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Species Composition of Chrysomelidae (Coleoptera) in Saklıkent Vicinity (Antalya, Turkey) with Observations on Potential Host Plants

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ABSTRACT

The study was performed in Saklıkent vicinity (Antalya), located at Beydağları mountain range, during 2005 and 2006. A total of 130 Chrysomelidae species belonging to 35 genera and 9 subfamilies were recorded from various habitats of different altitude, topography and vegetation. Alticinae was the most dominant subfamily among the others representing about 63% of the all species collected. Host plant associations of 76 Chrysomelidae species out of 130 were determined and listed in a table. Fagaceae (11%) and Rosaceae (6%) were the mostly preferred host plant families representing Chrysomelidae species specialized to tree vegetation, while Lamiaceae (20%), Brassicaceae (16%), Scrophulariaceae (7%), Boraginaceae (6%), and Asteraceae (5%) were dominant host plant families for species feeding herbaceous vegetation.

Key words: Coleoptera, Chrysomelidae, Saklıkent, species composition, host plants, Antalya, Turkey

INTRODUCTION

Chrysomelidae, known as leaf beetles, constitutes one of the most species-rich families of Coleoptera, thus a great proportion of insect diversity, including about 40.000 species described and possibly up to 50.000 species (Jolivet & Verma, 2002; Santiago-Blay, 2004).

The Chrysomelidae are closely related with Curculionidae, Cerambycidae and Bruchidae all of which are regarded as phytophagous herbivore beetles due to their feeding habit (Hsiao, 1994). Almost all leaf beetles, adults and larvae, feed on leaves, flowers, stems or roots (Jolivet & Verma, 2002). Many species are economically important as pests of food crops, tree and shrub plantations, medical herbs and fodder crops, although several species are beneficial as biological control agents of weeds (Booth *et al*., 1990; Mirzoeva, 2001).

Insects and plants have been evolving together for more than 300 million years, and they succeed to form a biological partnership during this time which has flourished to mutual benefit (Schoonhoven, 2005). Determining the associations between plants and insects including geographical, physiological, chemical and evolutionary patterns

of host use has been a central interest in recent years (Becerra & Venable, 1999). Chrysomelidae itself is a natural subject for studying plant-insect interactions (Flowers & Janzen, 1997). Despite several studies dealing with faunistics of Chrysomelidae of Turkey (Kasap, 1987a; b; Kısmalı, 1989; Kısmalı & Sassi, 1994; Aslan *et al*., 1996; 1999; 2000; 2003; Sassi & Kısmalı, 2000), knowledge about the leaf beetles and their host records seem still to be insufficient.

Beydağları mountain complex represents the southwestern extension of Taurus which serves as an important barrier for many taxa by separating two topographic subregions of Anatolia. Saklıkent is located on this important mountain range in the western part of Antalya and provides heterogeneous topography and climate features. The objective of the present study was to present the diversity of Chrysomelidae in this region by relating to the floristic diversity and to specific host plants.

MATERIAL AND METHODS

Study site

The study was carried out at Saklıkent vicinity located on Beydağları mountain complex, which is one of the most important mountain ranges of western Mediterranean region of Turkey. Beydağları is situated in the west part of Antalya gulf (30°18' E, 36°75' N) with a land area of 191.178 ha and with altitudes ranging from 160-3070 m a.s.l. Different vegetation types including forest, shrub, steppe, etc. exist in the area as well as many endemic plant species (Kurt, 2006). It is considerable in biogeographic respect as it forms an important part of Taurus mountain range together with Akdağlar complex. Saklıkent is one of the famous ski centers of Turkey located in Saklı plateau with a maximum altitude of 3000 m. Together with its environs Saklıkent forms an important part of Beydağları mountain series presenting subalpine zone features with relatively cold climate and members belonging to steppe vegetation. The various degrees of altitudes, hence the vegetation diversity changing in small distances makes the area desirable for many chrysomelids.

The southern and northern slopes of the study area represent climatic and biotic contrasts. Southern slopes are warmer, displaying typical Mediterranean climate features. Lower parts of these slopes comprise maquis, several shrubs and *Pinus brutia* assemblages typically while upper parts include *Pinus nigra* and species of *Cedrus* (more than 1000 m) predominantly. Northern slopes and higher elevations are significantly colder characterized by the presence of mountainous meadows and durable shrubs.

Beetle sampling

Field surveys were performed at 30-day intervals from April to October in 2005 and 2006. Totally, 14 surveys were conducted. Beetles were collected from various plants, shrubs and trees using sweep net, hand and aspirator. The authors tried to collect extensively on the widest possible area and kind of vegetation. Plants with leaves showing feeding marks were primarily examined. Plant species on which adult beetles were seen feeding constantly in the field observations were considered to

be potential host plants. To increase our confidence in the determination of true host associations, obvious damage levels on the vegetation and number of feeding adult leaf beetles observed on were also taken into consideration. High population density of feeding beetles was accepted as the main factor in related host plant determination. Plants with feeding records in small numbers of beetles were ignored.

Collected beetles were taken to the laboratory for further analysis and dissection. The specimens were identified to species. Damaged host plants were also collected, preserved by using standard methods, and sent to specialists for identification. The doubtful host plant associations were not included. Voucher specimens and host plants are deposited at the Biology Department of Süleyman Demirel University, Isparta.

RESULTS

A total of 130 chrysomelid species representing 9 subfamilies and 35 genera were collected from Beydağları mountain range as a result of field surveys conducted during 2005 and 2006 (Table 1). Alticinae, Chrysomelinae, Clytrinae, and Galerucinae were determined as the most species rich subfamilies in the area respectively (Fig. 1). Alticinae was evidently dominant among the other subfamilies, comprising 83 out of 130 species collected.

Seasonal abundance of leaf beetles peaked in spring season (including April, May and early June) and clearly decreased at the beginning of the summer for both study years in the area investigated (Fig. 2). For almost all subfamilies dominance and species richness values were maximum in spring and in the early summer, especially for Clytrinae, Galerucinae and Cryptocephalinae of which species mainly prefer young and fresh leaves of *Quercus* spp. and *Crateagus* spp. The dominance and species richness of leaf beetles gradually decreased in the mid and late summer (corresponding to months between July-October).

The most frequently collected species of the study area are shown in Table 2 with frequency percentages. Most of these leaf beetles were also the most dominant species throughout the study period.

Tituboea macropus, Clytra bodemeyeri, Smaragdina xanthaspis, Chrysolina marginata, Entomoscelis adonidis, Calomicrus atrocephalus, Luperus discolor, Phyllotreta procera, Aphthona bonvouloiri, Longitarsus anchusae, L. pellucidus, L. succineus, Podagrica malvae, Psylliodes chrysocephalus and *P. chalcomerus* were usually collected during spring season while *Coptocephala unifasciata, Cryptocephalus octocasmus, Longitarsus australis, L. aramaicus, L. baeticus, L. foudrasi, L. hermonensis, L. albineus* and *Psylliodes cupreus* were recorded as common species of summer season. The rarely collected species of the study area (represented by singletons or doubletons) were *Labidostomis lucida, Chrysolina chalcites, C. gypsophilae, Phyllotreta atra, P. pontoaegeica, Longitarsus atricillus, L. bytinskii, L. ochroleucus, Aeschrocnemis whiteheadi, Chaetocnema montenegrina, Dibolia timida, Psylliodes gibbosus* and *P. toelgi.*

Host plant associations of 76 out of 130 leaf beetles were determined in the present study as a result of field surveys and observations. The determined host

plant records were given in Table 1, identified to species or genus. For the beetles with undetermined host plants, previous feeding records were given together with the related literature (indicated with an asterisk in the table). Among the 22 host plant families reported, in terms of family dominancy, the mostly preferred ones were Fagaceae (11%) and Rosaceae (6%) for tree vegetation, Lamiaceae (20%), Brassicaceae (16%), Scrophulariaceae (7%), Boraginaceae (6%) and Asteraceae (5%) for herbaceous vegetation (Fig. 3).

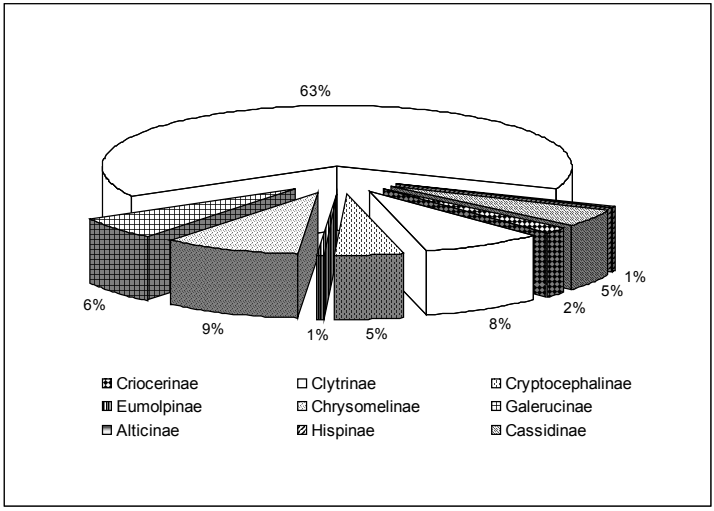

Fig. 1. Percentage of leaf beetle subfamilies in terms of species number collected from the study area.

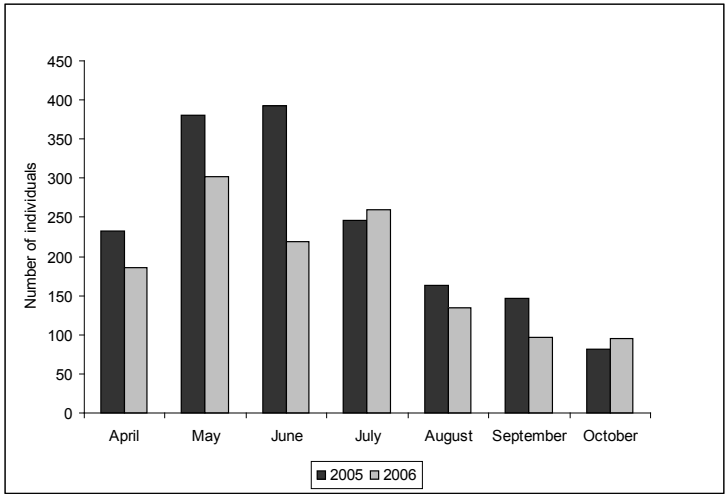

Fig. 2. Seasonal abundance dynamics of leaf beetles in 2005 and 2006.

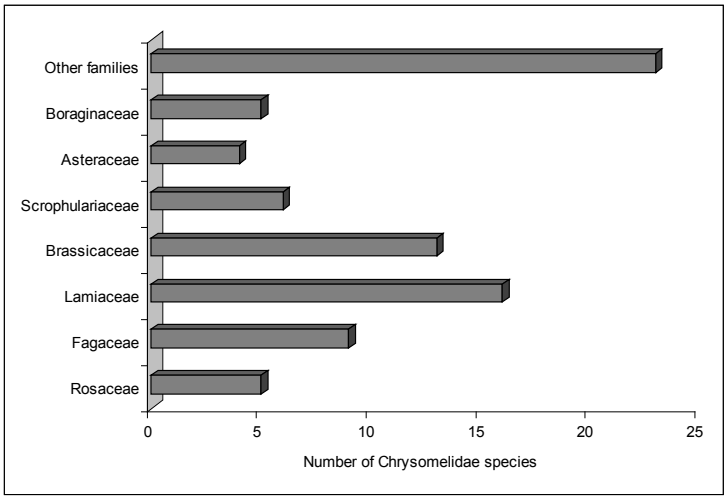

Fig. 3. Number of leaf beetles associated with host plant families recorded.

DISCUSSION AND CONCLUSION

Our results showed that Beydağları mountain range has a great of importance for chrysomelid diversity because of its location in the transition area between the Mediterranean and central regions of Turkey in addition to its rich floristic structure. Although the present study comprise only a small part of this mountain range, Saklıkent and its surroundings, a noticeable number of species (130) was recorded. The number of Chrysomelidae species occurring in Turkey is not known exactly, but it represents an important part of the Turkish phytophagous insect fauna and probably includes over 800 species. The chrysomelid species reported from the study area in the present study represents more than 15 % of the whole Turkish Chrysomelidae fauna. Therefore, further studies and sampling efforts are needed in the Beydağları region to assess the actual Chrysomelidae diversity.

Flea beetles (Alticinae) comprise more than half of the species composition in the community of the area studied. This is because adult flea beetles feed mainly above the ground on various parts of the herbaceous plants (Konstantinov & Tishechkin, 2004), and it is well known that the number of phytophagous insect species closely correlates with the number of plant species in a community (Murakami *et al*., 2005; Qdegaard, 2006). Saklıkent, due to its herbaceous vegetation diversity, provides desirable habitats, thus rich food sources for these tiny chrysomelids.

The vast majority of the species were trophically associated with herbaceous plants, while several species (e.g., *Clytra novempunctata, Labidostomis maculipennis, Smaragdina limbata, Cryptocephalus octacosmus, Monolepta anatolica*) were also found on trees or shrubs including oaks, hawthorns, roses and others. *Quercus* spp. (Fagaceae) and *Crataegus* spp. (Rosaceae) were predominantly preferred by the shrub and tree-dwelling chrysomelids of the study area. Especially young and fresh leaves, being more nutritious, tender and richer in water and nitrogen (Jolivet & Verma,

2002; Southwood *et al*., 2004; Murakami *et al.*, 2005), were consistently eaten by these beetles. This also explains why the number of chrysomelids, particularly species belonging to Clytrinae and Cryptocephalinae, was high in the spring season, a case supported by many previous studies (Coley & Aide, 1991; Wagner, 1999; Novotny *et al.*, 2003; Leksono *et al*., 2005).

In the present study, the plant families most commonly recorded to be serving as host plants for the Alticinae were Lamiaceae, Brassicaceae, Scrophulariaceae, Boraginaceae, and Asteraceae. The same plant families were reported in other previous studies dealing with host plant associations of Alticinae (Santiago-Blay, 2004; Aslan & Gök, 2006). High host-specificities were recorded for some genera of alticines like *Phyllotreta* more restricted on Brassicaceae, *Aphthona* on Euphorbiaceae and *Longitarsus* mainly on Boraginaceae, Scrophulariaceae and Lamiaceae. It is known that plant chemistry is the principal factor influencing the feeding behaviour and host selection of phytophagous insects. Secondary plant substances (peculiar to any plant and basically responsible for the plant's defence mechanism) work as important feeding stimulants in the selection of host plants (Matsuda, 1988; Jolivet, 1992). Brassicaceae, well known to contain glucosinolates, is distinctly preferred by *Phyllotreta* species (Furth, 1979; Doguet, 1984; Vig & Verdyck, 2001), similarly, most of the *Longitarsus* species feed on plants from the families Asteraceae and Boraginaceae both of which include pyrrolizidine alkaloids (PA_S) (Dobler *et al*., 2000; Narberhaus *et al*., 2003).

Determination of host plant associations of Chrysomelidae is important for answering numerous questions including biological, ecological, biogeographical and evolutionary perspectives. Moreover, it is difficult to make definite generalizations for host plant preferences of leaf beetles throughout the world, because of lacking information in some regions. This study constitutes one more contribution in order to complete the inadequate data of Turkish Chrysomelidae and their host plant records, and we hope to continue expanding the knowledge in further studies.

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Table 1. Host plant associations of leaf beetles recorded in Saklıkent vicinity, Turkey with related host families.

Subfamily		Species	Host plant records	Plant family
Criocerinae				
1		*Crioceris asparagi* (Linnaeus, 1758)	*Asparagus acutifolius* L.	Liliaceae
2		*Oulema melanopus* (Linnaeus, 1758)	*Poa* sp.	Poaceae
Clytrinae				
3		*Tituboea macropus* (Illiger, 1800)	*Astragalus* sp.	Fabaceae
4		*Clytra bodemeyeri* Weise, 1900	*Quercus* spp.	Fagaceae
5		*Clytra novempunctata* Olivier, 1808	*Crataegus* spp.	Rosaceae
6		*Coptocephala unifasciata* (Scopoli, 1763)	**Daucus, Pastinaca, Peucedanum, Echinophora* (Mohr, 1966; Gruev & Tomov, 1984)	
7		*Labidostomis lucida* (Germar, 1824)	** Vicia sativa* (Gruev & Tomov, 1984)	
8		*Labidostomis maculipennis* Lefevre, 1870	*Quercus* spp.	Fagaceae
9		*Labidostomis oertzeni* Weise, 1889	**Salix, Populus, Alnus* (Gruev & Tomov, 1984)	
10		*Labidostomis propinqua* Faldermann, 1837	*Crataegus* spp.	Rosaceae
11		*Smaragdina biornata* (Lefèvre, 1872)	*Geranium* sp.	Geraniaceae
12		*Smaragdina limbata* (Steven, 1806)	*Quercus* spp. *Crataegus* spp.	Fagaceae Rosaceae
13		*Smaragdina xanthaspis* (Germar, 1824)	**Hypericum, Rumex* (Gruev & Tomov, 1984)	
Cryptocephalinae				
14		*Cryptocephalus duplicatus* Suffrian, 1847	*Taraxacum* sp. *Potentilla inclinata* Vill.	Asteraceae Rosaceae
15		*Cryptocephalus moraei* (Linnaeus, 1758)	*Hypericum confertum* Choisy *H. perforatum* L.	Hypericaceae
16		*Cryptocephalus octacosmus* Bedel, 1891	*Quercus* spp.	Fagaceae
17		*Cryptocephalus oranensis* Weise, 1882	*Berberis crataegina DC.*	Berberidaceae
18		*Pachybrachis fimbriolatus* (Suffrian, 1848)	*Quercus* spp.	Fagaceae
19		*Pachybrachis tessellatus* (Olivier, 1791)	*Quercus* spp.	Fagaceae
Eumolpinae				
20		*Macrocoma* sp.		
Chrysomelinae				
21		*Chrysolina chalcites* (Germar, 1824)	Unknown	
22		*Chrysolina gypsophilae* (Küster, 1845)	**Linaria, Salvia* (Mohr, 1966; Lopatin, 1984)	
23		*Chrysolina herbacea* (Duftschmid, 1825)	*Mentha* sp.	Lamiaceae
24		*Chrysolina marginata* (Linnaeus, 1767)	**Achillea, Matricaria, Artemisia, Chrysanthemum* (Mohr, 1966; Gruev & Tomov, 1986)	
25		*Chrysolina reitteri* (Weise, 1884)	*Brassica* sp.	Brassicaceae
26		*Gonioctena fornicata* (Brüggemann, 1873)	*Medicago* sp.	Fabaceae
27		*Phaedon pyritosus* (Rossi, 1792)	*Ranunculus repens* L.	Ranunculaceae
28		*Phaedon cochlearia* (Fabricius, 1792)	*Nasturtium* sp.	Brassicaceae
29		*Entomoscelis adonidis* (Pallas, 1771)	**Adonidis* (Lopatin, 1984)	
30		*Entomoscelis suturalis* Weise, 1882	*Glaucium flavum* Crantz., *G. corniculatum* (L.)	Papaveraceae
31		*Plagiodera versicolora* (Laicharting, 1781)	*Salix* spp.	Salicaceae
32		*Timarcha tenebricosa* (Fabricius, 1775)	**Galium* (Gruev & Tomov, 1986)	
Galerucinae				
33		*Calomicrus apicalis* Demaison, 1891	*Pinus* spp.	Pinaceae
34		*Calomicrus lividus* (Joannis, 1866)	*Poa* sp.	Poaceae
35		*Luperus xanthopoda* Schrank, 1781	*Quercus* spp.	Fagaceae
36		*Luperus discolor* Faldermann, 1837	Unknown	
37		*Exosoma neglectum* Mohr, 1968	*Allium sp.*	Liliaceae
38		*Galeruca interrupta* (Illiger, 1802)	**Artemisia, Cardaria* (Warchałowski, 1994)	
39		*Monolepta anatolica* Bezdek, 1998	*Prunus sp.*	Rosaceae
40		*Xanthogaleruca subcoerulescens* Weise, 1884	*Celtis glabrata* Steven ex Planchon	Ulmaceae

Table 1 (Continued).

Subfamily		Species	Host plant records	Plant family
Alticinae				
41		*Phyllotreta aerea* Allard, 1859	**Erysimum, Sinapis, Raphanus, Reseda, Armoracia, Alliaria* (Furth, 1979)	
42		*Phyllotreta astrachanica* Lopatin, 1977	*Cardaria draba* (L.), *Isatis tinctoria* L.	Brassicaceae
43		*Phyllotreta atra* (Fabricius, 1775)	**Reseda, Tropaeolum, Brassica, Armoracia, Cardamine, Sisymbrium, Sinapis, Reseda, Lepidium* (Mohr, 1966; Čížek, 2008)	
44		*Phyllotreta corrugata* Reiche, 1858	*Diplotaxis tenuifolia* (L.) DC., *Cardaria draba* (L.), *Sinapis* sp.	Brassicaceae
45		*Phyllotreta egridirensis* Gruev and Kasap, 1985	*Isatis* sp. *Erysimum* sp.	Brassicaceae
46		*Phyllotreta erysimi* Weise, 1900	*Cardaria draba* (L.)	Brassicaceae
47		*Phyllotreta maculicornis* Pic, 1906	*Cardaria draba* (L.)	Brassicaceae
48		*Phyllotreta nigripes* (Fabricius, 1775)	*Erysimum goniocaulon* Boiss., *Cardaria draba* (L.), *Lepidium perfoliatum* L.	Brassicaceae
49		*Phyllotreta pontoaegeica* Gruev, 1982	Unknown	
50		*Phyllotreta procera* (Redtenbacher, 1849)	*Reseda luteola* L.	Resedaceae
51		*Phyllotreta vittula* (Redtenbacher, 1849)	*Cardaria draba* (L.)	Brassicaceae
52		*Aphthona pygmae* Kutschera, 1861	*Euphorbia macroclada* Boiss., *Euphorbia* spp.	Euphorbiaceae
53		*Aphthona bonvouloiri* Allard, 1861	*Euphorbia macroclada* Boiss.	Euphorbiaceae
54		*Aphthona Warchałowskii* Fritzlar, 2001	*Euphorbia macroclada* Boiss.	Euphorbiaceae
55		*Longitarsus aeneicollis* (Faldermann, 1837)	**Carduus, Senecio, Phlomis, Symphytum, Lithospermum* (Biondi, 1996; Čížek, 2008)	
56		*Longitarsus albineus* (Foudras, 1860)	*Heliotropium hirsutissimum* Grauer, *H. ellipticum* Ledeb.	Boraginaceae
57		*Longitarsus alfierii furthi* Gruev, 1982	*Nepeta nuda* L. *Anchusa leptophylla* Roemer and Schultes	Lamiaceae Boraginaceae
58		*Longitarsus anchusae* (Paykull, 1799)	*Anchusa leptophylla* Roemer and Schultes	Boraginaceae
59		*Longitarsus angelikae* Fritzlar, 2001	*Salvia heldreichiana* Boiss. ex Bentham *S. cryptantha* Montbret and Aucher ex. Bentham *Teucrium chamaedrys* L.	Lamiaceae
60		*Longitarsus aramaicus* Leonardi, 1979	*Salvia sclera* L.	Lamiaceae
61		*Longitarsus atricillus* (Linnaeus, 1761)	**Medicago, Onobrychis, Achillea, Ranunculus, Trifolium, Mentha* (Mohr, 1966; Gruev & Tomov, 1986; Biondi, 1996)	
62		*Longitarsus australis* (Mulsant and Rey, 1874)	*Scrophularia* sp.	Scrophulariaceae
63		*Longitarsus baeticus* Leonardi, 1979	*Verbascum* spp.	Scrophulariaceae
64		*Longitarsus ballotae* (Marsham, 1802)	*Marrubium parviflorum* Fisch.and Mey.	Lamiaceae
65		*Longitarsus bytinskii* Furth, 1979	**Plantago* (Biondi, 1996)	
66		*Longitarsus celticus* Leonardi, 1975	**Sideritis, Teucrium, Stachys* (Biondi, 1996; Čížek, 2008)	
67		*Longitarsus dimidiatus* (Allard, 1860)	**Echium, Anchusa, Cynoglossum, Borago* (Gruev & Tomov, 1986; Biondi, 1996; Aslan & Gök, 2006)	
68		*Longitarsus foudrasi* Weise, 1893	*Verbascum sinuatum* L.	Scrophulariaceae
69		*Longitarsus helvolus* Kutschera, 1863	*Teucrium chamaedrys* L.	Lamiaceae
70		*Longitarsus hermonensis* Furth, 1979	*Verbascum* sp.	Scrophulariaceae
71		*Longitarsus karlheinzi* Warchałowski, 1972	*Phlomis armeniaca* Willd.	Lamiaceae
72		*Longitarsus lateripunctatus personatus* Weise, 1893	**Pulmonaria, Symphytum* (Mohr, 1966; Gruev & Tomov, 1986)	
73		*Longitarsus linnaei* (Duftschmid, 1825)	**Symphytum, Echium, Alliaria, Brunnera, Nonnea* (Mohr, 1966; Gruev & Tomov, 1986; Biondi, 1996; Aslan & Gök, 2006)	
74		*Longitarsus luridus* (Scopoli, 1763)	*Salvia viridis* L.	Lamiaceae
75		*Longitarsus lycopi* (Foudras, 1860)	**Mentha, Lycopus, Melissa, Nepeta, Phlomis, Prunella, Salvia, Teucrium* (Mohr, 1966; Gruev & Tomov, 1986; Biondi, 1996)	
76		*Longitarsus minimus* Kutschera, 1863	**Plantago* (Biondi, 1996; Čížek, 2008)	
77		*Longitarsus nanus* (Foudras, 1860)	*Teucrium polium* L.	Lamiaceae
78		*Longitarsus nigrofasciatus* (Goeze, 1777)	*Verbascum* spp.	Scrophulariaceae

Table 1 (Continued).

Subfamily		Species	Host plants	Plant family
79		*Longitarsus nimrodi* Furth, 1979	*Onosma taurica* Pallas ex Willd. *Clinopodium vulgare* L.	Boraginaceae Lamiaceae
80		*Longitarsus obliteratoides* Gruev, 1973	**Thymus, Rosmarinus, Satureja, Coridothymus* (Biondi, 1996)	
81		*Longitarsus obliteratus* (Rosenhauer, 1847)	*Nepeta nuda* L., *Salvia verbenaca* L.	Lamiaceae
82		*Longitarsus ochroleucus* (Marsham, 1802)	**Achillea, Artemisia, Matricaria, Genista, Senecio, Xeranthemum, Agrostemma* (Mohr, 1966; Gruev & Tomov, 1986; Biondi, 1996; Aslan & Gök, 2006)	
83		*Longitarsus pellucidus* (Foudras, 1860)	*Convolvulus* sp. *Salvia tomentosa* Miller	Convolvulaceae Lamiaceae
84		*Longitarsus picicollis* Weise, 1900	*Verbascum* spp.	Scrophulariaceae
85		*Longitarsus parvulus* (Paykull, 1799)	*Salvia spp.*	Lamiaceae
86		*Longitarsus pratensis* (Panzer, 1784)	**Plantago, Thymus, Senecio, Chenopodium, Beta, Helianthemum* (Mohr, 1966; Gruev & Tomov, 1986; Biondi, 1996; Aslan & Gök, 2006)	
87		*Longitarsus pinguis* Weise, 1888	*Solenanthus stamineus* (Desf.) Wetts.	Boraginaceae
88		*Longitarsus reichei* (Allard, 1860)	**Plantago, Ballota, Prunella, Aster, Atriplex* (Biondi, 1996)	
89		*Longitarsus salviae* Gruev, 1975	*Salvia heldreichiana* Boiss. ex Bentham, *S. syriaca* L.	Lamiaceae
90		*Longitarsus succineus* (Foudras, 1860)	*Xeranthemum annuum* L.	Asteraceae
91		*Longitarsus trepidus* Warchałowski, 1973	**Salvia* (Biondi, 1996)	
92		*Longitarsus truncatellus* Weise, 1890	**Anchusa, Brunnera, Cynoglossum, Echium, Symphytum* (Biondi, 1996)	
93		*Altica oleracea* (Linnaeus, 1758)	**Lythrum, Polygonum, Cirsium, Epilobium, Vitis, Sanguisorba, Potentilla, Veronica, Acanthus* (Gruev & Tomov, 1986; Aslan & Gök, 2006)	
94		*Altica lythri* Aubé 1843	**Epilobium* (Mohr, 1966; Gruev & Tomov, 1986)	
95		*Altica quercetorum* Foudras, 1860	*Quercus* spp.	Fagaceae
96		*Crepidodera aurata* (Marsham, 1802)	*Salix* sp.	Salicaceae
97		*Aeschrocnemis anatolica* (Heikertinger, 1922)	*Vicia* sp.	Fabaceae
98		*Aeschrocnemis whiteheadi* (Warchałowski, 1998)	Unknown	
99		*Podagrica malvae* (Illiger, 1807)	*Alcea* sp., *Malva* spp.	Malvaceae
100		*Chaetocnema concinna* (Marsham, 1802)	**Chenopodium,Polygonum, Beta* (Gruev & Tomov, 1986)	
101		*Chaetocnema coyei* (Allard, 1863)	**Carex* (Gruev & Tomov, 1986)	
102		*Chaetocnema montenegrina* Heikertinger, 1912	Unknown	
103		*Chaetocnema scheffleri* Kutschera, 1864	**Rumex* (Mohr, 1966; Gruev & Tomov, 1986)	
104		*Chaetocnema tibialis* (Illiger, 1807)	**Amaranthus, Chenopodium, Atriplex, Beta, Spinacia* (Furth, 1985; Gruev & Tomov, 1986)	
105		*Dibolia carpathica* Weise, 1893	*Nepeta nuda* L.	Lamiaceae
106		*Dibolia rugulosa* Redtenbacher, 1849	*Stachys byzantina* K.Koch ex Scheele, *Phlomis pungens* Willd.	Lamiaceae
107		*Dibolia timida* (Illiger, 1807)	**Eryngium* (Mohr, 1981; Gruev & Tomov, 1986)	
108		*Psylliodes aereus* Foudras, 1860	*Alyssum murale* Waldst. and Kit.	Brassicaceae
109		*Psylliodes anatolicus* Gök and Çilbiroğlu, 2004	*Quercus* spp.	Fagaceae
110		*Psylliodes cerenae* Gök, *et al*., 2003	**Bromus* (Aslan & Gök, 2006)	
111		*Psylliodes chalcomerus* (Illiger, 1807)	*Carduus* sp., *Onopordum sp.*	Asteraceae
112		*Psylliodes chrysocephalus* (Linnaeus, 1758)	*Brassica elongata* Ehrh., *Sinapis arvensis* L.	Brassicaceae
113		*Psylliodes circumdatus* (Redtenbacher, 1842)	*Brassica sp.*	Brassicaceae
114		*Psylliodes cupreus* (Koch, 1803)	**Alyssum, Brassica, Diplotaxis, Sisymbrium* (Mohr, 1966; Gruev & Tomov, 1986; Čížek, 2008)	
115		*Psylliodes gibbosus* Allard, 1860	**Lolium, Scleropoa, Sinapis* (Mohr, 1966; Furth, 1983)	
116		*Psylliodes hospes* Wollaston, 1854	**Diplotaxis, Farsetia, Zilla* (Furth, 1983)	

Table 1 (Continued).

Subfamily		Species	Host plant records	Plant family
117		*Psylliodes hyoscyami* (Linnaeus, 1758)	**Hyoscyamus* (Mohr, 1966; Gruev & Tomov, 1986)	
118		*Psylliodes inflatus* Reiche, 1858	Unknown	
119		*Psylliodes instabilis* Foudras, 1859	*Alyssum murale* Waldst.andKit.	Brassicaceae
120		*Psylliodes milleri* Kutschera, 1864	**Erysimum* (Leonardi, 1971)	
121		*Psylliodes napi* (Fabricius, 1792)	**Nasturtium, Alliaria, Cardamine, Brassica, Sinapis, Barbarea, Lunaria* (Mohr, 1966; Gruev & Tomov, 1986; Čížek, 2008)	
122		*Psylliodes sophiae* (Illiger, 1807)	**Descurainia, Sisymbrium* (Mohr, 1966; Gruev & Tomov, 1986)	
123		*Psylliodes toelgi* Heikertinger, 1914	**Biscutella* (Mohr, 1966; Čížek, 2008)	
Hispinae				
124		*Hispa atra* Linnaeus, 1967	**Poa, Agropyrum* (Mohr, 1966)	
Cassidinae				
125		*Cassida seraphina* Ménétriés, 1836	**Beta, Chenopodium, Spinacia* (Kısmalı & Sassi, 1994)	
126		*Cassida rufovirens* Suffrian, 1844	**Achillea, Matricaria, Anthemis* (Mohr, 1966; Gruev & Tomov, 1986)	
127		*Cassida vibex* Linnaeus, 1767	**Cirsium,Carduus, Arctium, Centaurea* (Mohr, 1966)	
128		*Cassida rubiginosa* Müller, 1776	*Carduus* sp.	Asteraceae
129		*Cassida brevis* Weise, 1884	Unknown	
130		*Hypocassida subferruginea* (Schrank, 1776)	*Convolvulus sp.*	Convolvulaceae

* Indicates previous host plant records for the leaf beetles with undetermined host plants.

Table 2. Most frequently collected leaf beetles of the study area.

Leaf beetle species	Frequency (%)
Clytra novempunctata	57
Smaragdina limbata	71
Cryptocephalus duplicatus	50
Pachybrachis tessellatus	50
Chrysolina herbacea	43
Entomoscelis adonidis	57
Luperus xanthopoda	64
Phyllotreta nigripes	57
Phyllotreta erysimi	43
Aphthona pygmaea	64
Longitarsus aeneicollis	64
Longitarsus alfierii furthi	78
Longitarsus ballotae	57
Longitarsus karlheinzi	43
Longitarsus nigrofasciatus	85
Longitarsus obliteratus	57
Longitarsus pinguis	50
Longitarsus salviae	50
Altica oleracea	57
Aeschrocnemis anatolica	43
Chaetocnema coyei	78
Dibolia carpathica	64
Psylliodes instabilis	71
Hypocassida subferruginea	64

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