

Researches on leaf-beetles (Coleoptera: Chrysomelidae) in the black pine of Banat (*Pinus nigra banatica*) habitate and adjacent areas from the „Domogled-Valea Cernei” National Park (Romania)

Alexandru CRIȘAN

Summary

A research on leaf-beetles made in 2005 in the black pine of Banat habitate and adjacent areas in the Domogled-Valea Cernei National Park revealed the presence of 55 species from 22 genera and 8 subfamilies. The subfamilies Alticinae and Cryptocephalinae were the best represented, in accord with the habitate conditions. A serie of 13 species here registered are rare and endangered species, other species found only in that area the characteristical vegetal food species.

Rezumat

Cercetări asupra crizomelidelor (Coleoptera: Chrysomelidae) în habitatul pinului negru de Banat și ariile adiacente din cadrul Parcului Național „Domogled-Valea Cernei”

În urma unei investigații facute în 2005 în zona studiată, am identificat 55 de specii de crizomelide din 22 de genuri și 8 subfamiliile. Subfamiliile Alticinae și Cryptocephalinae au fost cel mai bine reprezentate, în acord cu condițiile de habitat oferite de această arie. Un număr de 13 specii dintre cele identificate sunt considerate rare și periclitate; alte specii găsesc doar în această zonă baza trofică caracteristică.

Keywords: leaf-beetles, black pine habitate, natural rezervation

The forests of the black pine of Banat (*Pinus nigra banatica*) from the „Domogled -Valea Cernei” National Park constitute a remarkable habitate which preserve this kind of black pine of community interest, according to 92/43/ EEC Directive. This was the reason we participate in a project concerning the long term preservation of this kind of habitate, context in which a well known of local flora and fauna constitute an essential previous element. In this project are included also our researches on the leaf-beetles (Coleoptera, Chrysomelidae) of this protected area.

Placed in the hydrographical Cerna's river basin, the „Domogled-Valea Cernei” National Park benefit by a submediterranean climate characterised by more abundant rainfall and a more risen relative humidity of the air, durring the whole year time. The temperatures registered in this area also enter in those characteristical to submediterranean climate. Consequence of this climate and also of the orography of the zone characterised by very tilted slopes with different cardinal orientations, having also different soils formed prevalent on limestones, the flora and the vegetation of the Park are very di-

verse and rich.

Concerning the black pine of Banat habitate, this includes mostly the Cerna's left side slopes along about 24 km upstream of Baile Herculane vilage, starting with the Domogled massif. The black pine habitate is very broken up in relative small forest troupes, scarce curdled, frequently situated in high areas, over 700 m altitude, on very inclined limestone walls that border Cerna valley. It insert beech forests or mixture forests, and also bush areas, pastures and haylands, as adjacent zones.

We mention that, although the area was well studied concerning other insect groups (RAKOSY, 1997), local data on leaf-beetles (Chrysomelidae) family are not known, according to the run through known litterature (FLECK, 1905; GRUEV & all. 1993; IENIȘTEA 1968, 1974; IENIȘTEA & NEGRU 1975; KONNERT-IONESCU 1963; MARCU 1927, 1928, 1936, 1957; NEGRU 1957; NEGRU & ROȘCA 1967; PANIN 1951; PETRI 1912; ROȘCA 1973, 1974, 1976; ILIE 2001; MAICAN & SERAFIM 2001; SEIDLITZ 1891; KONNERT-IONESCU 1963; SZEL & all. 1995; CRIȘAN 1993, 1994, 1995; CRIȘAN & TEODOR 1994, 1996; CRIȘAN & BO-

NEA 1995; CRIȘAN & DRUGUȘ 2001; CRIȘAN & all. 1998, 1999, 2000).

Material and method

Samples were taken separately in the period May-August, in the black pine troupes and the eco-systems of the adjacent areas, using an insect net, by sweeping the vegetation, both the trees, bushes and herbs. Collected insects were put on 80% alcohol and then its were kept dry. The identification of the species was made in the laboratory, using different sources of litterature (MOHR 1966; PANIN 1951; KASZAB 1962-1971; KIPPENBERG & DOBERL 1994; SCHAUFUSS 1915; ROZNER 1996; WARCHALOWSKI 1993).

Results and discussion

Black pine of Banat habitate in the „Domogled-Valea Cernei” National Park is very broken up,

pine constituting relative small forest troupes with relative rare trees, the most of these very old and relative few more yung or regeneratives. It has also other wooden species and herbal ones. To these, also adjacent areas were considered, so that it resulted a relative great biodiversity among the phitophagous fauna in which leaf-beetles are integrated too. We registered in the collected material at all of 55 species of leaf-beetles from 22 genera and 8 subfamilies (Table 1).

Iven only the black pine habitate and adjacent areas were analised, in the most part xerical areas excepting a few moist zones in the proximity of the streams, we consider that the biodiversity of the leaf-beetle group is a rising one, both reffering to the species and to the subfamilies and genera. This reflects although the area’s flora risen biodiversity in which elements characteristical to the East sub-

Table 1

List of the species of leaf-beetles registered in the black pine of Banat habitate and the adjacent areas from the „Domogled-Valea Cernei” National Park (Romania)

Crt. Nr.	Subfamily/ Species	Date of capture	Nr. Ind.	Abd. %	Colection habitate
I. Orsodacninae Thomson 1859					
1	<i>Orsodacne lineola</i> (Panzer 1795)	15.06	1	0,6	-Dom, glades, to a great altitude
II. Criocerinae Latreille 1807					
2	<i>Oulema (Oulema) melanopus</i> (Linnaeus 1758)	20.05	1	0,6	-Dom, lawn to a great altitude
3	<i>Lilioceris merdigera</i> (Linnaeus 1758)	15.06	2	1,2	-Dom, glade in a beech forest.
III. Clytrinae Kirby 1837					
4	<i>Smaragdina affinis</i> (Illiger 1794)	15.06	2	1,2	- Dom, glades, to a great altitude
5	<i>Smaragdina flavicollis</i> (Charpentier, 1825)	20.05	1	0,6	-Dom. bushes nearby pine forest
6	<i>Smaragdina salicina</i> (Scopoli 1763)	15.06	4	2,3	- Dom, glades, to a great altitude
7	<i>Coptocephala chalybaea</i> (Germar 1824)	15.06 15.06	4 1	2,3 06	-Dom, glades -V. Țăsnei, towards „Piatra Albă” peak
IV. Cryptocephalinae Gyllenhal 1813					
8	<i>Cryptocephalus (Burlinius) querceti</i> Suffrian 1848	15.06	1	0,6	-Dom, a glade to low altitude
9	<i>Cryptocephalus (Burlinius) vittula</i> Suffrian 1848	02.08	1	0,6	-Km.12, glades to 600 m altitude
10	<i>Cryptocephalus (Cryptocephalus) bipunctatus</i> (Linnaeus 1758)	15.06 15.06	3 2	1,8 1,2	- Dom, glades, to a great altitude -V. Țăsnei, poieni
11	<i>Cryptocephalus (Cryptocephalus) aureolus</i> Suffrian 1847	21.05	2	1,2	V. Țăsnei, herbous vegetation
12	<i>Cryptocephalus (Cryptocephalus) aureolus</i> Suffrian 1847, spp. <i>illiricus</i> Franz 1949	15.06	2	1,2	- Dom, glades, to a great altitude

13	<i>Cryptocephalus (Cryptocephalus) biguttatus</i> (Scopoli 1763)	15.06	4	2,3	- Dom, glades, to a great altitude
14	<i>Cryptocephalus (Cryptocephalus) turcicus</i> Suffrian 1847	15.06	1	0,6	- Dom, glades, to a great altitude
15	<i>Cryptocephalus (Cryptocephalus) flavipes</i> Fabricius 1781	15.06	9	5,1	- Dom, glades, to a great altitude
		21.05	3	1,8	-V.Țăsnei, herbous vrge-tation
16	<i>Cryptocephalus (Cryptocephalus) sericeus</i> Linnaeus 1758	29.07	1	0,6	-Șușcu, a glade on the peak
17	<i>Cryptocephalus (Cryptocephalus) moraei</i> (Linnaeus 1758)	29.07	4	2,3	- Șușcu, a glade on the peak
		29.07	3	1,8	-„Balta Cerbului”, pasture
		02.08	4	2,3	-Km.22, hay-land
18	<i>Cryptocephalus (Cryptocephalus) hypocheridis</i> (Linnaeus 1758)	15.06	1	0,6	-V.Țăsnei,hygrophile herbous vegetation
		02.08	1	0,6	-Km. 22, hay-land
19	<i>Cryptocephalus (Cryptocephalus) violaceus</i> Laicharting 1781	15.06	2	1,2	- Dom, glades, to a great altitude
V. Chrysomelinae Latreille 1802					
20	<i>Chrysolina (Fastuolina) fastuosa</i> (Scopoli 1763)	15.06	5	2,9	-Dom, bushes
		15.06	1	0,6	- Dom, glades, to a great altitude
21	<i>Chrysolina (Ovostoma) olivieri</i> (Bedel 1892)	15.06	2	1,2	-Dom, nearby a pine forest plot
22	<i>Chrysolina (Menthastriella) herbacea</i> (Duftschmid 1825)	21.05	4	2,3	-V.Țăsnei,hygrophile herbous vegetation
		15.06	2	1,2	-Dom, a glade to the massif base
23	<i>Gastrophysa polygoni</i> (Linnaeus 1758)	21.05	1	0,6	-V. Țăsnei, V. mouth
		15.06	4	2,3	- Dom, a glade to the massif base
		15.06	1	0,6	-„Mușuroane”, lawn
24	<i>Gastrophysa viridula</i> (De Geer 1775)	15.06	3	1,8	-Dom, bushes
25	<i>Linnaeidea (Linnaeidea) aenea</i> (Linnaeus 1758)	15-06	2	1,2	-Dom, bushes
26	<i>Gonioctena (Gonioctena) nivosus</i> Suffrian 1851	15.06	1	0,6	-Dom, bushes
27	<i>Gonioctena (Goniomena) pallida</i> (Linnaeus 1758)	15.05	1	0,6	-Dom, bushes
28	<i>Timarcha (Timarcha) rugulosa</i> Herri-ch-Schaeffer 1838	22.05	2	1,2	-V.Țăsnei,hygrophile herbous vegetation
		15.06	1	0,6	-Dom, bushes
VI. Galerucinae Latreille 1802					
29	<i>Galeruca (Galeruca) tanacetii</i> (Linnaeus 1758)	15.06	2	1,2	-Dom,beech forest edge
		15.06	2	1,2	-„Mușuroane”, lawn
30	<i>Lochmaea capreae</i> (Linnaeus 1758)	20.05	1	0,6	-Dom, inside a beech forest
VII. Alticinae Kutschera 1859					
31	<i>Aphthona euphorbiae</i> (Schrank 1781)	21.05	1	0,6	-V.Țăsnei,hygrophile herbous vegetation
32	<i>Aphthona venustula</i> (Kutschera 1861)	21.05	7	4,0	-V.Țăsnei, on herbs
		20.05	4	2,3	-Dom, glades
33	<i>Aphthona abdominalis</i> (Duftschmid 1825)	21.05	1	0,6	-V.Țăsnei, on herbs
34	<i>Aphthona stussineri</i> Weise 1888	20.05	10	5,9	-Dom, glades
		15.06	1	0,6	-V.Țăsnei, on herbs

35	<i>Aphthona cyparissiae</i> (Koch 1803)	29.07	1	0,6	-„Șușcu”, a glade on the peak
36	<i>Longitarsus (Testergus) anchusae</i> Paykull 1799	20.05	1	0,6	- Dom, glades, to a great altitude
37	<i>Longitarsus (Longitarsus) jacobaeae</i> (Waterhouse 1858)	29.07	1	0,6	-„Șușcu”, a glade on the peak
38	<i>Longitarsus (Longitarsus) pellucidus</i> (Foudras 1860)	29.07	1	0,6	-Șușcu, a glade on the peak
39	<i>Longitarsus (Longitarsus) pallidicornis</i> (Kutschera 1863)	02.08	3	1,8	-Km.22, hay-lands to 600 m altitude
40	<i>Longitarsus (Longitarsus) pulmonariae</i> Weise 1893	15.06	2	1,2	-V. Țăsnei, towards „Piatra Albă” peak
		03.08	1	0,6	-Km. 22, a lawn towards Grovu Mare
41	<i>Longitarsus (Longitarsus) rubellus</i> (Foudras 1860)	15.06	1	0,6	-„Mușuroane”, a mezo-philous lawn
42	<i>Batophila fallax</i> Weise 1888	20.05	2	1,2	-Dom, bushes
43	<i>Asiorestia ferruginea</i> (Scopoli 1763)	15.06	9	5,3	-Dom, lawns
		15.06	3	1,8	-V.Țăsnei, on herbs
44	<i>Asiorestia transsylvanica</i> Fuss 1864	15.06	1	0,6	-Dom, a glade
45	<i>Derocrepis rufipes</i> (Linnaeus 1761)	20.05	2	1,2	-Dom,on <i>Cytissus sp.</i> (Fabaceae)
46	<i>Crepidodera nitidula</i> (Linnaeus 1758)	20.05	1	0,6	-Dom, inside a beech forest
47	<i>Crepidodera aurata</i> (Marsham 1802)	20.05	11	6,5	- Dom, Dom, inside a beech forest
48	<i>Chaetocnema (Tlanoma) heikertingeri</i> Ljubischev 1965	20.05	1	0,6	- Dom, glades, to a great altitude
49	<i>Dibolia (Dibolia)foersteri</i> Bach 1859	20.05	1	0,6	-Dom, a lawn
50	<i>Dibolia (Eudibolia) femoralis</i> Redtenbacher 1849	15.06	1	0,6	-„Mușuroane”, a mezo-philous lawn
VIII. Cassidinae Gyllenhal 1813					
51	<i>Cassida (Odontionycha) viridis</i> Linnaeus 1758	21.05	5	2,9	-V.Țăsnei, on herbs
		15.06	2	1,2	-Dom, bushes
52	<i>Cassida (Cassida) vibex</i> Linnaeus 1767	15.06	1	0,6	-Dom, bushes
53	<i>Cassida (Cassida) sanguinolenta</i> O.F. Muller 1776	15.06	1	0,6	-Dom, a glade
54	<i>Cassida (Cassida) nebulosa</i> Linnaeus 1758	21.05	1	0,6	-V.Țăsnei, herbous hygrophile vegetation
55	<i>Cassida (Cassida) lineola</i> Creutzer 1799	15.06	2	1,2	-„Mușuroane”, a mezo-philous lawn

Abbreviations: Nr. ind. – number of individuals; Abd-abundance; Dom.- Domogled; V.-valley

mediterranean zone mix with elements characteristic to temperate-continental zone.

The black pine habitats occupying xerical areas, with dominant South-Westical tilted slopes on limestone substrate, its conditions are good reflected in the compositional structure of leaf-beetles here registered, in which xerical species, as are that of Cryptocephalinae subfamily and a great part of Alticinae subfamily, are dominant both in number of species and in individuals (Fig. 1, Fig. 2).

The presence of any other leaf-beetle subfamilies is related with the microhabitate conditions, very varied, that the tilted pine habitats offers to a

great scale of plants that constitute food for different leaf-beetle species. This explains the presence of any species of Chrysomelinae and Cassidinae subfamilies, especially in the moist zones neighboring the streams, so that of any species of Clytrinae and Chrysomelinae subfamilies characteristic to wooden vegetation that integrate the black pine groups.

A series of registered species as: *Coptocephala chalybaea*, *Cryptocephalus aureolus ssp. iliricus*, *Cryptocephalus turcicus*, *Chrysolina oliveri*, *Gonioctena nivosus*, *Gonioctena pallida*, *Aphthona abdominalis*, *Derocrepis rufipes*, *Crepidodera niti-*

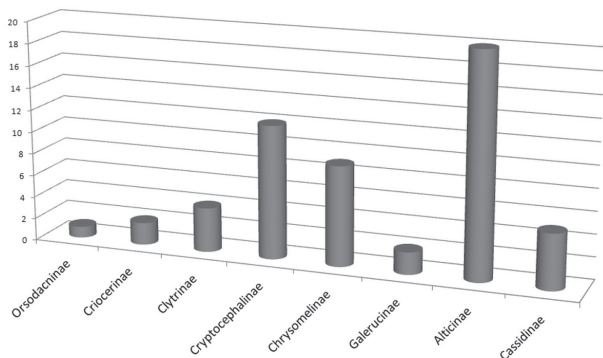


Fig. 1. Diagram of the number of species in each leaf-beetles' identified subfamily in the pine habitat and adjacent areas of the "Domogled -Valea Cernei" National Park.

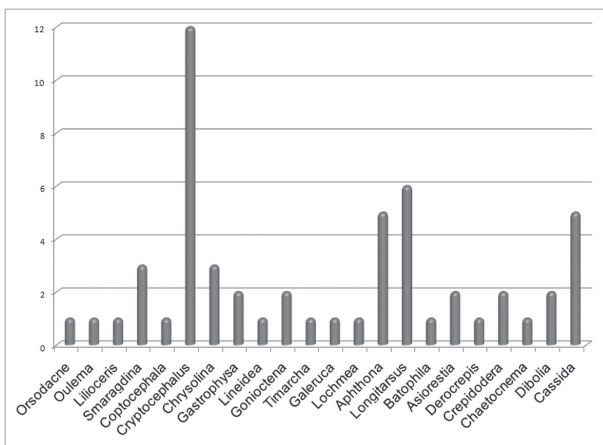


Fig.2. Diagram of the number of leaf-beetle species in each identified genus in the pine habitat and adjacent areas of the "Domogled-Valea Cernei" National Park.

dula, *Dibolia foersteri*, *Dibolia femoralis*, *Cassida lineola*, are rare, with a status of endangered species, although some of these (ex. *Derocrepis rufipes* oligophagous on *Cytisus* species) found only in this zone the characteristic vegetal food species.

These considerations recommend "Domogled-Valea Cernei" National Park as an area of natural protection for these leaf-beetle species.

REFERENCES

CRÎȘAN A. 1993a. Date asupra familiei Chrysomelidae (Coleoptera) în partea sudică a Deltei Dunării, An. șt. Inst. Tulcea: 67-74.

CRÎȘAN A. 1993b. Cercetări faunistice și ecologice asupra familiei Chrysomelidae (Coleoptera) în Cheile Turzii în 1992, Studia Univ. "Babeș-Bolyai", Biol. **38**(1-2): 59-67.

CRÎȘAN A. & TEODOR L. 1994. Researches on leaf-beetles (Coleoptera, Chrysomelidae) in "Scărița Belioara" Botanical Reservation, Bul.inf. Soc. lepid.rom, **7**(3-4): 255-260.

CRÎȘAN A. 1995. Cercetări asupra familiei Chrysomeli-

dae (Coleoptera) în Rezervația Biosferei "Delta Dunării", cu referire specială la *Stylosomus tamaricis* H-Schaeff. și *Cryptocephalus gamma* H-Schaeff, Bul.inf. Soc.lepid.rom. **6**(1-2): 145-149.

CRÎȘAN A. & BONEA V. 1995. Studiu faunistic asupra crizomelidelor (Coleoptera, Chrysomelidae) din zona Arcalia, (Jud. Bistrița-Năsăud), Bul. inf. Soc.lepid. rom, **6**(3-4): 305-317.

CRÎȘAN A. & DRUGUȘ M. 2001. Studiul faunistic și ecologic al crizomelidelor (Coleoptera, Chrysomelidae) din zona de confluență a Târnavelor, Bul.inf. Soc.lepid.rom. **12**(1-4), 191-200.

CRÎȘAN A. & TEODOR L. 1996a. Researches on leaf-beetles (Coleoptera: Chrysomelidae) in "Scarita-Belioara" Botanical Reservation", Bul.inf. Soc. lepid.rom, **7**(3-4): 255-260.

CRÎȘAN A. & TEODOR L. 1996b. Researches on Chrysomelidae (Coleoptera) fauna in "Cheile Turului" in 1995", Stud. Univ. "Babeș-Bolyai", Biol, **41**(1-2): 65-72.

CRÎȘAN A, POPA V, TEODOR L. 1998. Leaf-beetles (Coleoptera: Chrysomelidae) from the area "Cheile Someșului Cald- Ic Ponor", Romania, Bul.inf. Soc.lepid.rom, **9**(1-2): 127-132.

CRÎȘAN A, POPA V, TEODOR L. 1999. Studies on leaf-beetle fauna (Coleoptera: Chrysomelidae) in "Someșului Cald Gorges" area, Romania, Bul. inf. Soc.lepid.rom, **10**(1-4): 131-135.

CRÎȘAN A, TEODOR L. A, NISTOR L. 2000. Data on leaf-beetle fauna (Coleoptera: Chrysomelidae) in the North- West Transylvania (Romania), Bul. inf. Soc.lepid.rom, **11**(1-4): 111- 115.

GRUEV P, MERKL O, VIG K. 1993. Geographical distribution of Halticinae (Coleoptera, Chrysomelidae) in Romania, Ann. Hist. Nat. Mus. Hung, **85**: 75-132.

IENIȘTEA M. A. 1968. L'entomofaune de l île de Letea (Delta du Danube), ord. Coleoptera (pars), Trav. Mus. Hist. Nat. "Gr. Antipa", **8**: 81-93.

IENIȘTEA M. A. 1974. Contribution a la connaissance des coleopteres du Delta du Danube (la "grind" Caraorman), Trav. Mus. Hist. Nat. "Gr. Antipa", **14**: 239-249.

IENIȘTEA M. A, NEGRU Ș. 1975. Coleoptera, in Seria monografică "Porțile de Fier", Ed. Acad.Rom, București, pp. 193-214.

ILIE A. L. 2001. Cercetări privind fauna de crizomelide (Coleoptera, Chrysomelidae) din municipiul Craiova și împrejurimi, Bul.inf. Soc.lepid.rom, **12**, (1-4): 201-208.

KASZAB Z. 1962-1971. Magyarország állatvilága, Bogarak IV/B (Fauna Hungariae, Coleoptera IV/B), Akadémiai Kiadó, Budapest

KIPPENBERG H, DOBERL M. 1994 Familie Chrysomelidae, in Die Kafer Mitteleuropas, Supplement-

- band, Lohse G.A. and Lucht W.H. eds, Krefeld pp. 1-142
- KONNERT-IONESCU A. 1963. Halticinae recorded from Romania till 1961, Trav. Mus. Hist. Nat. "Gr. Antipa", **4**: 251-268.
- MARCU O. 1927. Neue Coleopteren aus der Bucovina, Bul. Fac. Șt. Cernăuți, **1**(2): 413-423.
- MARCU O. 1928. Beiträge zur Coleopterenfauna der Bucovina, Bull. Sci. Ec. Polytech, Timișoara: 4-11.
- MARCU O. 1931. Neue kaferformen aus Rumanien, Zur Coleopterenfauna der Bucovina, Bul. Sect. Sci, Acad. Roum, **9-10**: 1-10.
- MARCU O. 1933. Coleopterenfauna aus der Bucovina, Bull. Sect. Sci, Acad. Roum, **78**: 1-6.
- MARCU O. 1936. Coleopterenfunde aus der Bucovina, Bull. Sect. Sci. Acad. Roum, **16**: 1-6.
- MARCU O. 1957. Contribuții la cunoașterea faunei Coleopterelor Transilvaniei, Bul. Univ. "V. Babeș" și "Bolyai", Ser. Șt. nat, **1**(1-2): 527- 544.
- MOHR K. H. 1966. Chrysomelidae, in Freude H, Harde K.W, and Lohse G.A. (eds.) Die Käfer Mitteleuropas, Goeke und Evers-Krefeld, Zurich, 95-299.
- NEGRU Ș. 1957. Contribuțiune la cunoașterea Faunei colepterologice a Mangaliei și împrejurimilor ei, Ann. Univ. "C. I. Parhon", Ser. Șt. nat, **165**: 117- 130.
- NEGRU Ș, ROȘCA A. 1967. L' entomofaune des forets du Sud de la Doubroudja, ord. Coleoptera (pars), Trav. Mus. Hist. Nat. "Gr. Antipa", **7**: 119-145.
- PANIN S. 1951. Determinatorul coleopterelor dăunătoare și folositoare din R. P. Română, Ed. lit. șt. did. București, pp. 126-150.
- PETRI K. 1912. Siebenburgens Kaferfauna auf Grund ihrer Erforschung bis zum Jahre 1911, Buchdruckerei Jus. Drotleff, Hermannstadt, pp. 253-286.
- ROȘCA A. 1973. Contributions a la connaissance du genre *Cryptocephalus* Foucr. (Coleoptera, Chrysomelidae) en Roumanie, Trav. Mus. Hist. Nat. "Gr. Antipa", **13**: 143-154.
- ROȘCA A. 1974. Contributions a la connaissance du genre *Chrysomela* L. (Coleoptera, Chrysomelidae) en Roumanie, Trav. Mus. Hist. Nat. "Gr. Antipa", **14**: 250-259.
- ROȘCA A. 1976. L' entomofaune du Nord de la Dobrogea, la zone Măcin – Tulcea- Niculițel, ord. Coleoptera (pars), Trav. Mus. Hist. Nat. "Gr. Antipa", **17**: 145-152
- ROZNER I. 1996. An update list of the Chrysomelidae of Hungary and the adjoining parts of the Carpathian Basin (Coleoptera), Folia Entomol. Hung, **57**: 234-260.
- SEIDLITZ G. 1891. Fauna Transsylvanica, die Käfer (Coleoptera) Siebenburgens, Hartungsche Verlagsdruckerei, Königsberg, pp. 753-823.
- SZEL G, ROZNER I, KOCS I. 1995. Contribuții la cunoașterea coleopterelor din Transilvania (România) pe baza colectărilor din ultimii ani, Acta Muz. Secuiesc al Ciucului, Muz. Naț. Secuiesc: 73-92.
- WARCHALOWSKI A, (1993) Fauna Polski- Fauna Poloniae- Chrysomelidae (Coleoptera, Insecta), Tom. 15, Pol. Akad. Nauk, Warszawa pp. 2-278

Alexandru CRIȘAN
 Universitatea "Babeș-Bolyai",
 Catedra de Taxonomie și Ecologie,
 str. Clinicilor, 5-7, 400006, Cluj Napoca

Received: 14.01.2007
 Accepted: 16.01.2007
 Printed: 24.12.2007