

## THE INVASIVE INSECT SPECIES IN THE OLTENIA REGION (ROMANIA)

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**Abstract.** Given the generally negative impact of non-native organisms, and particularly the arthropods, in the ecosystems of a given area, the paper presents new information about the presence and distribution of invasive insect species on woody plants in the forests and green spaces of Oltenia region. Starting from a list of forest insect species already reported in Romania and in the neighbouring countries, and assumed to be present in the south-western part of the country, a network of monitoring points was set up, fixed or along the routes, with known geographic coordinates. The detection of these species was achieved either by the presence of insects in the adult stage, captured in the traps baited with different attractants (pheromones or kairomones) in the case of beetles, or by the characteristics of the attack and the presence of insects on the attacked organs, in the case of the other insect groups. 18 species of invasive insects were found, of which 6 species were already reported in Oltenia and 12 species can be considered new reports in Oltenia region.

**Keywords:** invasive insects, Oltenia region, distribution.

**Rezumat. Specii de insecte invazive din zona Olteniei (România).** Având în vedere impactul negativ, în general, al organismelor non-native asupra ecosistemelor dintr-o anumită zonă, și în special cel al artropodelor, lucrarea prezintă informații noi despre prezența și răspândirea speciilor de insecte invazive pe plantele lemnoase din pădurile și spațiile verzi, din zona Olteniei. Plecând de la o listă a speciilor de insecte forestiere invazive semnalate deja în România sau în țările vecine și presupuse a fi prezente și în zona de sud-vest a țării, s-a amplasat o rețea de puncte de monitorizare fixe sau pe itinerar, de coordonate geografice cunoscute, iar depistarea acestor specii s-a realizat fie după prezența insectelor în stadiul de adult, capturate la capcane amorțate cu diverși atractanți (feromonali sau kairomonali) în cazul coleopternelor, fie după caracteristicile atacului ori după atac și prezența, pe organele atacate, a insectelor aflate în diverse stadii de dezvoltare, în cazul celorlalte grupe de insecte. Au fost depistate 18 specii de insecte invazive, dintre care 6 specii erau deja semnalate în Oltenia, iar 12 specii pot fi considerate ca semnalări noi pentru regiunea Olteniei.

**Cuvinte cheie:** insecte invazive, Oltenia, distribuție.

### INTRODUCTION

Through their activities and especially by the transport of goods from one area to another, people have contributed, deliberately or unintentionally, to the spread in time and space of the organisms (plants, animals, microorganisms etc.) which could find suitable living conditions in new geographical areas. Where these species multiplied greatly, became dominant and adversely affected the ecosystems they entered. Such species are considered invasive and the phenomenon of penetration, establishment and spread into new territories is called biological invasion (SIMBERLOFF, 2013).

In the recent decades, as a consequence of intensified global exchange of goods and of the climate changing, the biological invasions represent the second biggest threat to biodiversity after the habitat fragmentation (SCHMITZ & SIMBERLOFF, 1997).

Insects are around 85% of invasive invertebrates in Europe (ROQUES et al., 2009), and of these the species associated with woody plants prevail (ROQUES, 2015). MATTSON et al. (2007) mention 109 species of phytophagous exotic insects who already have stable populations in the forests of Europe, including 57 in North America and 52 in Asia and the pace of obtaining new species in Europe is growing exponentially (ROQUES et al., 2009).

These trends, which occur in Europe, are also present in Romania and they are more obvious especially after the EU accession, when customs controls were reduced and border crossing and transportation of goods and people greatly intensified. As a result, every year new species that have entered Romania are recorded (OLENICI & DUDUMAN, 2016).

Before 1989, only a few species of forest invasive insects were found in Romania, such as: *Gilletteella cooley* (Gillette, 1907), *Eopineus strobilus* (Hartig, 1837), *Aphrastasia pectinatae* (Cholodkovsky, 1888), *Diaspidiotus perniciosus* (Comstock, 1881), *Megastigmus spermotrophus* Wachtl, 1893, *Nematus tibialis* Newman, 1837, *Hyphantria cunea* (Drury, 1773) and *Ips duplicatus* (Sahlberg, 1836) (OLENICI, 2008).

The increase in trade and movement of people after 1989 has facilitated the penetration in our country of a growing number of new species, such as: *Parectopa robiniella* Clemens, 1863, *Macrosaccus robiniella* (Clemens, 1859) (NEȚOIU 1994, 2003), *Phyllonorycter issikii* (Kumata, 1963) (KOVÁCS et al., 2006; URECHE, 2006), *Cameraria ohridella* Deschka & Dimic, 1986 (RÁKOSY & RUICĂNESCU, 1999; ȘANDRU, 1999), *Leptoglossus occidentalis* Heidemann, 1910 (RUICĂNESCU, 2009), *Obolodiplosis robiniae* (Haldeman, 1847) (BĂLINT et al., 2010), *Aproceros leucopoda* Takeuchi, 1939 (BLANK et al., 2010), *Xylosandrus germanus* (Blandford, 1894) (OLENICI et al., 2014).

During 2016-2017, INCDS "Marin Drăcea" has conducted extensive research on the detection and distribution of invasive forest insect species within a national project (TOMESCU, 2016, 2017) and this paper presents new information about the presence of these species in the forests and green spaces of the Oltenia region.

### MATERIAL AND METHODS

Oltenia is a region in the south-western part of Romania and comprises an area of about 12% the country's territory. It encompasses the three main types of landforms (mountain, hill and plain), arranged from north to south in gradual elevation, decreasing from the height of 2500 m (Southern Carpathians), to average heights of 500-800 m of the plateau of Subcarpathians and Mehedinți Plateau, to values of 150-400 m of the Getic Piedmont and below 50 m in Olteniei Plain (BOENGIU & GOLEA, 2012) (Fig. 1).

A list of invasive insect species expected to be present in Romania and in Oltenia was drawn up using information from literature and a network of monitoring points, fixed and on routes, with known geographical coordinates, was established across forests and outside them (airports, parks, green spaces, deposits of wood, etc.). During the growing season (April to September) of 2016 and 2017, observations and/or regular collection of biological material were performed every 7-14 days, depending on the biology of each.

For the species whose presence can be detected easily by the features of the attack or after the attack and the presence of insects in various stages, the place of observation was directly related to the presence of host tree species. Depending on the biology of each species of insect, samples of biological material were taken from the places of observation, such as traces of damages and various stages of insects to be identified.

In the cases of xylophagous and xylomycetophagous species, whose penetration in the country is most likely related to imported wood, detection was performed using traps with different attractants (pheromones or kairomones), located in areas of wood concentration (imported or of autochthonous production), but also in tree stands containing the host species, both in the vicinity of log-yards and in other areas (Photos 1-2).

Because no specific attractants were available for most species, pheromones of other species were used (*Ips typographus* - atraTYP, *Trypodendron lineatum* - atraLINEA) or substances with kairomonal role (ethanol, alpha-pinene). Biological material collected from research places was analyzed and the species that caused the damages were identified.

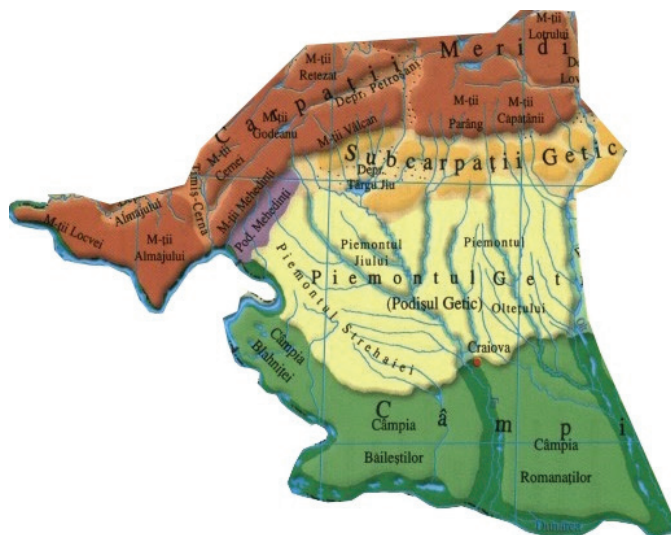


Figure 1. Physical map of Oltenia region (BOENGIU & GOLEA, 2012)



Photos 1-2. The two types of traps baited with attractants used to collect the beetles (original).

## RESULTS AND DISCUSSIONS

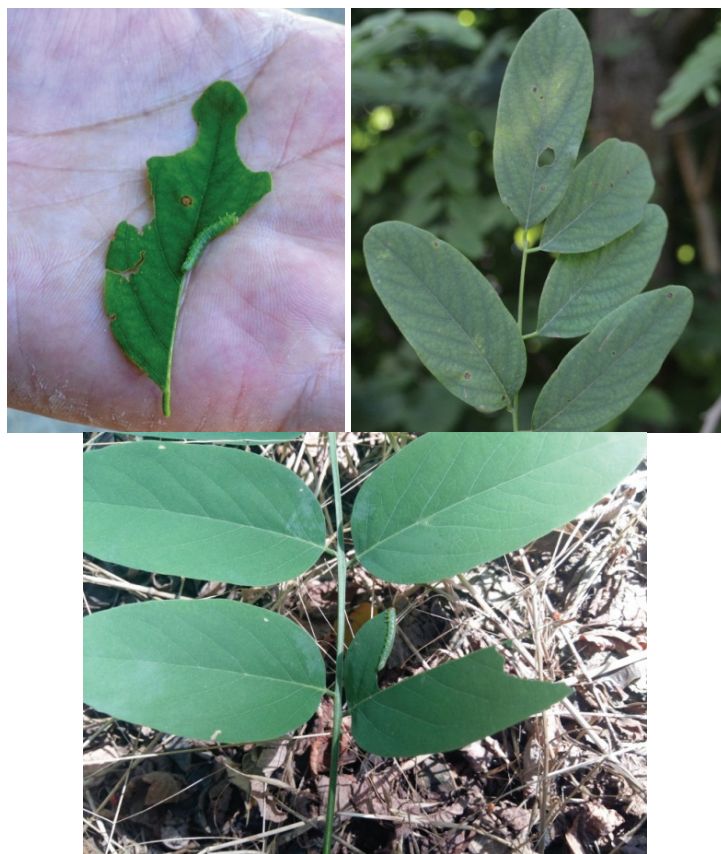
### Invasive forest insect species previously reported in Oltenia

#### *Ips duplicatus* (Sahlberg, 1836) (Coleoptera, Curculionidae, Scolytinae) – the double-spined bark beetle

Between 2016-2017, this species was found in the adult stage only in a location out of nine monitoring places in Oltenia, namely near Râmnicu Valcea (Băbeni - N44.953471°, E24.239173°), in a softwood timber yard. Until the early twentieth century, it was found only in the Euro-Siberian taiga, from Sweden to the island of Sakhalin, then gradually expanded in Austria, Slovakia, Poland, Germany, France, Belgium, the former Yugoslavia, Hungary. In Romania, the species was observed in 1948-1967 in Suceava, Neamț, Bacău, Buzău, Covasna, Harghita, Mureș, Maramureș and Voineasa (Vâlcea) (VASILIU et al., 1978; OLENICI et al., 2009; DUDUMAN et al., 2011). The first outbreak was recorded after 2002 in Norway spruce (*Picea abies* (L.) H. Karst.) stands aged of 30-40 years, installed outside the natural range, at an altitude of 300-400 m, in the Suceava area, due to many years of deficient rainfall (OLENICI et al., 2011). It has a striking secondary pest behavior, but can kill the trees debilitated by other factors.

#### *Nematus tibialis* Newman, 1837 (Hymenoptera, Tenthredinidae) - the locust sawfly

During the 2016-2017 growth season, observations have been made in numerous nursery crops, tree stands and isolated black locust trees (23 locations), but the insect has been detected in only five locations across the whole area at Crivina forest (44.519167° N, 22.576944° E), Piscu vechi forest (N 43.883889°, E 23.165556°), Cobia (N 44.141667°, E 23.738333°), Ostroveni (N 43.791944°, E 23.931944°) and Brădet (N 44.892222°, E 23.050000°). Detection was done after the characteristic attack (holes in the leaf) and the presence of larvae that, at the end, eat the ends of the leaflets to the main rib (Photos 3-5). The species has been previously reported from Alba, Arad, Harghita, Ilfov, Mehedinți and Tulcea (Scobiola-Palade, 1981) and recently in the counties of Moldova (OLENICI et al., 2018).



Photos 3-5. Aspects of attack produced by *Nematus tibialis* in Crivina Forest, Șimian Forestry District (original).

#### *Cameraria ohridella* Deschka & Dimic, 1986 (Lepidoptera, Gracillariidae) - the horse-chestnut leaf miner

During 2016-2017 several parks, gardens, paths and alignments were inspected all over Oltenia, where chestnut and sycamore trees are present. In all sampled locations, we found some features of damage caused by the larvae and individuals in various life stages of the insect (Photos 6-8). The species was found in Drobeta Turnu Severin (N 44.622222°, E 22.650000°), Orșova (N 44.722778°, E 22.398611°), Șimian (N 44.610556°, E 22.734167°), Craiova (N 44.298333°, E 23.802222°), Melinești (N 44.565833°, E 23.711389), Corabia (N 43.774444°, E 24.501667°), Caracal



(N 44.116111°, E 24.332778° ), Balș (N 44.350556°, E 24.100000°), Tg. Jiu (N 45.039722°, E 23.267222°), Călimănești (N 45.241111°, E 24.341389°) and Rm. Vâlcea (N 45.102500°, E 24.353611°).

The species was first observed in Romania in 1996, at Lovrin, in Timis county (ȘANDRU, 1999), and has been reported in various parts of the country, including the mountain area (NEȚOIU at al., 2004; OLENICI & DUDUMAN, 2016). So far, injuries have only been observed on ornamental chestnut trees (*Aesculus hippocastanum* L.), although the literature states that can attack also the mountain maple (*Acer pseudoplatanus* L.).



Photos 6-8. Aspects of the *Cameraria ohridella* attack at trees along the G. Enescu Street, Craiova (original).

### ***Hyphantria cunea* (Drury, 1773) (Lepidoptera, Arctiidae) - the fall webworm**

During the 2016-2017 growing season, the observations made by the working group in the stands, orchards, alignments, parks, isolated mulberry trees, American maple trees, plum trees, and other broadleaf species regarding to the presence of larvae and nests showed that the species infested the area of the Oltenia plains and hills, but the intensity of the attack was different from one location to another. Defoliation caused by caterpillar ranges from weak to very heavy, especially on tree alignments located along the roads, in parks and at forest edge, but also in orchards (Photos 9-11). Infestation with this species was noted in Caracal (N 44.112161°, E 24.343994°), Deveselu (N 44.067484°, E 24.383237°), Vlădila (N 44.006911°, E 24.414022°), Balș (N 44.343200°, E 24.129778°), Leu (N 44.188147°, E 23.998733°), Balasan (N 44.026619°, E 23.268739°), Radovan (N 44.160131°, E 23.601883°), Ostroveni (N 43.826752°, E 23.881396°), Băilești (N 44.069883°, E 23.371253°), Poiana Mare (N 43.919663°, E 23.066763°), Crivina (N 44.484167°, E 22.641944°) and Drăgășani (N 44.565231°, E 24.268483°). The species was reported in Romania since 1949 and currently widespread in all areas of the country where environmental conditions are favorable (OLENICI & DUDUMAN, 2016).



Photos 9-11. Aspects of *Hyphantria cunea* attack in Zaval and Băilești – Dolj (original).

### ***Macrosaccus (Phyllonorycter) robiniella* (Clemens, 1859) (Lepidoptera, Gracillariidae) - the locust leaf miner**

This species, native to North America, had been recorded in Romania since 2002 (NEȚOIU, 2003) and currently is widespread in most of Romania (NEȚOIU & TOMESCU, 2006, 2009).

The injuries caused by the larvae are represented by a stigmatomom type mine located on the underside of the black locust leaves. First, the larvae consume the lacunar tissue, take away the lower epidermis of mesophyll, then enters into palisade tissue and consume the whole mesophyll, inside the mine leaving only the veins. Over time, the lower epidermis becomes white and the upper epidermis and conductive vessels become brown and dry (Photos 12-14).

From July to August, when the attack is obvious and leaves have not yet started to fall prematurely, there have been inspected many nurseries or tree stands and isolated black locust trees (including parks), and the insect has been detected in most locations, as follows: Streaia (N 44.618889°, E 23.179722°), Poienari (N 45.143889°, E 23.771111°), Rm. Vâlcea (N 45.103889°, E 24.353056°), Dăești (N 44.952500°, E 24.110556°), Hinova (N 44.558889°, E 22.764722°), Bulzești (N 44.492778°, E 23.890556°), Giulești (N 44.883333°, E 24.044722°), Ostroveni (N 43.791944°, E 23.931944°), Pisculeț (N 43.883889°, E 23.165556°), Brădet (N 44.892222°, E 23.050000°), Segarcea (N 44.141667°, E 23.738333°), Rovinari (N 44.902222°, E 23.161944°), Arginnești (N 44.576389°, E 23.434167°), Cârlogani (N 44.577500°, E

23.117222°), Balasan (N 44.037222°, E 23.250278°), Pinoasa (N 44.898889°, E 23.104444°), Crivina (N 44.519167°, E 22.576944°), Tunari (N 43.898333°, E 23.104444°), Rovinari (N 44.928333°, E 23.166944°), Bechet (N 43.792222°, E 23.931667°), Dăbuleni (N 43.818056°, E 24.050833°), Ostroveni (N 43.806667°, E 23.924444°), Apele Vii (N 44.068596°, E 23.997664°), Tismana (N 45.094495°, E 22.922233°) and Călimănești (N 45.236667°, E 24.341389°).



Photos 12-14. Aspects of the attack produced by *Macrosaccus robinella*. Piscu-Tunari Forest, Poiana Mare Forestry District (original).

***Parectopa robinella* Clemens, 1863 (Lepidoptera, Gracillariidae) – the locust digitate leaf miner**

The observations carried out during 2016-2017 in many nurseries, tree stands and isolated trees (including parks) have led to the detection by the symptoms of attack of this species (Photos 15-17) in all places investigated in Oltenia, together with *M. robinella*.

Originating in North America, the species was introduced in Europe through Italy, from where it spread rapidly in many European countries, arriving in Romania since 1988 (NEȚOIU, 1994; RUȘTI, 1994) in the Crivina Forest, on the border with Serbia, and currently it is widespread in most of the country (NEȚOIU & TOMESCU, 2006).



Photos 15-17. Aspects of attack produced by the *Parectopa robinella* on the upper face of the lamellae (a) and on the back of lamellae (b) (original)

**New invasive forest insect species reported in Oltenia**

***Xylosandrus germanus* (Blandford, 1894) (Coleoptera, Curculionidae, Scolytinae) – the black timber bark beetle**

In 2016 and 2017, adult individuals of this species were captured in only three out of 9 fixed observation places in Oltenia. It was found in a log-yard at Băbeni (N 44.953471°, E 24.239173°), in the neighborhood of a



company selling ornamental plants in Bunesti (N 45.086768°, E 24.217583°) and in a forest nursery at Tismana (N 45.071749°, E 22.933806°). All three locations are in the northern part of the region, in the submontane zone.

The species is native to eastern Asia, from the Kuril Islands to Vietnam and currently is present in North America and in many European countries. In Romania it was detected in 2009 in Runcu Groși Nature Reserve (Arad), then in Suceava county, in Voievodeasa Forest Reserve (2011-2012) and in a tree stand near Cacica (2014) (OLENICI et al., 2014, 2015).

It is distinguished by his polyphagia and can colonize many species of forest interest in our country, both softwood and hardwood, but also fruit trees as apple, apricot, walnut and even vines. At the same time, the species has the ability to attack both dying or debilitated trees and apparently healthy trees which release ethanol, due to stress generating action of other factors (RANGER et al. 2013, 2015).

***Gilletteella (Adelges) cooleyi* (Gillette, 1907) (Hemiptera, Adelgidae) - Cooley spruce gall adelgid**

Detection was done looking after heavy waxy, white secretions, covering larvae, and after the deformation and discoloration of needles caused by them (Photos 18-19). During the growth seasons of 2016 and 2017 (May to September), by observing 10 stands, orchards or duglas fir (*Pseudotsuga menziesii* (Mirb.) Franco) nursery crops in Oltenia, the species was detected in four locations: on isolated trees in the park of Rm. Vâlcea (N 45.103889°, E 24.353056°), at Călimănești (N 45.241111°, E 24.341389°), on trees growing in the yard of Polovragi forest district (45.191667° N, 23.791111° E), and in Târnava forest, Perișor forest district (N 44.151667°, E 23.540000°).

This species is native in North America, and it was reported in Romania after 1963 in Caraș-Severin, Hunedoara, Timiș and Bihor (BLADA, 1963; NANU, 1971; CEIANU 1971; SCUTĂREANU, 1970).



Photos 18-19. Aspects of the attack traces produced by the aphid *Gilletteella cooleyi*, Târnava Forest, Perișor Forestry District (original).

***Oxycarenus lavaterae* (Fabricius, 1787) (Hemiptera, Lygaeidae) – the lime seed bug**

The insects live in colonies which split as they become larger. In the crowns of mature trees, they remain unnoticed even in large populations, but in the fall, when they gather in large colonies on the bark of tree trunks and thick branches, they are easy to see. Colonies, of an intense red color, consists mainly of larvae that do not have wings, while shiny silver colonies, are comprised mainly of adults. They have dark red color and shining silver wings membranes (WERMELINGER et al., 2005). The detection of this species started in the autumn of 2016 and continued in 2017, wherever lime trees were found, especially in places where the colonies which form on the trunks and thick branches of the trees (Photos 20-22) are more easily noticed. Up to now, this species was found on the lime trees (*Tilia* species) which grow along the streets in Craiova (N 44.325833°, E 23.789722°). It seems that it avoids the tree stands.

The species was reported in Romania since 2008 and currently is spread across almost the entire country, at altitudes below 600 m (RĂDAC & PETROVICH, 2015). Both larvae and adults suck lime tree stems and branches during the growing season.



Photos 20-22. Aspects of winter colony formed by *Oxycarenus lavaterae* at INCDS Craiova (original).

***Aproceros leucopoda* Takeuchi, 1939 (Hymenoptera, Argidae) - the zig-zag sawfly**

During the 2016-2017 growing seasons, observations have been made in tree stands containing elms (*Ulmus* spp.) or in forest nurseries and to isolated trees in parks. Detection was done observing the characteristic attack (zigzag leaf consumption), but also the presence of the larvae on leaves with characteristic appearance (Photos 23-24). The species was detected in five locations out of eleven investigated places, in Dolj and Mehedinți (on isolated trees in the Botanical Garden Craiova - N 44.324722°, E 23.785278°; in the forests of Șimian - N 44.604444°, E 22.757222°, Ciochiuța - N 44.606944°, E 23.136944°, Lunca Banului - N 44.633056°, E 23.190278° and Arginești - N 44.577222°, E 23.43388°). It was reported in Romania since 2006, both in Banat and Moldova (BLANK et al., 2010). Initially, larvae eat elm leaves in zigzag, but this injury aspect gets indistinct as it expands, leading eventually to consumption of the entire leaf, except for the midrib. Total defoliation of trees is possible.



Photos 23-24. Aspects of attack produced by *Aproceros leucopoda* in Arginești Forest, Strehaia Forestry Department (original).

***Obolodiplosis robiniae* (Haldeman, 1847) (Diptera: Cecidomyiidae) – the locust gall midge**

Detection was made by the presence of characteristic galls on black locust leaves. The galls appear after the females lay eggs on the underside of the black locust leaves. The leaf becomes turgid and hypertrophied, the leaflet edge thickening, bending toward the lower side. In the gall thus formed are 1-2 larvae, exceptional even 7-8 larvae. On a leaflet it develops 1-4 attacks. After the larvae are leaving the galls, the leaflets dry and fall (Photos 25-27). The species was detected in all cultures in the nurseries or stands inspected across the entire area, where *M. robiniella* and *P. robiniella* were also found (see the locations mentioned for these species).

The species has been observed in Romania since 2007 and it is widespread in Ilfov, Prahova, Argeș, Dâmbovița, Arad (BÁLINT et al., 2010), but also in the northern part of Romania (OLENICI & DUDUMAN, 2016).



Photos 25-27. Aspects of attack produced by *Obolodiplosis robiniae* (original).

***Phyllonorycter issikii* (Kumata, 1963) (Lepidoptera, Gracillariidae) – the lime leaf miner**

In 2016 and 2017 several stands, nursery crops or isolated trees in parks were inspected in 16 places. Detection was done by looking for irregular spotted mines, located on the underside of leaves, generally toward the center of the leaf, between the veins (Photos 28-30). The species was found in the forest of Ciochiuța (N 44.595833°, E 23.140556°) and in Tismana (N 45.071667°, E 22.935833°). Previously it was reported in Romania from Iași and Bacău counties (2002), and after that from Harghita, Vaslui and Suceava (KOVÁCS et al., 2006; URECHE, 2006; STOLNICU, 2007; STOLNICU & URECHE, 2007; OLENICI & DUDUMAN, 2016).





Photos 28-30. Attack and the larva of *Phyllonorycter issikii* on lime tree leaves in Tismana – Gorj (original).

***Corythucha arcuata* (Say, 1832) (Hemiptera, Tingidae) – the oak lace bug**

Numerous nurseries and forest stands with various oak species were inspected in Oltenia since June, when females lay black eggs on the underside of the leaves, until September, when chlorotic discoloration on the upper side of leaves and characteristic black spots on the lower side can be seen (Photos 31-33). Adults and nymphs feeding on the underside of leaves were also noted. The species was detected in the most of investigated locations, except for those located in the forested hilly area of Mehedinți and Gorj counties, as follows: Balasan (N 44.037500°, E 23.250556°), Bratovoiești (N 44.090000°, E 23.905278°), Fărcaș (N 44.675833°, E 23.752778°), Botanical Garden Craiova (N 44.324167°, E 23.788056°), Nicolae Romanescu Park in Craiova (N 44.298333°, E 23.801944°), Eșelnița (N 44.649444°, E 22.275833°), Caracal (N 44.110833°, E 24.346944°), Crivina (N 44.696667°, E 22.505000°), Bulzești (N 44.473611°, E 23.856111°), Dăești (N 44.954722°, E 24.111389°), Rm. Vâlcea (N 45.103889°, E 24.353056°), Murta (N 44.006944°, E 23.916667°), Segarcea (N 44.117222°, E 23.741667°), Gura Vării (N 44.211944°, E 23.780000°) and Seaca de Pădure (N 44.350833°, E 23.300556°).

It is a North American species, found in Europe (Italy) since 2000 (BERNARDINELLI & ZANDIGIACOMO, 2000), then spread in Turkey (MUTUN, 2003), arriving in Bulgaria in 2012 (DOBREVA et al., 2013), Serbia and Hungary in 2013 (HRAŠOVEC et al. 2014). In Romania, it was noted for the first time in 2015, in the western part of the country, and shortly thereafter in the southern part (CHIRECEANU et al., 2017), but is present also in Moldova, the eastern region of Romania (OLENICI et al., 2018).



Photos 31-33. Attack produced by *Corythucha arcuata* in the Botanical Garden, Craiova (original).

***Appendiseta robiniae* (Gillete, 1907) (Hemiptera, Aphididae)**

Of the total of 25 locations sampled in Oltenia during the growing seasons of 2016 and 2017, it was detected in only two places, in Strehaia and in Râmnicul Vâlcea Park. In 2017, there were found more individuals of different development stages, mainly winged adults, approx. 1.5 mm long, having a pale green-yellow color with a black pigment to the top of the antennae and the rear femurs and one large black spot near the top (Photos 34-35), but no visible injuries were noted. The species was first found in Romania in 2016, in Bacău, and in many other locations of Moldova in 2017 (OLENICI et al., 2018).



Photos 34-35. Various development stages of *Appendiseta robiniae* (original)



***Prociphilus fraxinifolii* (Riley, 1879) (Hemiptera, Aphididae) – the leafcurl aphid**

The species has been found on the branch tips of the red ash trees with pseudogalls and aphid excretions (Photos 36-38). The trees were growing along the streets in Craiova (N 44.326111°, E 23.790000°), Strehaia (N 44.620556°, E 23.185833°), Tg. Jiu (N 45.039167°, E 23.269444°) and Milostea (N 45.130000°, E 23.827222°).

The species has not been reported in Romania before, but most likely it was present, being reported in Hungary (Remaudière & Ripka, 2003), Serbia (Petrović-Obradović et al., 2007) and Bulgaria (Trenchev & Trenchev, 2009). Now it is also present in the eastern part of the country (OLENICI et al., 2018).



Photos 36-38. Attack of *Prociphilus fraxinifolii* on trees along the G. Enescu Street in Craiova (original).

***Dasineura gleditchiae* (Osten Sacken, 1866) (Diptera, Cecidomyiidae) – the honeylocust pod gall midge**

Several tree stands, shelter-belts, isolated trees, and parks have been inspected during June to August in 2016 and 2017, when the leaves already formed galls on honey locust (*Gleditsia triacanthos* L.) trees, (Photos 39-41). The species has been found in seven locations out of 19 investigated places: Orșova (N 44.701944°, E 22.400556°), Zăval (N 43.827222°, E 23.881944°), Bratovoiești (N 44.107778°, E 23.916944°), Craiova (N 44.330833°, E 23.783611°), Arginești (N 44.573611°, E 23.421667°), Ocnîța (N 45.086389°, E 24.277222°) and Poienari (N 45.144722°, E 23.772222°).

The species originates in eastern part of North America (DROOZ, 1985), where its only host, *Gleditsia triacanthos*, is native. The young larvae feeding on leaves cause the formation of pod like galls, green to purple. Strong infestations cause defoliation, reduced growth, death to branches. According to EPPO (2008), the species has been reported in Europe since 1975 and is widespread in many European countries. In Romania it was also found in the eastern part of the country (OLENICI et al., 2018).



Photos 39-41. Galls on honey locust and larvae of *Dasineura gleditchiae* (original).

***Cydalima perspectalis* Walker 1859 (Lepidoptera, Crambidae) - the box tree moth**

The larvae feed on the leaves, sometimes causing total defoliation, which may lead to the drying of the plant. The small larvae feed on the upper side of the leaf, and the large larvae eat the leaves completely (Photos 42-43). The species was found in many green spaces in cities across the country and in the yards of citizens, in Craiova (N 44.313865°, E 23.809392°), Calafat (N 43.996806°, E 22.934100°), Segarcea (N 44.094922°, E 23.742852°), Cetate (N 44.111579°, E 23.645370°), Caracal (N 44.112873°, E 24.342084°) and other places in Oltenia.

The moth is native in East Asia (Japan, China, Korea, India) and is particularly dangerous for *Buxus sempervirens*, due to the rapid spread and aggressiveness of attack on host plants.

The insect was first detected in Germany in 2006, then in Switzerland and the Netherlands, in 2007, France, Britain and Austria, in 2009. In 2011 it was reported the presence in Hungary, Romania and Turkey (SZÉKELY et al., 2011). Its spreading seems to have been made from Asia with cargo containers. The species has 2-3 generations per year and in warmer regions even four generations.



Photos 42-43. Specific injury caused by *Cydalima perspectalis* larvae (original).

***Megabruchidius tonkineus* (Pic, 1904) (Coleoptera, Chrysomelidae, Bruchinae) – the East Asian seed beetle**

Species of oriental origin, it was detected for the first time in Europe, in Germany, in 1980, from whence it spread to other countries among which Romania and it is now present almost throughout the country (PINTILIOAIE et al., 2018).

We found it as larva, pupa and adult stage, in spring 2016 in various locations in and around Craiova, where we found honey locust trees with fructification (Photos 44-45).



Photos 44-45. *Megabruchidius tonkineus* female adult and honeylocust pods with exist holes made by adult beetles (original).

**CONCLUSIONS**

The observations and collectings of the entomological material conducted during 2016-2017 in 152 locations throughout Oltenia revealed 18 species of invasive forest insects, of which 6 species have been previously reported and 12 species are new records for this region.

From the first group, *I. duplicatus* and *N. tibialis* do not cause significant damages, while *H. cunea* is producing outbreaks cyclically throughout the region, with weak infestations in the tree stands and severe infestation on isolated trees or in street and road alignments. *C. ohridella* is present every year on the trees of green areas, frequently with severe infestations. *M. robinella* and *P. robinella* are present throughout the Oltenia and cause significant injuries to the black locust stands in southern part of the region.

The newly found species are taxonomically and ecologically quite diverse and have a varied status. The Order Hemiptera is represented by five species, Coleoptera, Diptera and Lepidoptera each by two species, and Hymenoptera by one species. There were found two new species of aphids, *A. robiniae*, *P. fraxinifolii*, an adelgid – *G. cooleyi*, a lygeid bug – *O. lavaterae* and a tingid bug – *C. arcuata*. The first four species are quite rare, while the last one is found almost everywhere in the county, particularly in the oak stands of plains and hills.

The two new species of beetles are an ambrosia beetle and a seed beetle. *X. germanus*, a polyphagous species, was caught in only three locations, within mixed hardwood and softwood forests from the Southern Carpathians and the



populations seem to be very low so far, while *M. tonkineus* was found in honey locust pods and seeds collected in Craiova and in the city surroundings.

Both dipteran species are gall midges, one on the black locust, and the second on the honey locust. The first, *O. robiniae* is already a common species in the region, while the second, *D. gleditchiae*, is quite rare, still spreading.

From Lepidoptera Order, two monophagous species were found, the lime leaf miner and the box tree moth. *P. issikii* has been found in mixed forests of the hilly area, without causing visible injury, while *C. perspectalis* is present in the cities and causes severe damages on box trees. *A. leucopoda*, a wasp whose larvae feed on elm tree foliage, was detected in the mixed forest of oaks and other broadleaves in the plain and hilly areas, without causing significant damage so far.

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