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LEAF BEETLES (COLEOPTERA: CHRYSOMELIDAE) OF MT. FRUŠKA GORA (VOJVODINA PROVINCE, NORTHERN SERBIA), WITH AN OVERVIEW OF HOST PLANTS

ZLATICE (COLEOPTERA: CHRYSOMELIDAE) PLANINE FRUŠKE GORE (VOJVODINA, SJEVERNA SRBIJA), SA PREGLEDOM BILJAKA HRANITELJICA

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Abstract

Leaf beetles (Coleoptera: Chrysomelidae) have not been sufficiently studied in Serbia so far. The species of the family were investigated in a protected area – the Fruška Gora National Park (Vojvodina Province, Northern Serbia) over the period of 11 years (2001–2011). Mt. Fruška Gora is an isolated island mountain in the Pannonian Plain and is characterized by a complex assembly of forest, meadow, shrubby, grassland, cultivated land, wetland, and aquatic phytocenoses. At total of 99 chrysomelid species from 42 genera and 11 subfamilies were identified from the area. The data on nutritional preference of the found Chrysomelidae species and host plants are given by own observations in nature. Furthermore, economically important leaf beetle species (i.e., forest and crop pests) are identified and briefly discussed as well. The registered species can be classified into seven chorotypes of Holarctic and three chorotypes of Europe according to zoogeographical analysis.

KEY WORDS: Chrysomelidae, Serbia, diversity, trophic associations, distribution

Introduction
Uvod

Family Chrysomelidae is one of the largest phytophagous groups of order Coleoptera. More than 38000 species and 2500 genera have been known so far (Seeno & Wilcox 1982). According to some assumptions their number is far greater, more than 60000 species worldwide (Suzuki 1996). The Catalogue of Palaearctic Coleoptera mentions the existence of 28560 taxa of Chrysomeloidea (Löbl & Smetana 2010). Today, modified classification system proposed by Seeno & Wilcox (1982) is the most utilized, according to which the family Chrysomelidae is composed of 20 subfamilies (Suzuki 1996). Because of the phylogenetic relatedness Bruchinae are sometimes treated as a subfamily within the family Chrysomelidae (Reid 2000; Farrell & Sequeira 2004).

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Chrysomelidae fauna in Serbia is relatively poorly studied. Only a small number of faunistic papers have been published for the group as a whole or some of its subfamilies inhabiting Serbia. Most attention has been paid to leaf beetle species that have a certain economic importance (Živojinović & Tomić 1956; Nonveiller 1960; Jovanić 1962; Živojinović 1963). So far, 415 species of leaf beetles from 74 genera and 13 subfamilies are known to inhabit the territory of Serbia (Gavrilović & Ćurčić 2011, 2013; Stančić 2013). A survey of the leaf beetle fauna of Mt. Fruška Gora was given by Груев (1984, 1986). He noted the presence of 51 species from 18 genera and 4 subfamilies.

Mount Fruška Gora is an imposing orographical element in the relief of Autonomous Province of Vojvodina (Northern Serbia). The area of the entire mountain is around 500 km^2, while the area of the region higher than 150 m a.s.l. is around 1160 km^2 (Ćurčić 2007). To the north the terrain slopes gently downward toward the Danube River. Since 1960 Mt. Fruška Gora is a national park. Today, the national park covers the area of 25393 ha. The highest part of the mountain range is under primary forest vegetation, while western and eastern regions lack the original natural vegetation. Forests remain intact only in certain areas, but other parts of the mountain are covered by grass and bush vegetation and agricultural fields.

Primary objective of this study is to present the diversity of fauna of the family Chrysomelidae (excluding Bruchinae) of the Mt. Fruška Gora. Given that Serbian leaf beetle fauna is insufficiently surveyed we predict that this locality would yield new taxa and new trophic associations. Observing insect feeding in natural conditions is a good way to improve our knowledge of species biology. Bordering the Pannonian Basin on one side and mountainous region of the central parts of the Balkan Peninsula on the other, it is expected that characteristic position of Mt. Fruška Gora would show a specific species composition from different zoogeographical regions.

Materials and Methods
Materijal i metode

Analysed leaf beetle material had been collected from 2001 to 2011. Insects were collected every year, from the end of March until the beginning of November, depending on weather conditions and outdoor temperature. In order to identify host plant species and to observe the feeding of larvae and imagines collecting was mostly done by hand or using an aspirator. Entomological net was used for collecting of species that can fly or quickly get away. On meadows and fields, where one or several plant species were dominant, sweeping method was used. A beating tray was satisfactory method for collecting tree- and bush-dwelling species.

Insects were killed in killing bottles by ethyl acetate, diethyl ether was also used to a lesser extent. Imagines are stored as dry preparations on entomological pins or glued on sample cards in the private collection of the first author. Stereomicroscope Carl Zeiss STEMI 2000-C with independent lighting Schott KL1500 LCD was used for analysing the material. Material identification was done using the keys by Warchalowski (2003), Bieńkowski (2004), Winkelman & Debreuil (2008) and Debreuil (2010).

Trophical relationships between Chrysomelidae and their host plants were identified on the basis of damages to vegetative and floral parts and the presence of numerous specimens of larvae and imagines. Only host plants from which the insects were collected are presented in this study. Economically important species of Chrysomelidae are particularly singled out. Identification of plants was done using herbarized material and photographs taken in the field. Plant identification was done using the keys by Josifović (1970–1977), Sarić & Diklić (1986) and Sarić (1992).

Leaf beetles were collected from more than 35 localities in the area of Mt. Fruška Gora (Table 1). These localities represent habitats with different types and different composition of vegetation: region along the Danube River, wet meadows, willow (*Salix* spp.) and poplar (*Populus* spp.) forests, grasslands with elements of steppe and shrub-steppe plants, a zone of shrubs bordering forests, forests of various compositions, forest clearings, stream valleys, lakes, mountain peaks, numerous agricultural fields and plantations, etc. Using the GPS device Garmin Dakot 20, precise locations were determined on which the insect specimens were collected.

General distributional data are included, together with species distribution details on Mt. Fruška Gora. Using the information on general geographical distribution of each species, the zoogeographical distribution was determined. World distribution and zoogeographical analysis is given for all collected species (Warchałowski 2003; Беньковский 2011; Audisio 2013). Geographical distribution is expressed through chorotype association. Chorotype classification according to Vigna Taglianti *et al.* (1999) was used. Each species is placed within one of the chorotypes of Holarctic and Europe.

Results
Rezultati

In the area of Mt. Fruška Gora the presence of 99 species from 42 genera and 11 subfamilies from the family of Chrysomelidae have been identified (Table 1). Chrysomelinae are represented by 23 species from 10 genera (23.23% of the total number of registered species), while Alticinae include 22 species from 10 genera (22.22%). Cryptocepha-

Table 1. Chrysomelidae species collected from Mt. Fruška Gora. Data for each species indicate its world distribution, dispersal on Mt. Fruška Gora, zoogeographical belonging and host plants information.

Tablica 1. Sabrane vrste zlatica (Chrysomelidae) sa Fruške gore, njihovo područje rasprostranjenosti u svijetu, na istraživanom području, zoogeografska pripadnost i podaci o biljkama hraniteljicama.

SUBFAMILY ALTICINAE
***Altica quercetorum* Foudras, 1860** Europe, Asia Minor, Caucasus/Glavica (18. VI 2002), Ležimir (4. X 2004), Iriški Venac (9. V 2005), Lipovača (30. III 2011)/W Palaearctic chorotype; European chorotype/Betulaceae, Fagaceae. *Corylus colurna* L., *Quercus petraea* (Mattuschka) Liebl, *Q. robur* L. Treated as forestry pest species. Damages oak trees of different ages. Infestations have been recorded in central and southern parts of Serbia (Glavendekić 2000; Mihajlović 2008).
***Aphthona flava* Guillebeau, 1894** S, E, SE Europe, Asia Minor; introduced to N America and Canada/Lipovača (22. IV 2007), Beočin (6. X 2011)/Holarctic chorotype; South European chorotype/Euphorbiaceae; *Euphorbia cyparissias* L., *E. esula* L. Larvae feed on roots, while imagoes eat plant leaves, twigs and shoots.
***Aphthona nonstriata* Goeze, 1777** Europe, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan/Krčedin (27. IV 2003), Rakovački Rit (17. VII 2005)/Euroasian chorotype; European chorotype/Iridaceae; *Iris pseudacorus* L.
***Aphthona pallida* (Bach, 1856)** Europe, Caucasus/Beočin (28. IV 2009)/W Palaearctic chorotype; European chorotype/Geraniaceae; *Geranium macrorrhizum* L., *G. robertianum* L.
***Chaetocnema chlorophana* (Duftschmid, 1825)** Europe, N Africa, Asia Minor, Near East, Caucasus/Čortanovci (9. VI 2008), Ledinci (2. V 2011)/W Palaearctic chorotype; European chorotype/Poaceae; *Alopecurus pratensis* L., *Dactylis glomerata* L., *Festuca pratensis* Huds., *Poa annua* L.
***Chaetocnema tibialis* (Illiger, 1807)** Europe, N Africa, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan, C Asia/Krčedin (27. IV 2003), Popovica Lake (3. VI 2005), Rakovački Rit (21. IV 2008), Moharač Lake, Erdevik (13. VII 2010)/Central Asian-Euro-Mediterranean chorotype; European chorotype/Chenopodiaceae; *Atriplex patula* L., *Beta vulgaris* L., *Chenopodium album* L. Occurs as a pest of sugar beet (*Beta vulgaris* L.) (Heikertinger 1951).
***Crepidodera aurata* (Marsham, 1802)** Europe, N Africa, Asia Minor, Caucasus, Siberia, Kazakhstan, Mongolia, Far East, China, Korea/Vorovo (7. VI 2008), Stražilovo (5. V 2009)/Palaearctic chorotype; European chorotype/Salicaceae; *Populus* × *canadensis* Moench, *P. nigra* L., *Salix alba* L., *S. caprea* L. Feeds on cultivars of *Salix* and *Populus* species, but rarely causes significant damage.
***Crepidodera fulvicornis* (Fabricius, 1792)** Europe, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, China/Stražilovo (30. IV 2010)/Eurasian chorotype; European chorotype/Salicaceae; *Salix alba* L.
***Crepidodera plutus* (Latreille, 1804)** Europe, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, Far East, China, Korea, Japan/Moharač Lake, Erdevik (17. IV 2008), Krčedin (27. IV 2003, 12. V 2009)/Eurasian chorotype; European chorotype/Salicaceae; *Salix alba* L., *Populus* × *canadensis* Moench, *P. tremula* L.
***Dibolia cryptocephala* (Koch, 1803)** Europe, Asia Minor, Caucasus, Siberia, Kazakhstan/Paragovo (30. VII 2009)/Eurosiberian chorotype; European chorotype/Lamiaceae; *Glechoma hirsuta* Waldst. et Kit.
***Epitrix atropae* Foudras, 1860** Europe, N Africa, Asia Minor, Caucasus/Velika Remeta Monastery (16. VI 2005)/W Palaearctic chorotype; European chorotype/Solanaceae; *Atropa belladonna* L., *Datura stramonium* L.
***Epitrix pubescens* (Koch, 1803)** Europe, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan/Stražilovo (13. VIII 2001), Vrdnik (5. VII 2006), Lipovača (22. IV 2007), Glavica (7. IX 2010)/Eurasian chorotype; European chorotype/Solanaceae; *Solanum dulcamara* L., *S. nigrum* L.
***Longitarsus ferrugineus* (Foudras, 1860)** Europe, N Africa, Caucasus/Stražilovo (13. V 2005), Iriški Venac (24. IV 2008), Vorovo (7. VI 2008), Testera (18. V 2011)/W Palaearctic chorotype; European chorotype/Lamiaceae; *Glechoma hirsuta* Waldst. et Kit., *Mentha aquatica* L., *M. longifolia* (L.) Huds. Occurs as a pest on mint plantations.
***Longitarsus pratensis* (Panzer, 1794)** Europe, N Africa, Asia Minor, Near East, Caucasus, Kazakhstan, C Asia/Ležimir (30. VI 2008)/Palaearctic chorotype; European chorotype/Plantaginaceae; *Plantago major* L.
***Longitarsus substriatus* Kutschera, 1863** C, S, E Europe, Asia Minor/Iriški Venac (8. V 2004), Stražilovo (30. IV 2010)/W Palaearctic chorotype; European chorotype/Lamiaceae; *Glechoma hederacea* L.
***Phyllotreta christinae* Heikertinger, 1941** C, S, E Europe; endemic species of the mountainous regions of Europe/Zmajevac (6. VII 2009)/W Palaearctic chorotype; European chorotype/Brassicaceae; *Cardamine amara* L.

Table 1. Continued.
Tablica 1. Nastavak.

***Phyllotreta dilatata* Thomson, 1866**

W, N, C, E Europe, Siberia/Stražilovo (30. IV 2010)/Eurosiberian chorotype; Central European chorotype/Brassicaceae; *Rorippa* spp.

***Phyllotreta striolata* (Fabricius, 1803)**

Europe and Asia; introduced to N America and Republic of South Africa/Beočin (3. VII 2008)/Holarctic chorotype; European chorotype/Brassicaceae; *Brassica napus* L., *B. oleracea* L., *Sinapis arvensis* L. Occurs as a pest on various cruciferous vegetables (Lee *et al.* 2011; Tansey *et al.* 2008).

***Podagrica fuscicornis* (Linnaeus, 1766)**

Europe, N Africa, Asia Minor, Near East, Caucasus/Krušedol (12. VI 2009)/W Palaearctic chorotype; European chorotype/Malvaceae; *Malva sylvestris* L.

***Podagrica menetriesi* (Faldermann, 1837)**

C, E, S, SE Europe, Asia Minor, Near East, Caucasus, Kazakhstan, C Asia, China/Čortanovci (9. VI 2008)/Eurasian chorotype; European chorotype/Malvaceae; *Alcea rosea* L., *Malva sylvestris* L.

***Psylliodes affinis* (Paykull, 1799)**

Europe, N Africa, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan, Altai, C Asia; introduced to N America/Jazak Monastery (10. VII 2003), Stražilovo (13. VI 2005, 1. VI 2007), Andrevlje (19. IV 2011)/Holarctic chorotype; European chorotype/Solanaceae; *Atropa belladonna* L., *Solanum dulcamara* L.

***Psylliodes dulcamarae* (Koch, 1803)**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia/Erdevik (4. VII 2001), Čerević (3. VII 2009)/Euroasian chorotype; European chorotype/Solanaceae; *Solanum dulcamara* L.

SUBFAMILY CASSIDINAE

***Cassida canaliculata* Laicharting, 1781**

C, S, E, SE Europe, Asia Minor, Caucasus, W Siberia, Kazakhstan, C Asia/Stražilovo (21. V 2001), Vrdnik (5. VII 2006)/Euroasian chorotype; European chorotype/Lamiaceae; *Salvia pratensis* L.

***Cassida hemisphaerica* Herbst, 1799**

Europe, N Africa, Asia Minor, Caucasus; introduced to N America/Beočin (26. IV 2002)/Holarctic chorotype; European chorotype/Caryophyllaceae; *Dianthus campestris* Bieb., *D. deltoides* L., *Silene vulgaris* (Moench) Garcke.

***Cassida pannonica* Suffrian, 1844**

C, S, E, SE Europe, Asia Minor, Near East, Caucasus, W Siberia, Kazakhstan, C Asia/Popovica (19. V 2008), Krčedin (12. V 2009)/Euroasian chorotype; Central European chorotype/Asteraceae; *Centaurea jacea* L.

***Cassida panzeri* Weise, 1907**

Europe, Siberia, Caucasus, Kazakhstan, Far East/Čortanovci (18. VI 2006), Beočin (3. VII 2008)/Eurasian chorotype; European chorotype/Asteraceae; *Cirsium arvense* (L.) Scop., *C. vulgare* (Savi) Ten., *Tragopogon pratensis* L.

***Cassida rubiginosa* Müller, 1776**

Europe, N Africa, Asia Minor, Near East, Caucasus, Far East, Japan, Taiwan; introduced to N America/Stražilovo (13. V 2005), Čortanovci (3-8. V 2008)/Holarctic chorotype; European chorotype/Asteraceae; *Arctium lappa* L., *Carduus acanthoides* L., *Cirsium arvense* (L.) Scop., *Serratula tinctoria* L.

***Cassida sanguinolenta* Müller, 1776**

Europe, N Africa, Asia Minor, Caucasus, W Siberia, Kazakhstan, C Asia, Far East/Krčedin (12. V 2009)/Palaearctic chorotype; European chorotype/Asteraceae; *Achillea millefolium* L.

***Cassida vibex* Linnaeus, 1767**

Europe, Caucasus, Siberia, Kazakhstan, C Asia, Far East, China, Japan/Vrdnik (16. VI 2005), Čortanovci (11. IV 2007)/Eurasian chorotype; European chorotype/Asteraceae; *Centaurea scabiosa* L., *Cirsium arvense* (L.) Scop., *C. palustre* (L.) Scop.

***Cassida viridis* Linnaeus, 1758**

Europe, N Africa, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, Far East, Japan/Krčedin (6. IX 2002), Ravne (28. IV 2003), Osovlje (4. V 2005), Ležimir (4. IX 2009), Stražilovo (30. IV 2010)/Palaearctic chorotype; European chorotype/Lamiaceae; *Galeopsis tetrahit* L., *Mentha aquatica* L., *M. longifolia* (L.) Huds., *M. spicata* L., *Salvia pratensis* L., *Stachys palustris* L.

***Hypocassida subferruginea* (Schrank, 1776)**

Europe, N Africa, Asia Minor, Near East, Caucasus, Siberia, C Asia, Far East, China, Korea/Stražilovo (21. V 2001), Vrdnik (18. VIII 2007), Sremska Kamenica (8. X 2008)/Palaearctic chorotype; European chorotype/Convolvulaceae; *Convolvulus arvensis* L.

***Pilemostoma fastuosa* (Schaller, 1783)**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, China/Crveni Čot (21. VI 2003), Vorovo (9. V 2008)/Eurasian chorotype; European chorotype/Asteraceae; *Senecio jacobaea* L.

SUBFAMILY CHRYSOMELINAE

***Chrysolina chalcites* (Germar, 1824)**

C, S, SE Europe, Asia Minor, Near East, Caucasus, Kazakhstan, C Asia/Stražilovo (21. V 2001), Krčedin (29. VII 2003), Glavica (2. VII 2008)/Eurasian chorotype; South European chorotype/Betulaceae, Lamiaceae; *Corylus avellana* L., *Glechoma hirsuta* Waldst. et Kit. Mentioned in literature as a potentially harmful species on hazelnut plantations (Snare 2006).

Table 1. Continued.
Tablica 1. Nastavak.

***Chrysolina coerulans* (Scriba, 1791)**

Europe, Asia Minor, Near East, Caucasus, Mt. Ural, C Asia/Vrdnik (27. V 2003), Popovica Lake (3. VI 2005), Stražilovo (14. VII 2005, 14. VII 2007), Vorovo (9. V 2008)/Eurasian chorotype; European chorotype/Lamiaceae; *Mentha aquatica* L., *M. longifolia* (L.) Huds.

***Chrysolina fastuosa* (Scopoli, 1763)**

Europe, Asia Minor, Caucasus, W Siberia, Kazakhstan, Altai, C Asia/Velika Remeta Monastery (23. V 2002), Krčedin (27. IV 2003), Vorovo (18. V 2005), Stražilovo (17. VII 2005), Moharač Lake, Erdevik (17. IV 2008), Ledinci Lake (3. VI 2010)/Eurasian chorotype; European chorotype/Lamiaceae, Urticaceae; *Ballota nigra* L., *Galeopsis ladanum* L., *G. speciosa* Mill., *G. tetrahit* L., *Lamium album* L., *L. maculatum* L., *Stachys palustris* L., *Urtica dioica* L.

***Chrysolina graminis* (Linnaeus, 1758)**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, Far East, N China/Krčedin (23. V 2004), Vrdnik (18. VIII 2007)/Eurasian chorotype; European chorotype/Lamiaceae; *Lycopus europaeus* L., *Mentha aquatica* L., *Stachys palustris* L.

***Chrysolina gypsophilae* (Küster, 1845)**

Europe, N Africa, Asia Minor, Caucasus, Kazakhstan, C Asia/Iriški Venac (18. VI 2002), Velika Remeta Monastery (16. VI 2005), Letenka (20. IX 2006), Ravne (9. X 2009)/Palaearctic chorotype; European chorotype/Plantaginaceae; *Linaria dalmatica* (L.) Mill., *Plantago lanceolata* L.

***Chrysolina herbacea* (Duftschmid, 1825)**

Europe, Asia Minor, Near East, Caucasus, Kazakhstan/Vrdnik (27. V 2003), Popovica Lake (3. VI 2005), Stražilovo (14. VII 2007), Vorovo (9. V 2008, 18. VI 2008)/Eurasian chorotype; European chorotype/Lamiaceae; *Mentha aquatica* L.

***Chrysolina olivieri* (Bedel, 1892)**

C, S, E, SE Europe; hilly and mountainous areas/Vrdnik (27. V 2003), Letenka (19. IX 2003, 8. VI 2005), Stražilovo (24. VIII 2004, 13. VI 2005, 14. VII 2005, 30. IV 2010), Osovlje (9. V 2005), Ležimir (30. VI 2008), Paragovo (30. VII 2009)/W Palaearctic horotype; Central European chorotype/Lamiaceae; *Salvia glutinosa* L.

***Chrysolina polita* (Linnaeus, 1758)**

Europe, Asia Minor, Near East, Caucasus, W Siberia, Kazakhstan, Altai, C Asia, Mongolia, Far East, China/Krčedin (6. IX 2002), Vrdnik (27. V 2003), Stražilovo (14. VII 2007), Paragovo (14. VII 2008), Ledinci Lake (3. VI 2010)/Eurasian chorotype; European chorotype/Lamiaceae, Urticaceae; *Ballota nigra* L., *Glechoma hederacea* L., *Lycopus europaeus* L., *Mentha aquatica* L., *M. arvensis* L., *Urtica dioica* L.

***Chrysolina sturmi* (Westhoff, 1882)**

Europe, Caucasus, W Siberia, Kazakhstan/Crveni Čot (21. VI 2003), Stražilovo (24. VIII 2004, 14. VII 2007), Čortanovci (18. VI 2006)/Eurosiberian chorotype; European chorotype/Lamiaceae; *Glechoma hederacea* L.

***Chrysolina vernalis* (Brullé, 1832)**

S, SE Europe, Asia Minor/Krčedin (27. IV 2003), Iriški Venac (24. IV 2008)/Euro-Mediterranean chorotype; South European chorotype/Plantaginaceae; *Plantago lanceolata* L., *P. major* L.

***Chrysomela cuprea* Fabricius, 1775**

Europe, Asia Minor, Near East, Caucasus, C Asia, Altai, Mongolia, Far East/Krčedin (27. IV 2003), Rakovački Rit (17. VI 2004), Stražilovo (1. VI 2007)/Eurasian chorotype; European chorotype/Salicaceae; *Salix alba* L., *S.* × *fragilis* L.

***Chrysomela populi* Linnaeus, 1758**

Europe, N Africa, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan, C Asia, Far East, China, Japan/Krčedin (27. IV 2003, 23. V 2004), Popovica Lake (26. IV 2006), Čortanovci (10. V 2008)/Palaearctic chorotype; European chorotype/Salicaceae; *Populus alba* L., *P. tremula* L., *Salix alba* L., *S. cinerea* L. Occurs as one of the most important pests of *Populus* and *Salix* cultivars.

***Chrysomela vigintipunctata* Scopoli, 1763**

C, S, E Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, Far East, China, Korea, Japan/Krčedin (18. X 2008)/Eurasian chorotype; European chorotype/Salicaceae; *Salix alba* L., *S. cinerea* L. Can occur as a pest on willow plantations.

***Colaphus sophiae* (Schaller, 1783)**

C, E, SE Europe, Asia Minor, Caucasus/Vrdnik (16. VI 2005), Čortanovci (12. V 2009)/W Palaearctic chorotype; European chorotype/Brassicacae; *Brassica oleracea* L., *B. rapa* L., *Raphanus sativus* L. Can damage certain plant cultures (canola, cruciferous vegetables, radish, mustard plants, etc.) (Bieńkowski 2004).

***Gastrophysa polygoni* (Linnaeus, 1758)**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, Altai, C Asia, Far East, Korea; introduced to N America/Iriški Venac (8. V 2004), Beočin Monastery (28. IV 2009)/Holarctic chorotype; European chorotype/Polygonaceae; *Persicaria mitis* (Schrank) Assenov, *Polygonum aviculare* L., *Rumex crispus* L.

***Gonioctena fornicata* (Brüggemann, 1873)**

C, E, S, SE Europe, N Africa, Asia Minor, Caucasus /Krčedin (27. IV 2003, 12. V 2009), Čortanovci (25. IV 2005), Stražilovo (13. V 2005, 4. X 2007), Vorovo (27. IV 2006), Direk (7. IV 2008), Grgeteg (6. V 2008)/W Palaearctic chorotype; Central European chorotype/Fabaceae; *Medicago sativa* L., *Trifolium repens* L., *Vicia sativa* L. Occurs as a pest of certain fodder crops, such as alfalfa and red clover.

Table 1. Continued.
Tablica 1. Nastavak.

***Gonioctena viminalis* (Linnaeus, 1758)**

Europe, Caucasus, Siberia, Kazakhstan, Altai, C Asia, Mongolia, Far East, N China, Korea, N America/Krčedin (18. X 2008)/Holarctic chorotype; European chorotype/Salicaceae; *Salix cinerea* L., *S.* × *fragilis* L.

***Leptinotarsa decemlineata* (Say, 1824)**

N America; introduced to Europe and parts of N Africa and Asia/Ledinci (20. VIII 2002), Krčedin (6. IX 2002), Stražilovo (14. VII 2005, 30. IV 2010), Vrdnik (18. VIII 2007), Beočin Monastery (28. IV 2009)/subcosmopolitan; European chorotype/Solanaceae; *Datura stramonium* L., *Hyoscyamus niger* L., *Solanum dulcamara* L., *S. lycopersicum* L., *S. melongena* L., *S. nigrum* L., *S. tuberosum* L. Occurs as one of the most important pests of potato in Europe, but can also damage other related plants from the same family, such as tomato, eggplant, etc.

***Phaedon cochleariae* (Fabricius, 1792)**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Far East, China, Korea; introduced to N America/Rakovac (17. VI 2004), Vrdnik (5. VII 2006), Čortanovci (12. V 2008)/Holarctic chorotype; European chorotype/Brassicaceae; *Alliaria petiolata* (Bieb.) Cavara et Grande, *Brassica napus* L., *Cochlearia officinalis* L., *Rorippa amphibia* (L.) Besser, *Sinapis alba* L. Can occur as a pest of cruciferous vegetables (cabbage, horseradish, radish, etc.) (Uddin *et al.* 2008).

***Phratora vulgatissima* (Linnaeus, 1758)**

Europe, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, Far East, China; introduced to N America/Rakovački Rit (17. VI 2004, 17. VII 2005), Krčedin (18. X 2008)/Holarctic chorotype; European chorotype/Salicaceae; *Salix alba* L., *S. cinerea* L., *S. caprea* L. Can damage certain willow cultivars (Leherman *et al.* 2012).

***Plagiodera versicolora* (Laicharting, 1781)**

Europe, N Africa, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, China, Taiwan, Korea, Japan; introduced to N America/Vrdnik (5. VII 2006), Rakovački Rit (21. IV 2008)/Holarctic chorotype; European chorotype/Salicaceae; *Salix alba* L., *S. cinerea* L.

***Timarcha goettingensis* (Linnaeus, 1758)**

Europe (mostly C Europe)/Krčedin (27. IV 2003), Rakovac (26. VII 2005), Vrdnik (11. VI 2010), Andrevlje (6. XI 2010)/W Palaearctic chorotype; European chorotype/Rubiaceae; *Galium aparine* L., *G. mollugo* L., *G. odoratum* (L.) Scop., *G. verum* L.

***Timarcha tenebricosa* (Fabricius, 1775)**

Europe, Asia Minor, Caucasus/Krčedin (27. IV 2003), Velika Remeta Monastery (16. VI 2005), Stražilovo (2. XI 2005), Ravne (7. IV 2006), Iriški Venac (23. V 2008, 30. IV 2010)/W Palaearctic chorotype; European chorotype/Rubiaceae; *Galium mollugo* L., *G. verum* L.

SUBFAMILY CLYTRINAE

***Clytra laeviuscula* Ratzeburg, 1837**

Europe, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan, Altai, C Asia, Mongolia, China/Krčedin (23. V 2004), Popovica Lake (26. IV 2006), Čortanovci (18. VI 2006, 9. VI 2008, 1. VII 2008), Direk (12. VI 2008)/Eurasian chorotype; European chorotype/Salicaceae, Rosaceae; *Prunus cocomilia* Ten., *Populus tremula* L., *Salix cinerea* L.

***Labidostomis cyanicornis* (Germar, 1822)**

C, S, E, SE Europe, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia/Krčedin (27. IV 2003)/Eurosiberian chorotype; European chorotype/Salicaceae; *Salix alba* L., *S.* × *fragilis* L.

***Labidostomis humeralis* (Schneider, 1792)**

Europe, Asia Minor, Caucasus, Caspian Sea surrounding/Popovica (26. V 2009), Beočin (27. VI 2011)/Eurasian chorotype; European chorotype/Rosaceae; *Crataegus laevigata* (Poir.) DC.

***Labidostomis longimana* (Linnaeus, 1760)**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia/Velika Remeta Monastery (23. V 2002), Vrdnik (18. VIII 2007), Direk (12. VI 2008), Grgeteg (4. VII 2008), Krčedin (12. V 2009), Čerević (24. VI 2010)/Eurasian chorotype; European chorotype/Fabaceae; *Lotus corniculatus* L., *Trifolium* sp.

***Labidostomis lucida* (Germar, 1824)**

W, C, S, SE Europe, Asia Minor, Caucasus, Siberia, Kazakhstan/Krčedin (29. VII 2003), Popovica (26. V 2009)/Eurasian chorotype; European chorotype/Salicaceae; *Salix alba* L.

***Labidostomis pallidipennis* (Gebler, 1830)**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Altai, N China/Crveni Čot (16. VI 2002), Grgeteg (19. IX 2003), Osovlje (2. VII 2007)/Eurasian chorotype; European chorotype/Salicaceae; *Salix alba* L., *Populus tremula* L.

***Labidostomis tridentata* (Linnaeus, 1758)**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, Far East/Jazak Monastery (10. VII 2003), Krčedin (12. V 2009)/Eurasian chorotype; European chorotype/Rosaceae, Salicaceae; *Crataegus monogyna* Jacq., *Salix alba* L., *S. cinerea* L. Imagoes and early larval instars feed on leaves of trees and bushes. Later larval instars are saprophagous (Белова *et al*. 2008).

***Lachnaia sexpunctata* (Scopoli, 1763)**

C, S, E, SE Europe, Asia Minor; inhabits hilly and mountainous regions/Velika Remeta Monastery (23. V 2002), Vrdnik (27. V 2003), Stražilovo (14. VII 2007)/W Palaearctic chorotype; European chorotype/Fagaceae, Rosaceae; *Prunus avium* L., *P. domestica* L., *Quercus robur* L.

Table 1. Continued.
Tablica 1. Nastavak.

***Smaragdina affinis* (Illiger, 1794)**

Europe, Caucasus/Erdevik (19. IV 2004), Krčedin (12. V 2009)/W Palaearctic chorotype; European chorotype/Rosaceae; *Crataegus laevigata* (Poir.) DC., *C. monogyna* Jacq., *Prunus spinosa* L.

***Smaragdina aurita* (Linnaeus, 1767)**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, Far East, China, Japan; mostly inhabits hilly and mountainous regions, rarely found in plains/ Glavica (18. VI 2002), Vorovo (9. V 2008), Zmajevac (11. VI 2010)/Eurasian chorotype; European chorotype/Rosaceae; *Prunus spinosa* L.

***Smaragdina salicina* (Scopoli, 1763)**

Europe, Asia Minor, Caucasus, Siberia, China/Vorovo (9. V 2008), Glavica (6. V 2009)/Eurasian chorotype; European chorotype/Rosaceae, Salicaceae; *Cornus sanguinea* L., *Crataegus monogyna* Jacq., *Prunus spinosa* L., *Salix alba* L., *S.* × *fragilis* L.

***Smaragdina xanthaspis* (Germar, 1824)**

C, S, E, SE Europe, Asia Minor, Caucasus; inhabits hilly and mountainous regions/Ledinci (23. V 2002), Krčedin (23. V 2004), Vrdnik (18. VIII 2007), Popovica (19. V 2008), Vorovo (7. VI 2008), Direk (12. VI 2008), Iriški Venac (23. VI 2008), Ležimir (30. VI 2008), Čortanovci (1. VII 2008), Čerević (24. VI 2010)/Eurasian chorotype; European chorotype/Betulaceae, Fagaceae, Rosaceae, Salicaceae; *Betula pendula* Roth, *Crataegus monogyna* Jacq., *Populus tremula* L., *Quercus petraea* (Mattuschka) Liebl, *Q. robur* L.

***Tituboea macropus* (Illiger, 1800)**

C, S, SE Europe, Asia Minor, Caucasus, Kazakhstan, C Asia; lives in xerothermic habitats on southern slopes of hills and mountains/Crveni Čot (21. VI 2003), Direk (1. VI 2007), Glavica (2. VII 2008), Grgeteg (4. VII 2008)/W Palaearctic chorotype; European chorotype/Fagaceae, Rosaceae; *Fagus sylvatica* L., *Prunus spinosa* L., *Quercus robur* L.

SUBFAMILY CRIOCERINAE

***Crioceris duodecimpunctata* (Linnaeus, 1758)**

Europe, N Africa, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan, C Asia, Far East, China, Korea, Japan/Krčedin (12. V 2009)/Palaearctic chorotype; European chorotype/Asparagaceae; *Asparagus officinalis* L. Larvae live inside asparagus berries, while imagoes feed on the shoots and leaves. Occurs as a pest of asparagus plantations (varieties of *Asparagus officinalis* L.) (LeSage *et al.* 2008).

***Lema cyanella* (Linnaeus, 1758)**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, Far East, N China, Korea, Japan/Čortanovci (6. IX 2002), Velika Remeta Monastery (16. VI 2005), Glavica (6. V 2009), Čerević (3. VII 2009)/Palaearctic chorotype; European chorotype/Asteraceae; *Carduus acanthoides* L., *Cirsium arvense* (L.) Scop.

***Lilioceris lilii* (Scopoli, 1763)**

Europe, N Africa, Asia Minor, Caucasus, Siberia, Kazakhstan, Altai, C Asia; introduced to N America/Krčedin (27. IV 2003, 18. X 2008), Rakovački Rit (17. VI 2004)/Holarctic chorotype; European chorotype/Liliaceae, Convallariaceae; *Convallaria majalis* L., *Lilium candidum* L., *L. martagon* L. Due to absence of natural enemies the species may become a pest of some autochthonous and decorative plants in North America (Majka & LeSage 2008).

***Lilioceris merdigera* (Linnaeus, 1758)**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, Far East, Japan; introduced to N and S America/Ledinci (14. V 2006), Paragovo (18. V 2006), Popovica (26. VI 2006), Direk (7. IV 2008), Vorovo (9. V 2008), Stražilovo (30. IV 2010)/subcosmopolitan; European chorotype/Alliaceae; *Allium cepa* L., *A. sativum* L., *A. ursinum* L. Sporadically occurs as a pest of onions (Łuczak 1992).

***Oulema gallaeciana* (Heyden, 1879)**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, Far East; introduced to N America/Čortanovci (6. IX 2002), Vrdnik (18. VIII 2007)/Holarctic chorotype; European chorotype/Poaceae; *Avena sativa* L., *Triticum aestivum* L., *Zea mays* L. Occurs as a pest of cereals in certain parts of Europe and North America (Ulrich *et al.* 2004).

***Oulema melanopus* (Linnaeus, 1758)**

Europe, N Africa, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan, Altai, C Asia, Mongolia, China; introduced to N America/Čortanovci (6. IX 2002), Krčedin (6. IX 2002), Ležimir (31. III 2005), Letenka (28. VI 2005), Osovlje (6. VII 2005), Stražilovo (14. VII 2005, 28. V 2006, 30. IV 2010), Ravne (7. IV 2006), Direk (1. VI 2007, 7. IV 2008), Grgeteg (6. V 2008)/Holarctic chorotype; European chorotype/Poaceae; *Bromus* sp., *Festuca* sp., *Hordeum vulgare* L., *Poa annua* L., *Secale cereale* L., *Triticum aestivum* L., *Zea mays* L. Represents one of the most important insect pest species of cereals.

SUBFAMILY CRYPTOCEPHALINAE

***Cryptocephalus apicalis* Gebler, 1830**

C, E, SE Europe, Caucasus, S Siberia/Neradin (20. V 2011)/Eurosiberian chorotype; European chorotype/Asteraceae; *Artemisia vulgaris* L.

***Cryptocephalus aureolus* Suffrian, 1847**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia/Velika Remeta Monastery (16. VI 2005), Vrdnik (5. VII 2006), Čortanovci (1. VII 2008), Glavica (2. VII 2008), Čerević (24. VI 2010)/Eurasian chorotype; European chorotype/Asteraceae, Rosaceae; *Anthemis tinctoria* L., *Filipendula ulmaria* (L.) Maxim., *Rosa canina* L.

Table 1. Continued.
Tablica 1. Nastavak.

***Cryptocephalus bipunctatus* (Linnaeus, 1758)**

Europe, N Africa, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Far East, China, Korea/Erdevik (19. IV 2004), Glavica (6. V 2009), Krčedin (12. V 2009)/Palaearctic chorotype; European chorotype/Betulaceae, Rosaceae; *Corylus avellana* L., *Rubus caesius* L.

***Cryptocephalus cordiger* (Linnaeus, 1758)**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, Far East; inhabits hilly and mountainous regions/Zmajevac (8. V 2004), Grgeteg (6. V 2008)/Eurasian chorotype; European chorotype/Betulaceae, Rosaceae; *Quercus robur* L., *Rosa canina* L., *R. spinosissima* L. Species frequent in oak forests.

***Cryptocephalus decemmaculatus* (Linnaeus, 1758)**

Europe, Mt. Ural, Siberia/Koševac (21. V 2009)/Eurosiberian chorotype; European chorotype/Salicaceae; *Salix alba* L.

***Cryptocephalus flavipes* Fabricius, 1781**

Europe, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan, C Asia, Far East, China; inhabits meadows and wet areas near rivers/Brankovac (19. IX 2003), Rakovački Rit (17. VII 2005), Krčedin (12. V 2009), Čerević (24. VI 2010)/Eurasian chorotype; European chorotype/Salicaceae; *Populus alba* L.

***Cryptocephalus hypochaeridis* (Linnaeus, 1758)**

Europe/Crveni Čot (21. VI 2003), Direk (1. VI 2007), Iriški Venac (23. V 2008), Vorovo (18. VI 2008), Krčedin (12. V 2009)/W Palaearctic chorotype; European chorotype/Asteraceae, Cistaceae, Fabaceae, Hypericaceae, Ranunculaceae; *Centaurea jacea* L., *Cichorium intybus* L., *Crepis biennis* L., *Taraxacum officinale* Webb.

***Cryptocephalus moraei* (Linnaeus, 1758)**

Europe, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan, C Asia/Stražilovo (17. VII 2005), Ravanica Monastery (5. VII 2006), Vorovo (29. VII 2008)/Eurasian chorotype; European chorotype/Fabaceae, Rosaceae; *Crataegus monogyna* Jacq., *Onobrychis viciifolia* Scop.

***Cryptocephalus octacosmus* Bedel, 1891**

Europe, Caucasus, Siberia, Kazakhstan/Rakovac (17. VI 2004), Popovica Lake (3. VI 2005), Ležimir (30. VI 2008), Čortanovci (1. VII 2008)/Eurosiberian chorotype; European chorotype/Rosaceae; *Crataegus laevigata* (Poir.) DC., *C. monogyna* Jacq., *Rosa canina* L.

***Cryptocephalus octomaculatus* Rossi, 1790**

Europe, Caucasus/Osovlje (27. VII 2005), Letenka (15. V 2007)/W Palaearctic chorotype; European chorotype/Betulaceae, Fagaceae; *Corylus avellana* L., *Quercus petraea* (Mattuschka) Liebl.

***Cryptocephalus schaefferi* Schrank, 1789**

C, S, E, SE Europe, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan; lives in hilly and mountainous areas/Čortanovci (6. IX 2002), Stražilovo (14. VII 2005), Rakovački Rit (21. IV 2008)/Eurasian chorotype; European chorotype/Betulaceae, Fagaceae, Rosaceae, Salicaceae; *Corylus* spp., *Crataegus monogyna* Jacq., *Fagus* spp., *Malus* spp., *Prunus* spp., *Quercus* spp., *Salix* spp.

***Cryptocephalus sericeus* (Linnaeus, 1758)**

Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, China/Ledinci (23. V 2002), Stražilovo (14. VII 2005), Direk (12. VI 2008), Paragovo (30. VI 2008), Grgeteg (4. VII 2008), Moharač Lake, Erdevik (13. VII 2010)/Eurasian chorotype; European chorotype/Asteraceae; *Carduus crispus* L., *Centaurea scabiosa* L., *Serratula tinctoria* L.

***Cryptocephalus sexpunctatus* (Linnaeus, 1758)**

Europe, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, Far East, Japan; inhabits hilly and mountainous regions/Stražilovo (24. VIII 2004), Iriški Venac (9. V 2006), Grgeteg (6. V 2008), Čortanovci (12. V 2009)/Eurosiberian chorotype; European chorotype/Betulaceae, Salicaceae; *Corylus avellana* L., *Populus tremula* L., *Salix alba* L., *S.* × *fragilis* L.

***Cryptocephalus strigosus* Germar, 1824**

C, S, E, SE Europe/Krušedol Monastery (12. VI 2009)/W Palaearctic chorotype; European chorotype/Rosaceae; *Rosa canina* L.

***Pachybrachis tessellatus* (Olivier, 1791)**

Europe, Asia Minor, Near East, Caucasus, Caspian Sea surrounding/Beočin (17. IX 2009), Krušedol Monastery (15. VI 2009)/Eurasian chorotype; European chorotype/Fagaceae; *Quercus petraea* (Mattuschka) Liebl, *Q. robur* L.

SUBFAMILY DONACIINAE

***Donacia marginata* Hoppe, 1795**

Europe, N Africa, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan, C Asia/Bruje Lake, Erdevik (14. VIII 2011)/Palaearctic chorotype; European chorotype/Cyperaceae, Iridaceae, Poaceae, Typhaceae; *Phragmites australis* (Cav.) Steud., *Sparganium erectum* L.

SUBFAMILY EUMOLPINAE

***Pales ulema* (Germar, 1813)**

C, S, SE Europe, Asia Minor/Erdevik (4. VII 2001), Osovlje (14. VI 2005), Popovica (24. V 2007), Stražilovo (14. VII 2007), Grgeteg (6. V 2008), Vorovo (9. V 2008), Glavica (6. V 2009)/W Palaearctic chorotype; European chorotype/Rosaceae; *Cornus mas* L., *Crataegus monogyna* Jacq. Larvae feed on roots of the plants.

Table 1. Continued.
Tablica 1. Nastavak.

SUBFAMILY GALERUCINAE
***Calomicrus circumfusus* (Marsham, 1802)**
Europe, N Africa, Asia Minor/Koševac (21. V 2009), Testera (18. V 2011)/W Palaearctic chorotype; European chorotype/Fabaceae; *Cytisus scoparius* (L.) Link, *Trifolium campestre* Schreb., *Vicia lathyroides* L.
***Euluperus major* Weise, 1886**
S, E, SE Europe, Asia Minor/Stražilovo (14. VII 2007), Beočin Monastery (28. IV 2009)/W Palaearctic chorotype; South European chorotype/Rosaceae; *Crataegus monogyna* Jacq., *Rosa canina* L.
***Galeruca rufa* Germar, 1824**
C, S, E, SE Europe, Asia Minor, Caucasus/Vorovo (27. IV 2006), Vrdnik (11. VI 2010)/W Palaearctic chorotype; European chorotype/Convolvulaceae; *Convolvulus arvensis* L.
***Galeruca tanaceti* (Linnaeus, 1758)**
Europe, Asia Minor, Caucasus, Siberia, Kazakhstan, C Asia, Mongolia, Far East, Japan; introduced to N America/Vrdnik (27. V 2003), Iriški Venac (1. VI 2003), Osovlje (2. VII 2007), Krčedin (18. X 2008)/Holarctic chorotype; European chorotype/Asteraceae, Brassicaceae, Caryophyllaceae, Plantaginaceae; *Achillea millefolium* L., *Cardamine pratensis* L., *Plantago major* L., *Sinapis arvensis* L., *Stellaria media* (L.) Vill. Sporadically occurs as a pest of some plant cultures (strawberries, herbs, spice plants) (Petrova *et al.* 2006; Roditakis & Roditakis 2006).
***Galerucella calmariensis* (Linnaeus, 1767)**
Europe, N Africa, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan, C Asia, Far East, China, Korea, Japan; introduced to N America/Krčedin (27. IV 2003), Rakovački Rit (21. IV 2008)/Holarctic chorotype; European chorotype/Lythraceae; *Lythrum salicaria* L.
***Galerucella lineola* (Fabricius, 1781)**
Europe, N Africa, Asia Minor, Near East, Caucasus, Siberia, Kazakhstan, C Asia, Far East, China, Japan/Rakovački Rit (21. IV 2008)/Palaearctic chorotype; European chorotype/Salicaceae; *Salix cinerea* L. Occurs as a pest of poplar and willow cultivars (Alford 2012).
SUBFAMILY HISPINAE
***Hispa atra* Linnaeus, 1767**
Europe, Asia Minor, Near East, Caucasus, C Asia, Mongolia, China/Andrevlje (5. VII 2011)/Eurasian chorotype; European chorotype/Poaceae; *Elytrigia repens* (L.) Nevski.
SUBFAMILY ORSODACNINAE
***Orsodacne cerasi* (Linnaeus, 1758)**
Europe, Asia Minor, Caucasus, Siberia, Kazakhstan/Grgeteg (19. IX 2003), Čortanovci (15. IV 2005), Popovica (19. V 2008), Vorovo (21. VIII 2008), Krčedin (12. V 2009)/Eurasian chorotype; European chorotype/Rosaceae; *Cornus sanguinea* L., *Filipendula ulmaria* (L.) Maxim., *Prunus avium* L., *Spiraea media* Schmidt. Imagoes eat pollen or flower parts, while larvae usually feed on leaves of plants.

linae are represented by 15 species from 2 genera (15.16%), Clytrinae include 13 species from 5 genera (13.13%), Cassidinae were present with 10 species from 3 genera (10.10%), Criocerinae contain 6 species from 4 genera (6.06%) and Galerucinae include 6 species from 4 genera (6.06%). Subfamilies Donaciinae, Eumolpinae, Hispinae and Orsodacninae are represented by one species each (1.01% each).

Leaf beetles were collected from 128 plant species from 84 genera and 26 families. Of these plants, 110 species from 69 genera and 19 families belong to class Magnoliopsida, while 18 species from 15 genera and 7 families are from class Liliopsida. From the total number of collected leaf beetles, 90 species from 35 genera and 9 subfamilies were caught on plants belonging to Magnoliopsida, and 9 species from 7 genera and 4 subfamilies were found on Liliopsida (Table 1).

Discussion
Rasprava

In relation to the results by Груев (1984, 1986), who last researched the Chrysomelidae fauna of Mt. Fruška Gora, a far greater number of species, genera and subfamilies were found in our research. Груев (1984, 1986) listed the existence of 51 species from 18 genera and 4 subfamilies. However, presence of 36 of these species (26 species of Alticinae, 3 species of Cassidinae and 7 species of Chrysomelinae) was not confirmed in our study. Together with Груев's results, leaf beetle fauna of Mt. Fruška Gora incorporates 135 species from 46 genera and 11 subfamilies. Fauna Europaea lists the species *Cryptocephalus decemmaculatus* (Linnaeus, 1758) as distributed within the territory of the former country Serbia and Montenegro, but without detailed information (Audisio 2013). Records of this species on Mt. Fruška Gora confirm its presence in Serbia.

The composition of the Chrysomelidae fauna of Mt. Fruška Gora is tightly linked with phytocenoses present in this region. Diversity of habitats and vegetation mostly influence those species that have specialized diets, but also to a lesser extent polyphagous species and those with ecological preferences (e.g., species that feed on aquatic plants). Due to high anthropogenic influence on Mt. Fruška Gora, many habitats are fragmented and leaf beetles are distributed somewhat mosaicly. Agricultural fields are, like isles, suitable for species that otherwise would not occur in the surrounding vegetation.

Among the leaf beetle species collected from Mt. Fruška Gora, a small number of them have an economic importance damaging agriculturally important plants. *Chaetocnema tibialis* (Illiger, 1807) is a pest of sugar beet (Nonveiller 1960; Sekulić *et al.* 2002). During this research on the southern slopes of Mt. Fruška Gora during spring imagines were seen to perforate leaves of sugar beet and spinach plants, usually in large numbers. *Gonioctena fornicata* (Brüggemann, 1873) occurs as a pest of certain fodder crops (György *et al.* 2007). Species was most often caught on *Medicago sativa* L. and *Trifolium pratense* L. *Leptinotarsa decemlineata* (Say, 1824) is a serious pest of *Solanum tuberosum* L. Widely distributed in the region of Vojvodina (Gavrilović & Ćurčić 2011), this species was regularly observed mostly on potatoes and other solanaceous plants (*Solanum* spp.). *Oulema melanopus* (Linnaeus, 1758) is a pest of cereals (Tanasković *et al.* 2012). It was found everywhere on Mt. Fruška Gora, doing most damage on fields of *Triticum aestivum* L., *Zea mays* L. and *Hordeum vulgare* L. *Lilioceris merdigera* (Linnaeus, 1758) occurred only locally on onions (*Allium cepa* L., *A. sativum* L.), damaging plant leaves only superficially.

Some species found during this study are known to occur as forest pests. *Altica quercetorum* Foudras, 1860 damages oak trees of different ages. Infestations have been recorded in central and southern parts of Serbia (Glavendekić 2000; Mihajlović 2008). *Chrysomela populi* Linnaeus, 1758 and *C. vigintipunctata* Scopoli, 1763 are one of the most important pests of poplar and willow cultivars in Serbia (Plavšić 1958). *Phratora vulgatissima* (Linnaeus, 1758) was observed damaging poplar sapling leaves in tree nurseries. *Lachnaia sexpunctata* (Scopoli, 1763) can inflict negligible damage to new buds and young leaves of *Quercus* spp., *Betula pendula* Roth, willows and poplars. *Galerucella lineola* (Fabricius, 1781) is a pest of willows, poplars, *Alnus* spp. and *Corylus* spp. This species normally feeds on plants from the family Salicaceae, but outbreaks or any significant damage to the trees were not observed (Mihajlović 2008).

A great number of the collected species have very wide distribution (Table 1). Most numerous are those whose distribution area encompass Eurasia to Himalayas. Among the analysed species, 11 of them belonging to Holarctic chorotype have an economic importance. Of these 11 species, 7 are treated as pests [*Lilioceris lilii* (Scopoli, 1763), *Oulema gallaeciana* (Heyden, 1879), *O. melanopus* (Linnaeus, 1758), *Phaedon cochleariae* (Fabricius, 1792), *Phratora vulgatissima* (Linnaeus, 1758), *Phyllotreta striolata* (Fabricius, 1803), *Galeruca tanaceti* (Linnaeus, 1758)], while 4 are used as biocontrol agents [*Aphthona flava* Guillebeau, 1894, *Cassida rubiginosa* Müller, 1776, *Galerucella calmariensis* (Linnaeus, 1767), *Gastrophysa polygoni* (Linnaeus, 1758)] in various biological control programs against weed plants (Lym 1998; Kok *et al.* 2000; Ulrich *et al.* 2004; Grevstad 2006; Petrova *et al.* 2006; Roditakis & Roditakis 2006; Majka & LeSage 2008; Lee *et al.* 2011).

Because of its height, Mt. Fruška Gora is a suitable habitat for species that prefer high altitude conditions of hilly and mountainous environments. Nine species found have such a preference (Table 1). Altitude and vegetation cover have a great impact on composition and distribution of leaf beetle fauna in such a way that this area is inhabited by certain hilly and mountainous species, but also the species characteristic to shrub-steppe ecosystems. Wetland vegetation that is distributed along the banks of the Danube River is populated by a specific leaf beetle fauna.

The species of Chrysomelidae identified from Mt. Fruška Gora are classified into 7 chorotypes of Holarctic (Eurasian, Palaearctic, West Palaearctic, Holarctic, Eurosiberian, Centralasian-Euro-Mediterranean and Euro-Mediterranean) and 3 chorotypes of Europe (European, Central European and South European). Two species have a subcosmopolitan distribution each [*Leptinotarsa decemlineata* (Say, 1824) and *Lilioceris merdigera* (Linnaeus, 1758)] (Table 1).

In the surveyed area elements of the leaf beetle fauna from different zoographical regions of Europe and Asia come into contact with each other and intertwine. Mt. Fruška Gora represents a northern extension of the Dinarides range, and is positioned in the southern part of the Pannonian Basin. The mountain is a transitional area where different regional relief characteristics, hydrological and climatological patterns combine (Ćurčić, 2007). Numerous species collected during this study typically occur in central and southern parts of Europe and the Mediterranean region. Typical Eastern European species were not found, but there are many species with the distribution in Asia that reach eastern parts of Europe and the Balkan Peninsula.

Conclusions
Zaključci

Number of species and genera of leaf beetles on Mt. Fruška Gora exceeds that found in the former studies. Subfamilies Chrysomelinae and Alticinae contain the greatest number

of species. On the basis of recent findings (Gavrilović & Ćurčić 2011, 2013; Stančić 2013), those numbers indicate that Mt. Fruška Gora is inhabited by around 32.5% of the species and 62% of the genera of leaf beetles known in Serbia.

The majority of leaf beetles found in our study were found to feed on primary host plants, while cases of allotrophy were rarely observed. Most were trophically associated with plants from class Magnoliopsida. Specialist herbivores are predominant among the presented species of leaf beetles, but food generalists are also numerous. Five agriculturally important species inhabit Mt. Fruška Gora. Six can be treated as forest pests. No major outbreaks of economically important species are known to have occurred during 11-year period of this study.

Most species found during the study have a wide distribution in Europe and can be included in the European chorotypes. Eurasian and West Palaearctic species are also quite common. Two species with subcosmopolitan distribution [*Leptinotarsa decemlineata* (Say, 1824) and *Lilioceris merdigera* (Linnaeus, 1758)] are treated as pests and have accidently been introduced to different parts of the world (Maican & Serafim 2004; Beenen 2005).

The first step in defining a biodiversity of one region includes identifying the composition of its flora and fauna and this study contributes to the knowledge of biodiversity of Mt. Fruška Gora. Biology of many species recorded in this study is poorly known, and identification of their host plants is the first stage in its understanding. Results of this study contribute to the faunistic knowledge of this diverse beetle family locally and in the region of Southeast Europe.

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References
Literatura

- Alford, D. V., 2012: Pests of Ornamental Trees, Shrubs and Flowers – A Color Handbook. Second Edition. Academic Press, 480 pp.
- Audisio, P., 2013: Fauna Europaea: Coleoptera 2 – Chrysomelidae. http://www.faunaeur.org/, Version 2.6.2, 29 August 2013. Cited 22 December 2013.
- Beenen, R., 2005: Translocation in leaf beetles (Coleoptera: Chrysomelidae). Bonner zoologische Beiträge, 54 (4): 179–199.
- Белова, Ю. Н., М. Н. Долганова, Н. С. Колесова, А. А. Шабунов, И. В. Филоненко, 2008: Разнообразие насекомых Вологодской области. Кафедра зоологии и экологии, Вологодский государственный педагогический университет, pp. 368, Вологда.
- Беньковский, А. О. 2011: Жуки-листоеды (Coleoptera, Chrysomelidae) Европейской части России. Lambert Academic Publishing, pp. 535., Saarbrucken.
- Bieńkowski, A. O., 2004: Leaf-Beetles (Coleoptera: Chrysomelidae) of the Eastern Europe. New Key to Subfamilies, Genera and Species. Mikron-print, pp. 278., Moscow.
- Ćurčić, S., 2007: Geografski položaj. In: Jovanović, N. (ed.), Fruška gora. Zavod za udžbenike i nastavna sredstva, pp. 11–17, Beograd.
- Debreuil, M., 2010: Les Clytrinae de France (Coleoptera, Chrysomelidae). Supplément, Rutilans, pp. 115, Villelongue-Dels-Monts.
- Farrell, B. D., A. S. Sequeira, 2004: Evolutionary rates in the adaptive radiation of beetles on plants. Evolution, 58 (9): 1984–2001.
- Gavrilović, B. D., S. B. Ćurčić, 2011: Diversity of species of the family Chrysomelidae (Insecta, Coleoptera) in Serbia, with an overview of previous researches. Acta zoologica bulgarica, 63 (3): 231–244.
- Gavrilović, B. D., S. B. Ćurčić, 2013: The diversity of the family Chrysomelidae (Insecta: Coleoptera) of the Obedska Bara Special Nature Reserve (Vojvodina Province, Serbia), with special reference to the host plants. Acta zoologica bulgarica, 65 (1): 37–44.
- Glavendekić, M. M., 2000: Beobachtungen bei einer Massenvermehrung des Eichenerdflohs, *Altica quercetorum* Foud. (Coleopt., Chrysomelidae) 1992 bis 1995 in Serbien. Journal of Pest Science, 73: 127–128.
- Grevstad, F. S., 2006: Ten-year impacts of the biological control agents *Galerucella pusilla* and *G. calmariensis* (Coleoptera: Chrysomelidae) on purple loosestrife (*Lythrum salicaria*) in Central New York State. Biological Control, 39: 1–8.
- Груев, Б. А., 1984: Листояди (Coleoptera, Chrysomelidae) от Фрушка гора (Войводина, СФР Югославия). Научни трудове, Пловдивски университет "Пасий Хилендарски" – Биология, 22 (2): 103–108.
- Груев, Б. А., 1986: Листояди (Coleoptera, Chrysomelidae) от Фрушка гора (Войводина, СФР Югославия) (2). Научни трудове, Пловдивски университет "Пасий Хилендарски" – Биология, 24 (1): 67–70.
- György, K., András, B., István, D., István, S., László, R., Erzsébet, K., László, I., Péter, S., T. Gábor, 2007: A lucerna védelme I. A lucerna kórtana, a gyökér és a lombozat állati kártevôi. Növényvédelem, 43 (4): 119–137.
- Heikertinger, F., 1951: Bestimmungstabellen europäischer Käfer (12. Stück). LXXXII. Fam. Chrysomelidae. 5. Subfam. Halticinae. Abteilung II. Bestimmungstabellen der paläarktischen Arten der Gattungen *Podagrica* Foudr., *Mantura* Steph. und *Chaetocnema* Steph. Koleopterologische Rundschau, 32 (1–3): 133–215.
- Josifović, M., 1970–1977: Flora SR Srbije 1–9. Srpska akademija nauka i umetnosti, Beograd.
- Jovanić, M., 1962: Prilog poznavanju štetne entomofaune na strnim žitima u Vojvodini. Agronomski glasnik (Novi Sad), 5–7: 458–466.
- Kok, L. T., T. J. McAvoy, W. T. Mays, 2000: Successful establishment of exotic agents for classical biological control of invasive

weeds in Virginia. In: Spencer, N. R. (ed.): Proceedings of the X International Symposium on Biological Control of Weeds. Montana State University, pp. 59–65, Bozeman.

- Lee, C. F., H. Y. Chang, C. L. Wang, W. S. Chen, 2011: A review of *Phyllotreta* Chevrolat in Taiwan (Coleoptera: Chrysomelidae: Galerucinae: Alticini). Zoological Studies, 50 (4): 525–533.
- Lehrman, A., M. Torp, J. A. Stenberg, R. Julkunen-Tiitto, C. Björkman, 2012: Estimating direct resistance in willows against a major insect pest, *Phratora vulgatissima*, by comparing life history traits. Entomologia Experimentalis et Applicata, 144 (1): 93–100.
- LeSage, L., E. J. Dobesberger, C. G. Majka, 2008: Introduced leaf beetles of the Maritime Provinces, 6. The common asparagus beetle, *Crioceris asparagi* (Linnaeus), and the twelve-spotted asparagus beetle, *Crioceris duodecimpunctata* (Linnaeus) (Coleoptera: Chrysomelidae). Proceedings of the Entomological Society of Washington, 110 (3): 602–621.
- Löbl, I., A. Smetana, 2010: Catalogue of Palaearctic Coleoptera, Vol. 6 – Chrysomeloidea. Apollo Books, Stenstrup, pp. 924.
- Lym, R. G., 1998: The biology and integrated management of leafy spurge (*Euphorbia esula*) on North Dakota rangeland. Weed Technology, 12: 367–373.
- Łuczak, I., 1992: Noxiousness of onion beetle (*Lilioceris merdigera* L.) to onion (*Allium cepa* L.). Folia Horticulturae, 4 (1): 83–93.
- Maican, S., R. Serafim, 2004: Leaf beetles (Coleoptera: Chrysomelidae) from Maramureş (Romania). Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa", 66: 139–159.
- Majka, C. G., L. LeSage, 2008: Introduced leaf beetles of the Maritime Provinces, 5. The lily leaf beetle, *Lilioceris lilii* (Scopoli) (Coleoptera: Chrysomelidae). Proceedings of the Entomological Society of Washington, 110 (1): 186–195.
- Mihajlović, Lj., 2008: Šumarska entomologija. Šumarski fakultet, Univerzitet u Beogradu, pp. 877, Beograd.
- Nonveiller, G., 1960: Štetni buvači kulturnog i drugog korisnog bilja Srbije. Posebna izdanja 10. Institut za zaštitu bilja, pp. 56, Beograd.
- Petrova, V., Z. Čudare, R. Cibuļskis, 2006: Predators and herbivore beetles (Coleoptera) naturally occurring on strawberry (Latvia). Acta Biologica Universitatis Daugavpiliensis, 6 (1–2): 155–159.
- Plavšić, V., 1958: Prilog poznavanju života i razvića velike topoline buba-listare (*Melasoma populi* L.). Topola, 2 (6): 463–468.
- Reid, C. A. M., 2000: Spilopyrinae Chapuis: a new subfamily in the Chrysomelidae and its systematic placement (Coleoptera). Invertebrate Taxonomy, 14 (6): 837–862.
- Roditakis, E., N. E. Roditakis, 2006: First record of *Galeruca tanaceti* in organic *Origanum vulgare* in Crete. Phytoparasitica, 34 (5): 486–487.
- Sarić, M. R., 1992: Flora Srbije 1. Srpska akademija nauka i umetnosti, pp. 429, Beograd.
- Sarić, M. R., N. Diklić, 1986: Flora SR Srbije 10. Srpska akademija nauka i umetnosti, pp. 400, Beograd.
- Seeno, T. N., J. A. Wilcox, 1982: Leaf Beetle Genera (Coleoptera: Chrysomelidae). Entomography Publications, pp. 221, Sacramento.
- Sekulić, R. G., A. N. Čačić, T. Kereši, Ž. Stojaković, 2002: Mogućnost suzbijanja repinog buvača (*Chaetocnema tibialis* Illig.) tretiranjem semena insekticidima. Zbornik radova Instituta za ratarstvo i povrtarstvo u Novom Sadu, 36: 25–32.
- Snare, L., 2006: Pest and Disease Analysis in Hazelnuts. Horticultural Australia Ltd., pp. 64, Sydney.
- Stančić, J., 2013: Tvrdokrilci (Insecta: Coleoptera) Ramsko-golubačke peščare (istočna Srbija). Acta entomologica serbica. Special Issue. Entomološko društvo Srbije, Beograd, pp. 488.
- Suzuki, K., 1996: Higher classification of the family Chrysomelidae (Coleoptera). Pp. 3–54. In: Jolivet, P. H., M. L. Cox (eds.): Chrysomelidae Biology, Vol. I. The Classification, Phylogeny and Genetics. SPB Academic Publishing BV, pp. 443, Amsterdam.
- Tanasković, S., M. Madić, D. Đurović, D. Knežević, F. Vukajlović, 2012: Susceptibility of cereal leaf beetle (*Oulema melanopa* L.) in winter wheat to various foliar insecticides in Western Serbia region. Romanian Agricultural Research, 29: 361–366.
- Tansey, J. A., L. M. Dosdall, B. A. Keddie, 2008: *Phyllotreta cruciferae* and *Phyllotreta striolata* responses to insecticidal seed treatments with different modes of action. Journal of Applied Entomology, 133 (3): 201–209.
- Uddin, M. M., C. Ulrichs, I. Mewis, 2008: *Phaedon cochleariae* (F.) performance on different crucifer varieties with different glucosinolate profiles. Communications in Agricultural and Applied Biological Sciences, 73 (3): 563–572.
- Ulrich, W., A. Czarnecki, T. Kruszyński, 2004: The occurrence of pest species of the genus *Oulema* (Coleoptera: Chrysomelidae) in cereal fields in Northern Poland. Electronic Journal of Polish Agricultural Universities, 7 (1): http://www.ejpau.media.pl/.
- Vigna Taglianti, A., P. A. Audisio, M. Biondi, M. A. Bologna, G. M. Carpaneto, A. De Biase, S. Fattorini, E. Piattella, R. Sindaco, A. Venchi, M. Zapparoli, 1999: A proposal for a chorotype classification of the Near East fauna, in the framework of the Western Palaearctic region. Biogeographia, 20: 31–59.
- Warchalowski, A., 2003: Chrysomelidae. The Leaf-Beetles of Europe and the Mediterranean Area. Natura Optima Dux Foundation, Warsaw, pp. 599.
- Winkelman, J., M. Debreuil, 2008: Les Chrysomelinae de France (Coleoptera, Chrysomelidae). Supplément, Rutilans, pp. 188., Villelongue-Dels-Monts.
- Živojinović, D., 1963: Prilog poznavanju štetne šumske entomofaune Deliblatskog peska. Zaštita bilja, 74 (14): 437–462.
- Živojinović, S., D. Tomić, 1956: Štetni insekti mekih lišćara. Zaštita bilja, 34: 1–22.

Sažetak

Zlatice (Chrysomelidae) za sada nisu dovoljno dobro proučene u Srbiji. Vrste ove obitelji istraživane su tijekom razdoblja od 11 godina (2001–2011) u zaštićenom području – Nacionalnom parku "Fruška gora". Planina Fruška gora je izolirana otočna planina u Panonskoj nizini, koju karakterizira kompleksni sklop šumskih, livadskih, žbunastih, travnatih, kultiviranih, močvarnih i vodenih fitocenoza. Kukci su prikupljeni sa 35 lokaliteta, odnosno različitih tipova staništa. Ukupno 99 vrsta zlatica iz 42 roda i 11 podobitelji identificirano je iz ovoga područja. Zajedno s rezultatima Grueva (1984, 1986), koji je vršio ranija istraživanja, fauna zlatica obuhvaća 135 vrsta iz 46 rodova i 11 podobitelji. Podobitelji Chrysomelinae i Alticinae obuhvaćaju najveći broj vrsta. Podaci o ishrani i biljkama hraniteljicama prikupljenih Chrysomelida dobiveni su na osnovi vlastitih zapažanja u prirodi. Zlatice su prikupljene sa 128 vrsta biljaka iz 84 roda i 26 obitelji. Većina je asocirana s biljkama klase Magnoliopsida. Gospodarski važne vrste zlatica (štetnici šuma i usjeva) identificirane su i kratko spomenute. Prema zoogeografskoj analizi registrirane vrste mogu se svrstati u sedam horotipova Holarktika i tri horotipa Europe. Velik broj vrsta ima široku distribuciju u Europi, ali su brojne i zapadnopalearktičke i euroazijske vrste. Zabilježeno je devet vrsta koje se tipično javljaju u brdsko-planinskim regijama.

KLJUČNE RIJEČI: Chrysomelidae, Srbija, bioraznolikost, trofičke asocijacije, distribucija