel Zararlılar Kataloğu*, 1928-1969, Izmir, 1-119.

- Huber, C. and Marggi, W. (1997). Revision der *Bembidion*-Untergattung *Phyla* Motschulsky, 1844 (Coleoptera, Carabidae, Bembidiinae). *Revue Suisse de Zoologie* 104 (4), 761-783.
- Lodos, N. (1983). Türkiye faunasına ait Ekin kambur böcekleri, *Zabrus* Clairv. (Coleoptera, Carabidae) cinsinin yeniden gözden geçirilmesi. *Türkiye Bitki Koruma Dergisi* 7, 51-63.
- Lodos, N. (1989). *Türkiye Entomolojisi IV (Genel, Uygulamalı, Faunistik)*. E. Ü. Ziraat Fakültesi Yayınları, No: 493. Bornova-Izmir, 1-250.
- Moravec, P. and Zieris, V. (1998). *Trechus skoupyi* sp.n. und Bemerkungen zu weiteren *Trechus*-Arten aus der Türkei und Griechenland (Coleoptera: Carabidae). *Klapalekiana* 34 (3-4), 203-218.
- Öncüer, C. (1991). *Türkiye Bitki Zararlısı Böceklerinin Parazit ve Predatör Kataloğu*. E.U. Ziraat Fakültesi Yayınları, No: 505. Bornova-Izmir, 1-354.
- Özbek, H., Güçlü, S. and Hayat, R. (1996). Kuzeydoğu tarım bölgelerinde taş çekirdekli meyve ağaçlarında bulunan fitofag ve predatör böcek türleri. *Turkish Journal of Agriculture and Forestry* 20, 267-282.
- Özder, N. (1999). Tekirdağ İlinde kiraz bahçelerinde bulunan doğal düşmanlar ve bunlardan yumurta parazitoiti *Trichogramma cacoeciae* March. (Hym.: Trichogrammatidae)'nin yaprak бүken türlerinde (Lep.: Tortricidae) doğal etkinliği üzerinde arařtırmalar. *Türkiye 4. Biyolojik Mücadele Kongresi*, 26-29 Ocak 1999, Adana, 663 pp, 341-354.
- Pawłowski, J. (1979). Révision du genre *Trechus* Clairv. (Coleoptera, Carabidae) du Proche Orient. *Acta Zoologica Cracoviensia* 23, 255-345.
- Sahlberg, J. (1912-1913). Coleoptera mediterranea orientalia, quae in Aegypto, Palaestina, Syria, Caramania atque in Anatolia occidentali anno 1904. *Öfversigt af Finska Vetenskaps-Societetens Förhandlingar* 55(19), 272.
- Tezcan, S., Mısırlı, A., Okur, B., Ul, M. A., Olgun, A., Demirkan, H., Ünal, A., Eryüce, N., Adanacıođlu, H., Çetinkaya, N., Aksoy, U., Anaç, D., Çokuysal, B. and Çakıcı, H. (2001). *Organik kiraz üretim olanaklarının arařtırılması*. E. Ü. Rektörlüğü Arařtırma Fonu Sonuç Raporu, 98 K 121280, 1-129.
- Ulu, O., Önuçar, A., Zümreođlu, A., Uzun, S., Ergüden, T. M., Aykaç, K., Kılıç, M., Çakır, O., Ceylan, S. and Koçlu, T. (1995). *Kiraz bahçelerinde entegre mücadele arařtırma,*

geleřtirme ve uygulama projesi. BKA / U17, 1.dilim sonuç raporu, 1-84.

- Ulusoy, R., Vatansver, G. and Uygun, N. (1999). Ulukışla (Niğde) ve Pozantı (Adana) yöresi kiraz ağaçlarında zararlı olan türler, doğal düşmanları ve önemlileri üzerindeki gözlemler. *Türkiye Entomoloji Dergisi* 23(2), 111-120.
- Wachmann, E., Platen, R. and Barndt, D. (1995). *Laufkäfer Beobachtung-Lebensweise*. Naturbuch Verlag, Germany, 1-295.
- Winkler, A. (1924-1932). *Catalogus Coleopterorum Regionis Palearcticae*. XVIII. Dittesgasse II. Wien, 1-663.
- Zaballos, J. P. and Jeanne, C. (1994). Nuevo Catalogo de los Carabidos (Coleoptera) de la Peninsula Iberica. *Monografias S. E. A.* 1, 1-159.



Serdar Tezcan, was graduated from Plant Protection Department, Agricultural Faculty of Ege University in 1981 and received Ph. D. degree in 1990. He was appointed as an assistant professor, as an associate professor and as a professor at the same department in 1993, 1995, and 2002, respectively.

Claude Jeanne, was born in Le Hâvre, France in 1925. He was graduated from Biology Department of Science Faculty of Bordeaux. Specialist on Carabidae (Coleoptera) since 1955. Described numerous new species from the Mediterranean Region and also from Turkey.



Bekir Keskin, was born in Germany in 1971. He was graduated from Biology Department of Science Faculty of Ege University in 1993 and received Ph. D. degree in 2005. He was appointed as a research assistant at the same department in 1995.