

RESEARCHES ON THE TROPHIC RELATIONSHIPS OF CHRYSOMELIDAE (COLEOPTERA) FROM ROMANIA

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Abstract. This paper is a synthesis on the trophic relationships (host plants, anthophagy, coprophagy, cannibalism) of Chrysomelidae (Coleoptera) from Romania. Some data are new and have never been published in scientific literature, other data corroborate the discoveries recorded by different entomologists and some data invalidate some former researches. Coprophagy and the cannibalism are extremely rare in Chrysomelidae. Observations of host plants are recorded for 49 species of Chrysomelidae, belonging to 6 subfamilies and 26 genera. The Poaceae are mostly utilized as a source of pollen.

Keywords: host plants, anthophagy, coprophagy, cannibalism, Chrysomelidae.

Rezumat. Cercetări asupra relațiilor trofice ale crisomelidelor (Coleoptera) din România. Lucrarea este o sinteză asupra relațiilor trofice (plante gazdă, antofagia, coprofagia, canibalism) ale crisomelidelor (Coleoptera) din România. Unele date sunt noi, nefiind publicate în literatura științifică, alte date coroborează descoperirile realizate de diverși entomologi și alte date invalidează cercetările anterioare. Coprofagia și canibalismul sunt extrem de rare la crisomelide. Sunt înregistrate observații ale plantelor gazdă pentru 49 specii de crisomelide, aparținând la 6 subfamilii și 26 genuri. Poaceele sunt cele mai utilizate surse de polen.

Cuvinte cheie: plante gazdă, antofagie, coprofagie, canibalism, Chrysomelidae.

INTRODUCTION

Due to the predominantly phytophagous feeding type, chrysomelids represent important links of the trophic chains. Works on the host plants of Chrysomelidae are numerous, but synthesis works presenting secondary or accidental host plants as well as anthophagy, coprophagy or cannibalism in the entire Chrysomelidae family are few (JOLIVET & HAWKESWOOD, 1995; JOLIVET, 1996; BIENKOWSKY, 2010; ILIE et al., 2019).

Anthophagy is a rare phenomenon, coprophagy and cannibalism are extremely rare phenomenon in chrysomelids. The paper provides new trophic information regarding chrysomelids from Romania (host plants, anthophagy, coprophagy and cannibalism), being a complement to the work previously developed by the authors (ILIE et al., 2019).

MATERIAL AND METHODS

The observations were recorded during 1998 – 2022 in two regions: Oltenia (south – western part of Romania) and Bihor county (north – western part of Romania).

The species were collected with the entomological net. For the determination of the species (chrysomelids, plants) different guides were used (SÂRBU et al., 2013; WARCHALOWSKY, 2003).

RESULTS AND DISCUSSIONS

The following observations were recorded during the analysed period (Table 1):

Table 1. Host-plants of Chrysomelidae recorded in different parts of Romania (original).

Species	New host plants (accidental or secondary host plants)	Attacked organ
Criocerinae subfamily Latreille, 1807		
<i>Lilioceris lili</i> Scopoli, 1763	<i>Solanum dulcamara</i> Linnaeus, 1753 (Solanaceae) <i>Solanum nigrum</i> Linnaeus, 1753 (Solanaceae)	Leaf Leaf
Cryptocephalinae subfamily Gyllenhal, 1813		
<i>Smaragdina salicina</i> Scopoli, 1763	<i>Pyrus pyraeaster</i> Linnaeus, 1753 (Rosaceae) <i>Crataegus monogyna</i> Jacquard, 1775 (Rosaceae) <i>Sarothamnus scoparius</i> Linnaeus, 1753 (Fabaceae) <i>Chamaecytisus albus</i> Rothmans, 1830 (Fabaceae) <i>Lotus corniculatus</i> Linnaeus, 1753 (Fabaceae) <i>Melilotus albus</i> Medik, 1793 (Fabaceae) <i>Quercus cerris</i> Linnaeus, 1753 (Fagaceae) <i>Quercus frainetto</i> Ten, 1813 (Fagaceae) <i>Bromus arvensis</i> Linnaeus, 1753 (Poaceae)	Leaf Leaf Leaf Leaf Leaf Leaf Leaf Leaf Leaf
<i>Smaragdina xanthaspis</i> Germar, 1824	<i>Agrostis stolonifera</i> Linnaeus, 1753 (Poaceae) <i>Phleum phleoides</i> Linnaeus, 1753 (Poaceae) <i>Dactylis glomerata</i> Linnaeus, 1753 (Poaceae)	Leaf Leaf Leaf
<i>Smaragdina aurita</i> Linnaeus, 1767	<i>Lotus corniculatus</i> Linnaeus, 1753 (Fabaceae)	Leaf

<i>Smaragdina affinis</i> Illiger, 1794	<i>Lotus corniculatus</i> Linnaeus, 1753 (Fabaceae)	Leaf
<i>Clytra laeviuscula</i> Ratzeburg, 1837	<i>Capsella bursa-pastoris</i> Linnaeus, 1753 (Brassicaceae)	Leaf
	<i>Bromus arvensis</i> Linnaeus, 1753 (Poaceae)	Pollen
	<i>Vicia angustifolia</i> Linnaeus, 1753 (Fabaceae)	Leaf
	<i>Cerasus vulgaris</i> Linnaeus, 1753 (Rosaceae)	Leaf
	<i>Rubus idaeus</i> Linnaeus, 1753 (Rosaceae)	Leaf
	<i>Prunus domestica</i> Linnaeus, 1753 (Rosaceae)	Leaf
	<i>Prunus spinosa</i> Linnaeus, 1753 (Rosaceae)	Leaf
<i>Labidostomis longimana</i> Linnaeus, 1761	<i>Agropyron cristatum</i> Linnaeus, 1753 (Poaceae)	Pollen
	<i>Agropyron repens</i> Linnaeus, 1753 (Poaceae)	Pollen
<i>Labidostomis tridentata</i> Linnaeus, 1761	<i>Crataegus monogyna</i> Jacquard, 1775 (Rosaceae)	Pollen
<i>Cryptocephalus vittula</i> Suffrian, 1848	<i>Quercus cerris</i> Linnaeus, 1753 (Fagaceae)	Leaf, Gemma
<i>Cryptocephalus moraei</i> Linnaeus, 1758	<i>Malva rotundifolia</i> Linnaeus, 1753 (Malvaceae)	Leaf
	<i>Agrostis stolonifera</i> Linnaeus, 1753 (Poaceae)	Pollen
	<i>Deschampsia cespitosa</i> Linnaeus, 1753 (Poaceae)	Pollen
	<i>Dactylis glomerata</i> Linnaeus, 1753 (Poaceae)	Pollen
<i>Cryptocephalus octacosmus</i> Bedel, 1891	<i>Sonchus arvensis</i> Linnaeus, 1753 (Asteraceae)	Leaf
<i>Cryptocephalus sericeus</i> Linnaeus, 1758	<i>Mentha</i> sp. Linnaeus, 1753 (Lamiaceae)	Pollen
Chrysomelinae subfamily Latreille, 1802		
<i>Chrysolina coerulans</i> Scriba, 1791	<i>Salix fragilis</i> Linnaeus, 1753 (Salicaceae)	Leaf
<i>Chrysolina sturmi</i> Westhoff, 1882	<i>Digitaria sanguinalis</i> Linnaeus, 1753 (Poaceae)	Pollen
<i>Chrysolina haemoptera</i> Linnaeus, 1758	<i>Glechoma hederacea</i> Linnaeus, 1753 (Lamiaceae)	Leaf
	<i>Agrostis stolonifera</i> Linnaeus, 1753 (Poaceae)	Seeds
<i>Chrysolina herbacea</i> Duftschmid, 1825	<i>Lycopus exaltatus</i> Linnaeus, 1753 (Lamiaceae)	Leaf
	<i>Dryopteris filix mas</i> Schott, 1796 (Polypodiaceae)	Leaf
	<i>Cirsium arvense</i> Linnaeus, 1753 (Asteraceae)	Leaf
	<i>Chenopodium album</i> Linnaeus, 1753 (Chenopodiaceae) - only in captivity	Leaf
<i>Chrysolina fastuosa</i> Scopoli, 1763	<i>Symphytum officinale</i> Linnaeus, 1753 (Boraginaceae)	Leaf
	<i>Erigeron annuus</i> Linnaeus, 1753 (Asteraceae)	Leaf
	<i>Rumex conglomeratus</i> Murray, 1770 (Polygonaceae)	Leaf
<i>Chrysolina gypsophilae</i> Kuster, 1845	<i>Lamium album</i> Linnaeus, 1753 (Lamiaceae)	Leaf
<i>Chrysolina sanguinolenta</i> Linnaeus, 1758	<i>Bellis perennis</i> Linnaeus, 1753 (Asteraceae)	Pollen
<i>Chrysolina aurichalcea</i> ssp. <i>bohemica</i> Muller, 1948	<i>Digitaria sanguinalis</i> Linnaeus, 1753 (Poaceae)	Pollen
<i>Chrysomela populi</i> Linnaeus, 1758	<i>Xanthium italicum</i> Moretti, 1822 (Asteraceae)	Leaf
<i>Entomoscelis adonidis</i> Pallas, 1771	<i>Robinia pseudoacacia</i> Linnaeus, 1753 (Fabaceae)	Leaf
<i>Phaedon laevigatus</i> Duftschmid, 1825	<i>Thalictrum minus</i> Linnaeus, 1753 (Ranunculaceae)	Leaf
<i>Gonioctena fornicata</i> Bruggemann, 1873	<i>Veronica urticifolia</i> Jacquard, 1775 (Scrophulariaceae)	Leaf
	<i>Rumex acetosa</i> Linnaeus, 1753 (Polygonaceae)	Leaf
Galerucinae subfamily Latreille, 1802		
<i>Galeruca pomonae</i> Scopoli, 1762	<i>Prunus domestica</i> Linnaeus, 1753 – seedling (Rosaceae)	Leaf
<i>Diabrotica virgifera</i> Le Conte, 1898	<i>Rosa chinensis</i> Jacquard, 1775 (Rosaceae)	Pollen
	<i>Chrysanthemum vulgare</i> Linnaeus, 1753 (Asteraceae)	Pollen
<i>Phyllobrotica adusta</i> Creutzer, 1795	<i>Lamium album</i> Linnaeus, 1753 (Lamiaceae)	Leaf
<i>Luperus xanthopoda</i> Schrank, 1781	<i>Pyrus pyraster</i> Linnaeus, 1753 (Rosaceae)	Leaf
	<i>Prunus spinosa</i> Linnaeus, 1753 (Rosaceae)	Leaf
	<i>Malus domestica</i> Linnaeus, 1753 (Rosaceae)	Leaf
	<i>Hordeum murinum</i> Linnaeus, 1753 (Poaceae)	Pollen
<i>Galeruca tanacetii</i> Linnaeus, 1758	<i>Plantago lanceolata</i> Linnaeus, 1753 (Plantaginaceae)	Leaf
	<i>Lilium candidum</i> Linnaeus, 1753 (Liliaceae)	Leaf
Alticinae subfamily Kutschera, 1859		
<i>Altica oleracea</i> Linnaeus, 1758	<i>Lythrum salicaria</i> Linnaeus, 1753 (Lythraceae)	Leaf
	<i>Armoracia rusticana</i> Gaertner, 1848 (Brassicaceae)	Leaf
	<i>Rosa chinensis</i> Jacquard, 1775 (Rosaceae)	Pollen, Flower (Petal)
	<i>Polygonum amphibium</i> f. <i>terrestre</i> Leys, 1765 (Polygonaceae)	Leaf
	<i>Brassica rapa</i> Linnaeus, 1753 (Brassicaceae)	Leaf
	<i>Erigeron annuus</i> Linnaeus, 1753 (Asteraceae)	Leaf
	<i>Trifolium pratense</i> Linnaeus, 1753 (Fabaceae)	Leaf
	<i>Rubus caesius</i> Linnaeus, 1753 (Rosaceae)	Leaf
	<i>Triticum aestivum</i> Linnaeus, 1753 (Poaceae)	Leaf
	<i>Geranium phaeum</i> Linnaeus, 1753 (Geraniaceae)	Leaf
	<i>Prunella vulgaris</i> Linnaeus, 1753 (Lamiaceae)	Leaf
	<i>Lilium candidum</i> Linnaeus, 1753 (Liliaceae)	Leaf
	<i>Chenopodium album</i> Linnaeus, 1753 (Chenopodiaceae)	Leaf
	<i>Kochia tricophylla</i> Linnaeus, 1753	Pollen
	<i>Amaranthus retroflexus</i> Linnaeus, 1753 (Amaranthaceae)	Pollen
	<i>Juncus tenuis</i> Wild, 1865 (Juncaceae)	Pollen
	<i>Medicago sativa</i> Linnaeus, 1753 (Fabaceae)	Pollen, Petals
	<i>Convolvulus arvensis</i> Linnaeus, 1753 (Convolvulaceae)	Petals
	<i>Ipomoea purpurea</i> Linnaeus, 1753 (Convolvulaceae)	Seeds
	<i>Anthoxanthum odoratum</i> Linnaeus, 1753 (Poaceae)	Seeds

	<i>Agrostis stolonifera</i> Linnaeus, 1753 (Poaceae)	Leaf
	<i>Lamium purpureum</i> Linnaeus, 1753 (Lamiaceae)	
<i>Phyllotreta vittula</i> Redtenbacher, 1849	<i>Agropyron repens</i> Linnaeus, 1753 (Poaceae) <i>Setaria viridis</i> Linnaeus, 1753 (Poaceae) <i>Triticum aestivum</i> Linnaeus, 1753 (Poaceae) <i>Medicago sativa</i> Linnaeus, 1753 (Fabaceae)	Pollen Pollen Pollen Pollen
<i>Phyllotreta nemorum</i> Linnaeus, 1758	<i>Quercus frainetto</i> Ten, 1813 (Fagaceae) – seedling <i>Asclepias syriaca</i> Linnaeus, 1753	Leaf Leaf
<i>Phyllotreta armoraciae</i> Koch, 1803	<i>Sisymbrium officinale</i> Scopoli, 1763 (Brassicaceae)	Leaf
<i>Dibolia timida</i> Illiger, 1807	<i>Rosa chinensis</i> Jacquard, 1775 (Rosaceae)	Petal
<i>Aphthona venustula</i> Kutschera, 1861	<i>Juncus effusus</i> Linnaeus, 1753 (Juncaceae)	Pollen
<i>Sphaeroderma testaceum</i> Fabricius, 1775	<i>Kochia scoparia</i> Linnaeus, 1753 (Chenopodiaceae)	Pollen
<i>Chaetocnema concinna</i> Marsham, 1802	<i>Vitis vinifera</i> Linnaeus, 1753 (Vitaceae)	Leaf
<i>Longitarsus minusculus</i> Foudras, 1860	<i>Stellaria nemorum</i> Linnaeus, 1753 (Caryophyllaceae)	Leaf
<i>Longitarsus melanocephalus</i> De Geer, 1775	<i>Ballota nigra</i> Linnaeus, 1753 (Lamiaceae)	Leaf
<i>Longitarsus longipennis</i> Kutschera, 1863	<i>Mentha longifolia</i> Linnaeus, 1753 (Lamiaceae) <i>Fragaria ananassa</i> West, 1812 (Rosaceae)	Leaf Leaf
<i>Longitarsus nigrofasciatus</i> Goeze, 1777	<i>Symphytum officinale</i> Linnaeus, 1753 (Boraginaceae)	Leaf
<i>Podagrica malvae</i> Illiger, 1807	<i>Marrubium vulgare</i> Linnaeus, 1758 (Lamiaceae) <i>Lamium purpureum</i> Linnaeus, 1753 (Lamiaceae)	Leaf Leaf
<i>Podagrica fuscicornis</i> Linnaeus, 1767	<i>Symphytum officinale</i> Linnaeus, 1753 (Boraginaceae) <i>Urtica dioica</i> Linnaeus, 1753 (Urticaceae) <i>Helianthus annuus</i> Linnaeus, 1753 (Asteraceae)	Leaf Leaf Leaf
<i>Podagrica menetriesii</i> Faldermann, 1837	<i>Urtica dioica</i> Linnaeus, 1753 (Urticaceae) <i>Arctium lappa</i> Linnaeus, 1753 <i>Cichorium intybus</i> Linnaeus, 1753 (Asteraceae)	Leaf Leaf Leaf
<i>Psylliodes chrysocephalus</i> Linnaeus, 1758	<i>Solanum dulcamara</i> Linnaeus, 1753 (Solanaceae)	Leaf
<i>Psylliodes hyosciani</i> Linnaeus, 1758	<i>Triticum aestivum</i> Linnaeus, 1753 (Poaceae)	Leaf
<i>Neocrepidodera transversa</i> Marsham, 1802	<i>Taraxacum officinale</i> Linnaeus, 1753 (Asteraceae)	Pollen
Cassidinae subfamily Gyllenhal, 1813		
<i>Hypocassida subferruginea</i> Schrank, 1776	<i>Rosa chinensis</i> Jacquard, 1775 (Rosaceae)	Pollen
<i>Cassida vibex</i> Linnaeus, 1758	<i>Arctium lappa</i> Linnaeus, 1753 (Asteraceae)	Leaf

Observations were recorded for host-plants in 49 species of Chrysomelidae belonging to 6 subfamilies and 26 genera.

The registered species of plants are secondary or accidental host plants for Chrysomelidae. Some data were corroborated on the host-plants and anthophagy for Chrysomelidae:

- *Lilioceris lili* Scop. on Solanaceae (JOLIVET & HAWKESWOOD, 1995);
- *Labidostomis* sp. feeding pollen (JOLIVET & HAWKESWOOD, 1995);
- *Smaragdina* sp. on Fabaceae, different trees of Rosaceae, young shrubs of *Quercus* L. and various Poaceae provide pollen (JOLIVET & HAWKESWOOD, 1995);
- *Cryptocephalus* sp. on Fagaceae, Asteraceae (JOLIVET & HAWKESWOOD, 1995);
- *Clytra laeviuscula* Ratz. on various trees, including roses (Rosaceae), according to www.coleoptera.org.uk;
- *Phaedon* sp. on Ranunculaceae (JOLIVET & HAWKESWOOD, 1995);
- *Diabrotica virgifera* Le Conte feeding pollen and petals (JOLIVET & HAWKESWOOD, 1995);
- *Phyllobrotica* sp. on Lamiaceae (JOLIVET & HAWKESWOOD, 1995);
- *Luperus* sp. on Rosaceae (JOLIVET, HAWKESWOOD, 1995);
- *Altica oleracea* L. on *Polygonum* sp., Brassicaceae (FURTH, 1980);
- *Dibolia* sp. on Rosaceae but feeding only leaves (JOLIVET & HAWKESWOOD, 1995) and not floral buds like in present case;
- *Psylliodes* sp. on Poaceae (JOLIVET & HAWKESWOOD, 1995).

Other data about the host-plants of Chrysomelidae were invalidated:

- *Phyllotreta* sp. on *Quercus* sp. (Fagaceae) and *Asclepias* sp. (Asclepiadaceae). According to the literature (JOLIVET & HAWKESWOOD, 1995) these plants only represent temporary refuges for the species of *Phyllotreta* genus. Two specimens of *Phyllotreta nemorum* L. were collected feeding the leaves of a seedling of *Quercus frainetto* Ten., being perceptible numerous little apertures on leaves, the Tinca forest, May 4, 2013, Bihor county (ILIE, 2017). Four specimens were collected feeding the leaves of *Asclepias syriaca* L., June 11, 2000, Calafat, Oltenia region (ILIE, 2002).
- *Phyllotreta armoraciae* Koch on *Sisymbrium officinale* Scop. JOLIVET and HAWKESWOOD (1995), WARCHALOWSKY (1995) said that this species is monophagous, because it feeds in nature only on *Armoracia rusticana* Gaertn. Two specimens of this species were collected feeding on leaves of *Sisymbrium officinale* Scop.: Tinca, July 8, 2015; Oradea, August 6, 2015, Bihor county. In this case, the species becomes oligophagous.
- *Podagrica* sp. on Boraginaceae, Lamiaceae, Asteraceae and Urticaceae. The literature (JOLIVET & HAWKESWOOD, 1995) indicated that specimens of *Podagrica* genus were collected from various other plants, excluding Malvaceae, but often (except for pollen) without any trophic relationships. Specimens were collected feeding on the leaves of the following species: two specimens of *Podagrica menetriesii* Fald. on *Urtica dioica* L., Tinca, June

14, 2015; three specimens of this species on *Arctium lappa* L., Tinca, June 10, 2015; six specimens on *Cichorium intybus* L., Tinca, July 24, 2015, Bihor county (ILIE, 2017); four specimens of *Podagrica malvae* Ill. on *Marrubium vulgare* L., Calafat, June 11, 2000, Oltenia region (ILIE, 2002); five specimens of *Podagrica fuscicornis* L. feeding the leaves of *Urtica dioica* L., May 26, 2000, Caraula; two specimens of this species feeding the leaves of *Sysimbrium officinale* L., Botanical Garden Craiova, June 10, 1999; twenty specimens feeding the leaves of three young *Helianthus annuus* L., Caracal, May 29, 2001, Oltenia region (ILIE, 2002). FURTH (1997) indicates that this genus (*Podagrica*) is probably allotrophy on Asteraceae.

- *Chrysolina coeruleans* Scr. on *Salix* sp. Different authors (JOLIVET & HAWKESWOOD, 1995; MUELLER, 1953) have considered that some records on the *Chrysolina* genus on Salicaceae, Betulaceae, Chenopodiaceae are very doubtful. Two specimens of *Chrysolina coeruleans* Scr. were collected on *Salix fragilis* L., Botanical Garden Craiova, May 23, 1999, Oltenia region (ILIE, 2002). This record confirms again the data of WEISE (1898), quoted by MUELLER (1953) who have collected, along the Ostra river, in Moravia, many specimens feeding on leaves of *Salix* sp. One specimen of *Chrysolina herbacea* Duft. consumed leaves of *Chenopodium album* L. only in captivity, Craiova, 1999, Oltenia region (ILIE, 2002). Regarding anthophagy, pollen feeders are relatively common among various Chrysomelidae family, mostly among Cryptocephalinae, Galerucinae, Alticinae and Cassidinae subfamilies.

Apart from pollen consumption, adults can feed on petals, but this fact has also been observed in larvae (petals, sepals). Example: the larvae of *Chrysolina herbacea* Duft. feeding on petals and sepals of various *Mentha* sp., Craiova, 1999, Oltenia region (ILIE, 2002).

The consumption of seeds by some chrysomelid adults was also observed, although, in normal living conditions they only feed on leaves. This fact was only observed in more severe living conditions (prolonged drought) when food was non-existent or insufficient (leaves were dry).

Example: *Altica oleracea* L. and *Chrysolina haemoptera* L. feeding seeds of various Poaceae, Tinca, July - August, 2015, Bihor county. Cannibalism has only been encountered in captivity, the absence or insufficiency of food causing adults to devour their own eggs. Example: *Chrysolina herbacea* Duft., Craiova, 1999 - 2000, Oltenia region (ILIE, 2002). Coprophagy is extremely rare, accidental in Chrysomelidae.

This fact was observed only in more severe living conditions (prolonged drought) when the food was non-existent or insufficient (leaves were dry), excrements serving in these cases both as food and as temporary shelter against very high temperatures.

Example: one specimen of *Longitarsus minimus* Kutschera, 1863 and one of *Chrysolina herbacea* Duft. feeding on cow excrement, Vârvoru de Jos, July 26, 2000, Oltenia region; *Phaedon laevigatus* Duftschmid, 1825 - one male specimen feeding on cow excrements, Tinca, July 20, 2016 (ILIE, 2017).

CONCLUSIONS

The research carried out on the trophic relationships of chrysomelids in different parts of Romania in the period 1998-2022 revealed secundar or accidental host plants for 49 species. Coprophagy was observed in 3 species and cannibalism in one species, only in captivity.

REFERENCES

- BIENKOWSKI A. O. 2010. Anthophagy in the leaf beetles (Coleoptera, Chrysomelidae). *Entomological Review*. Pleiades Publishing Inc. London. **90**(4): 423-432.
- FURTH D. 1980. Altica of Israel (Coleoptera: Chrysomelidae :Alticinae). *Israel Journal of Entomology*. Scimago Press. Ierusalim. **14**: 55-66.
- FURTH D. 1997. *Alticinae of Israel and adjeacent areas: smaller genera (Coleoptera: Chrysomelidae)* Israel Journal of Entomology. Scimago Press. Ierusalim. **21**: 121-146.
- ILIE A. L. 2002. *Studiul taxonomic, biologic și ecologic al crisomelidelor (Chrysomelidae, Coleoptera) din Oltenia*. Teză de doctorat. Univ. Al. I. Cuza Iași. 212 pp.
- ILIE A. L. 2017. New researches about the insects and other invertebrates from Tinca area during 2015-2017. *Revista Educația omului de azi pentru lumea de mâine*. Universitatea din Oradea (editor: Mariana Marinescu). Oradea. **14**: 83-88.
- ILIE LORENA COSMA. 2017. *Cercetări taxonomice, biologice și ecologice asupra gândacilor de frunze (Chrysomelidae, Coleoptera) din județul Bihor*. Teză de doctorat. Academia Română. Institutul de Biologie București. 207 pp.
- ILIE A. L., MARINESCU MARIANA, ILIE LOREANA COSMA. 2019. Data about host-plants and anthophagy of Chrysomelidae (Coleoptera) of Romania. *International scientific-practical Conference the results and prospects of the development of entomology in Eastern Europe*. Scientific and Practical Center of the National Academy of Sciences of Belarus for Bioresources. Minsk: 39-44.
- JOLIVET P. & HAWKESWOOD T. 1995. *Host -plants of Chrysomelidae of the world*. Backhuys Publishers Leiden. 218 pp.

- JOLIVET P. 1996. *Biologie des coleopteres chrysomelides*. Edit. Boubee. Paris. 274 pp.
- MUELLER G. 1953. I coleotteri della Venezia Giulia. *Centro sperimentale agraria forestale. Coleoptera. Phytophaga*. Universitaria Press. Trieste. **2**: 269-380.
- SÂRBU I., ȘTEFAN N., OPREA A. 2013. *Plante vasculare din România. Determinator ilustrat de teren*. Edit. Victor B. Victor. București. 1320 pp.
- WARCZALOWSKY A. 1995. *Fauna Polski. Fauna Poloniae*. Warszawa. **17**. 330 pp.
- WARCZALOWSKY A. 2003. *The leaf-beetles of Europe and the Mediterranean area*. Natura optima dux Foundation. Warszawa. 600 pp.
- ***. www.coleoptera.org.uk (accessed August 2, 2018).

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