# WESTERN CONIFER SEED BUG (*LEPTOGLOSSUS OCCIDENTALIS*) PRESENT IN ORNAMENTAL LANDSCAPES OF THE ROMANIA

**Ioana GROZEA[1], Ana Covilca MUNTEAN[1]**

*[1]Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" Timisoara, Romania*
*Corresponding author: ioana_entomol@yahoo.com*

***Abstract.*** *A new non-native species of stink bugs was accidentally identified in the ornamental landscapes in the western part of Romania. This is Leptoglossus occidentalis which is framed in follow systematic units: Insect class, Hemiptera order, Heteroptera suborder, Coreidae family and Coreinae subfamily. It is also known as western conifer seed bug (WCSB). The species originates in North America, where it has gradually expanded, covering the entire continent. Europe has been accidentally introduced in some parts of Europe, including Romania. In Romania, there are no detailed species-related references, only one published as a short (even very short, 1-page communication) and this does not fully satisfy the identification characters and the host plant range. The first 5 exemplars were found in a private garden from Timis County, in October of 2017, then several month later, in the same location (but during the vegetation period), there were 12 exemplars on a relatively small surface and these were observed directly on woody plants. The host plants that have been observed consisted of 2 species of juniper and 3 of pine species such as: Meyeri virginiana, Jenuperus squamata Blue Carpet, Pinus mugho mughus, Pinus silvestri and Pinus nigra. Own detailed features of morphological identification of the adult form of the species as well as the presence of insect at world level are also provided by this paper. Observations consisted of direct macroscopic studies on plants and insects in the area (habitat), but also in laboratory studies detailed on the binocular magnifier. The latter ones were performed at the Phytosanitary Diagnosis and Expertise Laboratory. Insect-host interaction is evidenced by the mechanisms of attack and the created symptoms and indirectly the particular and general damage to a given ecosystem. The potential for expansion across the western part of Romania, and especially in green spaces or botanical and relaxation parks, is still being addressed.*

***Keywords****: Leptoglossus occidentalis, western conifer seed bug, insect pest, juniper, pine.*

## INTRODUCTION

The species *Leptoglossus occidentalis*, known as the western conifer seed bug (WCSB), originates in North America, specifically California (RABITSCH, 2008). It can say that the first appearance of insect took place over 100 years ago (in 1910), and then has since expanded continuously (Central America, South America, Africa and Asia). Thus, it accidentally introduced also in Europe; the first appearance on this continent being recorded in 1999 in Italy (the northern part) (VILLA ET AL, 2001).

After this year (1999) it has expanded, so today it is present in several European countries, such as Italy (the first point in 1999), then in 2002 in Switzerland, 2003 in Slovenia, 2004 in Spain and in 2007 in Austria (in 2005), in 2006 it is reported in Hungary (HARMAT ET AL, 2006), France (DUSOULIER ET AL, 2007) and Germany and in 2007 in the Czech Republic, Belgium, Slovak Republic (2007) and England (2007) (MALUMPHY ET AL, 2007), Montenegro (2008). Since 2008, this has also been reported in Bulgaria (SIMOV, 2008), Serbia, Croatia (KMENT AND BAŇAŘ, 2008) and Poland. Later the insect was also seen in Turkey (in 2009) (FENT AND KMENT P, 2009). Later the insect was seen in Turkey (in 2009) and in 2010 in the Netherlands. It also appeared in the northern part of Europe in Norway (2017) (MJOS ET AL, 2010). The most recent invasive species was reported in Albania in 2018 (TORSTEN, 2018).

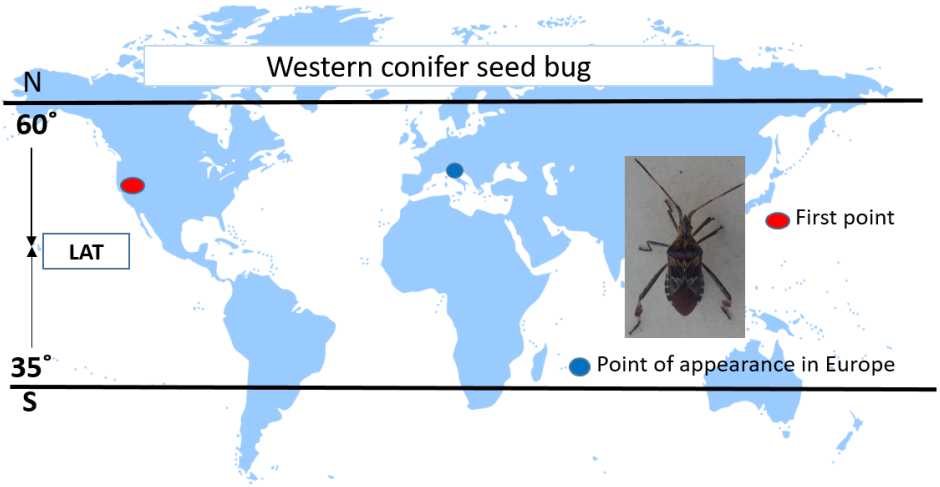


Fig. 1. The spreading limits of the species *Leptoglossus occidentalis* (western conifer seed bug) between 35˚S and 60˚S (representation on the map founded in the public domain); Photo of insect by Grozea, October 10, 2017

It first appeared in the northern hemisphere and spread across this line, but in the last years (2017), the species was also observed in the southern one (Chile) (Figure 1).

It is assumed that the introduction of the *Leptoglossus occidentalis* bug in Europe had a typical invasion pathway for human transport (PAINE AND LIEUTIER, 2016).

## MATERIAL AND METHODS

The observations that are the subject of this work paper have been made in the western part of Romania, more precisely in the Timis County (Dumbravita) during 2017 and 2018. In fact, specimens of *L. occidentalis* were accidentally observed in a private garden placed nearly of Green Forest (in October of 2017). The plant species present in this garden consisted of a mix of plants (flowers, fruit trees, trees and ornamental shrubs of which the conifers were predominantly) (Figure 2).

The surface of the observation area was relatively small, about 1000 $m^2$, between buildings and other spaces inhabited by humans.

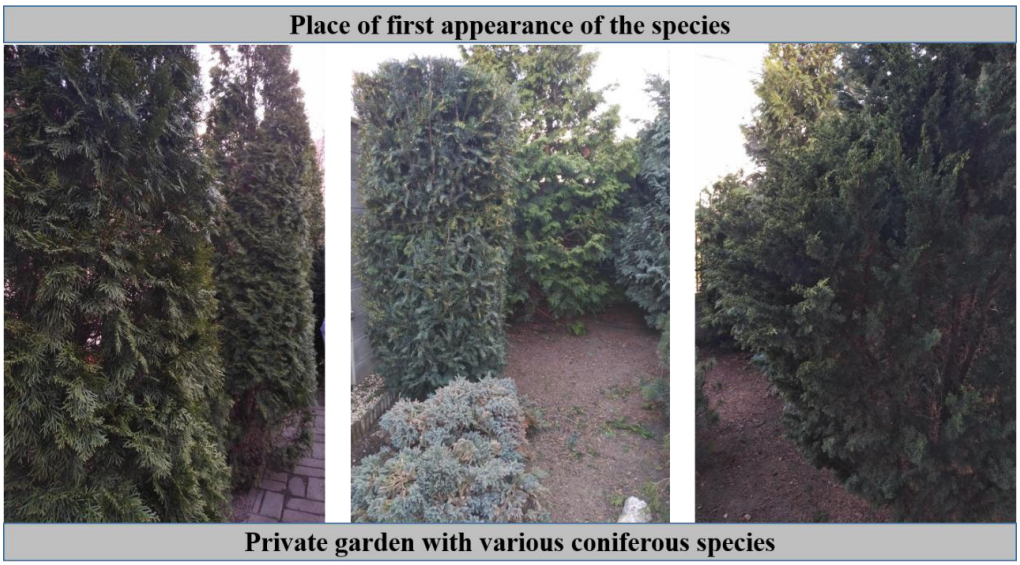


Fig. 2. Place of first observations of *L. occidentalis* species in Western Romania (Timis County)

As a new species reported in this area, some of the studies were referential. The study method was simple, given the accidental observation (collection, transport, identification, plant analysis that each specimen was observed).

*Table 1*

Number of specimens (males and females) observed in the first and second years (2017-2018)

| Specimens (of insects) collected | in first year (2017) | in second year (2018) | insects analyzed |
|---|---|---|---|
| Total number | 5* | 12* | 17 |
| Males | 3 | 7 | 10 |
| Females | 2 | 5 | 7 |
| Larvae | - | 1** | 1 |

** adults stage*
*** larval stage*

Each observed specimen (Table 1) was collected in closed plastic containers, then transported to the laboratory for Diagnosis and Phytosanitary Expertise (within BUASVM "King Michael I of Romania" Timisoara). Then followed the procedure for their preparation for detailed analysis and identification (according to the literature). Morphological details were studied at the binocular magnifier.

## RESULTS AND DISCUSSIONS

The results consisted of three lines: first signaling and continuous of monitoring, species determination by morphological description and identification of possible host plants.

**About first signaling of species and continuous of monitoring.** The first signal in western Romania was an accidental one, on October 10, 2017. After a careful analysis of the place (considered habitat) where the first specimen (only adults) was found, there were found four other specimens, which were considered as samples until the determination laboratory and comparative analysis with those mentioned in the literature.

**About species determination by morphological description.** All insect samples analyzed had dimensions of between 15.8 and 20 mm (Table 2). Males have smaller sizes than females. The background color of the front

wings is a mix of brown, black and red with white drawings and the dorsal part is brownish-red. The drawing on the front wings (placed at about their half) consists of fine white lines in zigzag or the letter W with the head down. On the lateral-dorsal part of the body (in the posterior half), on the abdominal extensions, there are five large white spots, visible. The antennas has segments brown alternating with red segments (Figure 3).

As a distinctive feature of other species in the genus, one bag (expansion) lighter than the rest of the segments was observed on the behind legs.

The study was done in comparison with selective literature (FENT AND KMENT P, 2009; VILLA ET AL, 2001).

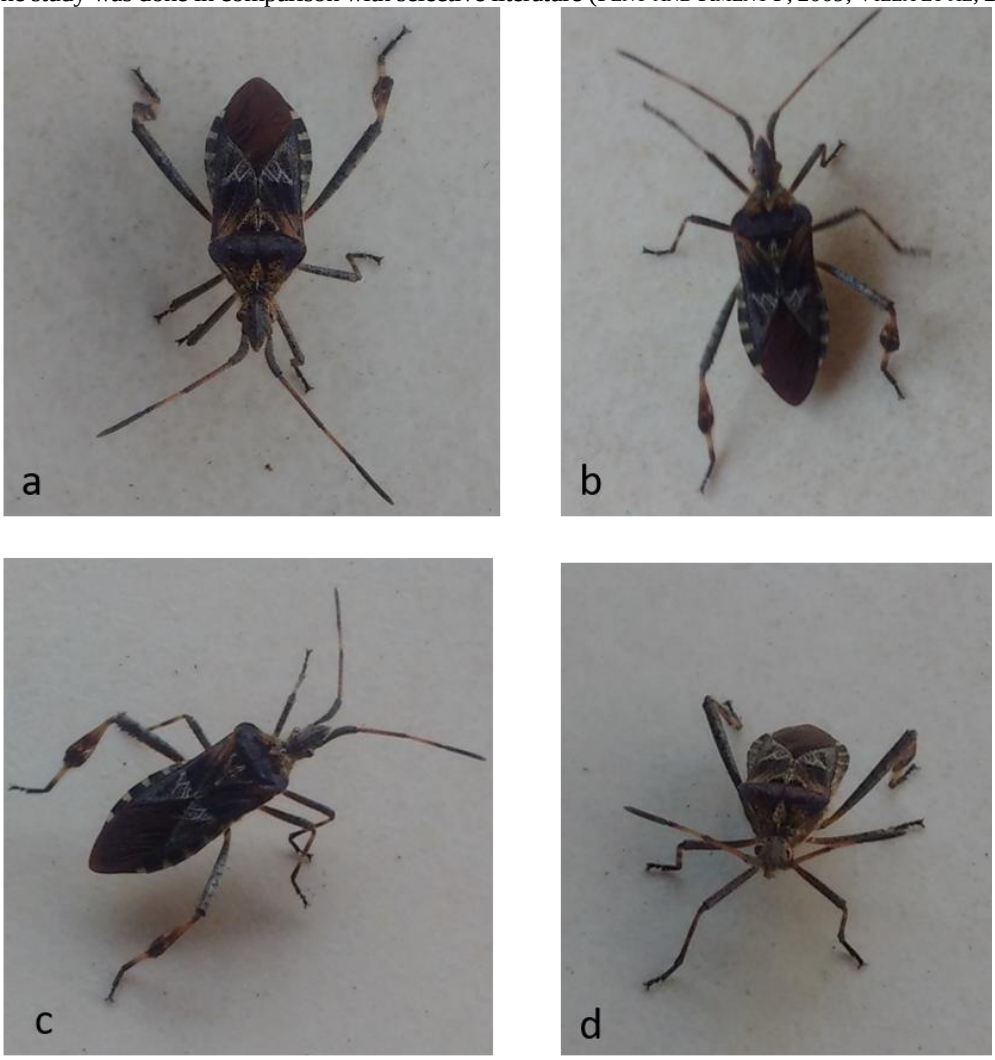


Fig. 3. Adult by *Leptoglossus occidentalis* (the first samples collected); a: antero-dorsal view; b: postero-dorsal view; c: latero-dorsal view; d: frontal view; Photos by Grozea, October 10-16, 2017

*Table 2*

Body size of insect samples analyzed, expressed by body length/mm (2017-2018)

| Samples (of insects) collected | Body length (mm) | | | |
|---|---|---|---|---|
| | In first year (2017) | | In second year (2018) | |
| No. | Males | Females | Males | Females |
| 1 | 16.4 | - | - | - |
| 2 | 15.8 | - | - | - |
| 3 | - | 18.9 | - | - |
| 4 | - | 19.6 | - | - |
| 5 | 17.1 | - | - | - |
| 6 | - | - | - | 19.7 |
| 7 | - | - | - | 20.0 |
| 8 | - | - | - | 19.1 |
| 9 | - | - | 16.5 | - |
| 10 | - | - | 17.4 | - |
| 11 | - | - | 17.4 | - |
| 12 | - | - | 16.9 | - |
| 13 | - | - | 17.5 | - |
| 14 | - | - | 16.8 | - |
| 15 | - | - | 16.8 | - |
| 16 | - | - | - | 18.8 |
| 17 | - | - | - | 18.5 |

**About identification of possible host plants.** In the place of origin, the main host plants for *L. occidentalis* are more numerous than in Europe, otherwise it is explicable considering the difference in time from the first signaling. It is clear that pine species are the favorite in all old or new areas. It seems that adults feed on flowers and seeds of coniferous species in the spring. In fact, in our observations, we found that they were feeding on the wood plant cones (autumn 2017 and spring or autumn 2018).

In Europe, more than 40 coniferous species of the Pinaceae and Cupressaceae families have been reported as established host plants or as host plants (KMENT AND BANAR, 2008). The host plants that have been observed in Romania (in active periods of insects) consisted of 2 species of juniper and 3 of pine species such as: *Meyeri virginiana, Jenuperus squamata Blue Carpet, Pinus mugho mughus, Pinus silvestri* and *Pinus nigra*. Our observations have shown that the insect has visited (being or just standing on the plant) 5 species of the families mentioned above. However, the plant species that the insect was observed to actually feed was *Pinus mugho mughus*. An insect-plant interaction were observed also on *Jenuperus squamata Blue Carpet*.

Two young larvae in first stage were found (on the plant) in April 12, 2018. Eggs and nymph have not been seen in these 2 years of study, most likely these will occur in future period with typical symptoms or their presence on plants. The larvae and nymph (according to the literature) develop 5 ages and feed on cones and leaves (needles). The eggs are laid on needles. Both adults and larvae have similar feeding mechanisms, extracting sap from cones, flowers, needles (PARLAK, 2017; KEGLEY, 2006).

CONNELLY AND SCHOWALTER (1991) have demonstrated through various types of feeding that congenital abortion has been associated with early feeding, and the total amount of seed on the cone has been greatly reduced.

The woody plants in the garden, considered habitat for the insect, did not suffer (in a visible way), the few specimens found being few. However, these damages are expected to occur from the following year, taking into account the year-to-year rate of multiplication and the location next to buildings that provide shelter over the winter (as adult stage).


Figure 4. Possible host plants of Leptoglossus occidentalis (a, b: Juniperus squamata blue carpet; c: Pinus mugho mughus, d: Meyeri virginiana); Photos of insect by Grozea, October 10, 2018

However, no economic losses have been recorded in Europe until now, as the pest seems to be isolated and has a fairly high capacity. It is possible that the next 10 years will be a big problem, due to the increasing number of specialists in various parts of Europe. That is why it is necessary to continue monitoring, even at the micro space (of gardens and green spaces), to prevent a possible population growth that affects both the landscape and the ornamental spaces, but especially the natural forest ecosystems, but also the wood production (EPPO, 2010).

## CONCLUSIONS

The insect *L. occidentalis* is one of the most recent invasive species for Romania. The status of this is the one that is being installed in Europe and is a real danger for ornamental conifers and those for wood production. Continuous monitoring is required in both natural and coordinated conifers ecosystems to limit enlargement.

## ACKNOWLEDGEMENT

The morphology studies were conducted in the Laboratory for Diagnosis and Phytosanitary Expertise within BUASVMT *King Mihai I of Romania* and observations from the ornamental space thanks to access provided from the owner of the private garden in Timis County.

## BIBLIOGRAPHY

CONNELLY AE, SCHOWALTER TD, 1991. Seed losses to feeding by *Leptoglossus occidentalis* (Heteroptera: Coreidae) during two periods of second-year cone development in western white pine. J. Econ. Entomol. 84(1): 215-217.

DUSOULIER F, LUPOLI R, ABERLENC HP, STREITO JC, 2007. L'invasion orientale de *Leptoglossus occidentalis* en France: bilan de son extension biogéographique en 2007 (Hemiptera Coreidae) (FR).

EPPO, 2010. Leptoglossus occidentalis: an invasive alien species spreading in Europe PPO Reporting Service no. 01. EPPO Global Database/009 (EU).

FENT M, KMENT P, 2009. First record of the invasive western conifer seed bug *Leptoglossus occidentalis* (Heteroptera: Coreidae) in Turkey. North-Western Journal Of Zoology, 7 (1): pp.72-80.

HARMAT B, KONDOROSY E, RÉDEI A, 2006. First occurence of the western conifer seed bug in Hungary. Project: Study of Hungarian Heteroptera fauna (HU).
KEGLEY S, 2006. Forest Health Protection and State Forestry Organizations Western Conifer Seed Bug, *Leptoglossus occidentalis* Heidemann. Forest Health Protection and State Forestry Organizations. Western Conifer Seed Bug Management. USDA: 10.3: 3 (USA).
KMENT P, BAŇAŘ P, 2008. Additional records of the invasive Nearctic bug *Leptoglossus occidentalis* (Heteroptera: Coreidae) in Croatia. Natura Croatica, 17 (2), 141-147 (CR).
MALUMPHY C, BOTTING J, BANTOCK T, REID S, 2008. Influx of *Leptoglossus occidentalis* Heidemann (Coreidae) in England. Het News 12: 7 (EN).
MJØS AT, NIELSEN TR, ØDEGAARD F, 2010. The Western Conifer Seed Bug (*Leptoglossus occidentalis* Heidemann, 1910) (Hemiptera, Coreidae) found in SW Norway. Norw. J. Entomol. 57, 20–22 (NO).
PAINE TD, LIEUTIER F, 2016. Insects and Diseases of Mediterranean Forest Systems. ISBN 978-3-319-24744-1 (eBook), DOI 10.1007/978-3-319-24744-1, 888p.
PARLAK S., 2017. An invasive species: *Leptoglossus occidentalis* (Heidemann) how does it affect forestry activities? Journal of Forestry Faculty (Kastamonu), 17 (3): 531-542. Doi:10.17475/kastorman.292220 (TR).
RABITSCH W, 2008. Alien true bugs of Europe. Zootaxa, 1827: 1-44 (AU).
SIMOV N, 2008. Western conifer seed bug *Leptoglossus occidentalis* Heidemann, 1910(Heteroptera: Coreidae) already in Bulgaria. Historia Naturalis Bulgarica, 19: 179-180 (BG).
TORSTEN VAN DH, 2018. First record of *Leptoglossus occidentalis* Heidemann (Heteroptera: Coreidae: Coreinae: Anisoscelini) in Albania. Revista Chilena de Entomología, 44 (3): 355-356 (CL).
VILLA M, TESCARI G, TAYLOR SJ, 2001. Nuovi dati sulla presenza in Italia di *Leptoglossus occidentalis* (Heteroptera, Coreidae). Bollettino della Società Entomologica Italiana. 133: 101 -112 (IT).