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**İnanç Özgen**Firat University, Engineering  
Faculty, Bioengineering  
Department, Elazığ, Turkey**Paride Dioli**Museum of Natural History  
Milano, Italy**Venhar Çelik**Firat University, Engineering  
Faculty, Bioengineering  
Department, Elazığ, Turkey

## New and interesting record of western conifer seed bug: *Leptoglossus occidentalis* (Heidemann, 1910) (Heteroptera: Coreidae) in Eastern Turkey

İnanç Özgen, Paride Dioli and Venhar Çelik

**Abstract**

The aim of the present study was to determine the species belonging to Hemiptera ordo between 2016 to 2017 years in Elazığ in Turkey. During the present study, *Leptoglossus occidentalis* (Heidemann, 1910) (Heteroptera: Coreidae) was collected and attracted our attention. The species was collected for the first time in Elazığ province as a result of this study. This was the first record outside of the western, middle, south and north region of Turkey. The distance to which the species was located was about 450 km away from Kayseri, the closest location where it was previously found. The fact that it was an invasive and harmful species to forest areas and trees, is an important factor for the active investigation of this species. In addition, it is believed that the species has been introduced into the region on the pine trees that are brought from outside. It is also considered that the species will spread to wider regions including East and Southeastern Anatolia in the following years.

**Keywords:** *Leptoglossus occidentalis*, coreidae, eastern turkey, new regional record, invasive species

**Introduction**

The Western Conifer Seed Bug, *Leptoglossus occidentalis* (Heidemann, 1910), is an invasive alien species of North American (Mexico, the United States, and Canada) origin [1]. In Europe, it was first found in Italy in 1999 [2]. In the following years, the species had spread rapidly to over many countries in Europe. The countries are Slovenia, Croatia, Hungary, Czech Republic, Poland, Austria, Switzerland, Germany, France, Belgium, England, and Spain, respectively [3]. In Turkey, it was firstly detected in İstanbul [4]. Later on, the species spreads to Edirne, Kırklareli (Lüleburgaz) [5, 6] İzmir provinces [7] and other localities [13]. In Eastern Asia the expansion reached China, Korea and Japan. [24, 25].

*L. occidentalis* is usually specialized on conifers and shows widespread distribution on *Pinus nigra*, *Pinus pinea*, *Pinus radiata* and *Abies concolor* [8]. Although there is no detailed study of its damage on natural conifers in the European countries, it has been reported that this species should definitely be considered as a potential harmful bug in the commercial forest sector [5]. Researchers were reported with a reference to [9] that the species is harmful to *P. pinea* among edible seeds in Italy [5]. In fact, pine nuts are used in the manufacture of many dishes and in particular, the typical sauce called "Pesto". Similarly, it was reported that this species caused damage to pistachios [10]. The same author also detected the species in almond trees. In addition, it was determined that the species caused a loss of *P. monticola* seeds up to 70-80% in North America, and could cause a loss of *Pseudotsuga menziesii* plant seeds up to 50% under natural conditions [11]. The purpose of this work was to provide further information about the areas of distribution by drawing attention to important invasive species.



**Fig 1:** Adult of *Leptoglossus occidentalis* Heidemann. Left: specimen from Italy (Photo courtesy of. C. Galliani) Right: specimen from Elazığ: posterior leg with typical expansion on hind tibia (Photo I. Özgen).

**Correspondence****İnanç Özgen**Firat University, Engineering  
Faculty, Bioengineering  
Department, Elazığ, Turkey

## Materials and Methods

**Material examined:** Elazığ, Baskil, Beşbölük village, 38° 35' 6.4356' N, 38° 42' 55.9656"E., 14.05.2016., 5 exc., *Pinus brutia*, leg. Özgen.

It has been reported that the species has spread to the Antalya, Bursa, Çorum, Edirne, Kastamonu, Kayseri, Kırklareli, İstanbul, İzmir, Sakarya and Tokat provinces of Turkey, in the previous years [13]. It was also recorded in Elazığ province (Fig. 2).

The present study was carried out between the years 2016 to 2017 in Elazığ in Turkey. The main material of the study was *L. occidentalis* species. The species were collected with Japanese umbrella. The samples were taken to the laboratory and diagnosed by the second author. The species has been identified on the basis of numerous comparative materials present in the collections of Museums of Natural History in Italy (Milan, Genoa, Bergamo, Udine and Alba) as well as in the second author's private collection (Sondrio-Italy). In fact, the first European specimens were collected in that Country [2]. The classification was completed by examining also the recent keys of the genus [12].

## Results

### Taxonomy

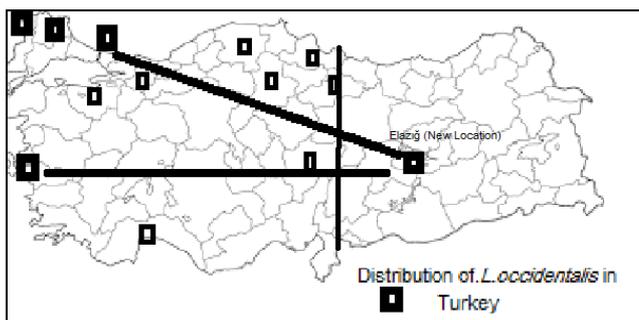
*Leptoglossus occidentalis* belongs to "*L. clypealis* species Group" which includes *clypealis*, *corculus*, *crestalis*, *dearmasi*, *hesperus*, *lonchoides* and *occidentalis*, and is characterized by having the tylus extending beyond juga as a porrect spine, which is as long or longer than length of an eye; they have also a broad irregular transverse fascia on corium. In this group, *L. occidentalis* stands out by having the outer border of metatibial dilatation entire and rounded, without emarginations and teeth. The general color of body is reddish-brown, with white short pubescence, longer on the head and the anterior part of pronotum, scutellum and legs. The head has, medially, a reddish-brown longitudinal stripe and two shorter stripes behind eyes. Antennae with the first segment is thicker, I, II and III segments are yellowish-brown, IV darker. Humeral angles of pronotum are widely rounded; the discal part is brown with several black round spots, without any pale transverse stripe. Corium reddish-brown, basally paler, with whitish zigzag transverse line medially.

There are more than 40 species in the genus, almost all (except two) restricted to the Western Hemisphere.

The remaining two species are Sub-cosmopolitan: the present *Leptoglossus occidentalis* (Heidemann, 1910) and *Leptoglossus gonagra* (Fabricius, 1775) (= *Cimex australis* Fabricius, 1775 and *Anisoscelis orientalis* Dallas, 1852).

They can be separated by the following Key, provided for Palaearctic Region by Fent& Kment [5].

Ten species are considered to be economically damaging agricultural and forestry pests and are discussed in detail [15]



**Fig 2:** The Distribution of *Leptoglossus occidentalis* Heidemann in Turkey.

## Biology and Ecology

Biology remained unknown until the middle of the last Century (1960) when the species became invasive in the United States of America [16]. After expanding its distribution to large areas of the Northern Hemisphere, it has been carefully studied and today it is possible to trace a fairly complete bio-ecological profile.

*Leptoglossus occidentalis* is univoltine in North America and Central Europe and Great Britain where adults appear in August; it is bivoltine in Mediterranean Areas (Sicily, eg) [14] and multivoltine in Mexico and Tropical areas, with maximum of three generations per year [15]. Adults overwinter in natural shelters or in human houses provided with a temperature not less than 1-2 °C. Second author has experienced that in mountain dwellings, Orobic Alps in Italy, it dies when the temperature drops below zero degrees centigrade for at least two days. Surviving adults return active in April (S-Europe) or May to June (N-Europe and N-America). They look for conifers, which feed young and adult, when fresh seeds and flowers are grown. Females lay eggs on the needles of the conifers they have reached in flight. Eggs hatching take place after 10-15 days. Early instars feed on coniferous needles and pine cones that are developing up to a few days before turning into Second instar. At that point, young bugs are already able to pinch the immature seeds in the pine cone. In fact, *L. occidentalis* cannot grow only by sticking the leaves, but it also needs to nourish the seeds as well. There are five instars between the egg and the adult: the development ends in a month and an half.

First-generation adults can be found at the end of July. Those of the second generation after two months (between September and October) [14-16]. Damages on pine cones are evident in the late period.

## Discussion

The species has spread very easily over the last 20 years in the Western Palearctic Region because all developmental stages may be translocated with its host plants as the case of likely accidental imports into Europe (Vicenza) [2]. *L. occidentalis* is also known to be a strong flier, much of the eastward range expansion in North America has been attributed to human-assisted dispersal following commercial pine plantings and landscaping, and via transcontinental shipping in Europe [15]. Considering the medium-large size of this insect (16-20 mm) we can exclude that the displacements may occur through the people, unlike many species of *Tingidae* (eg *Stephanitis* sp., *Corythucha* sp.) that are transported passively under the lapels of jackets and pants cuffs [20-22].

It appears likely that instead *L. occidentalis*, as happened to other bugs, find refuge inside the passenger compartment of the car or in the engine compartment, attracted by the persistent heat even during the autumn, when hibernation begins. For this reason they are also called "hitchhikers" [17] [19]. Another passive transport system is constituted by the sheet that covers many trucks and articulated vehicles, to which the insects cling when touched the plants on the edge of the road, causing a strong air displacement. In this way many insects can be passively transported for hundreds of kilometers [23]. In the case of maritime transport, it should be noted that in the ports for passengers and commercials, insects are attracted by the lights of ships during loading and then landing in new countries [26].

As for Central-Eastern Turkey, we specify that the Elazığ province, where the species was recently detected, is approximately 450 km away from the nearest location

(Kayseri) of the previous record in Anatolia <sup>[13]</sup>. When considering the distances between these locations, the probability of presence of the species in the areas between those locations, may indicate a spread of this species in our country. The presence of a great number of plant species between these locations, the fact that the species is invasive, and the presence of plantations such as pistachio and almond tree where the damage caused by this species, has already been ascertained in foreign countries, and this data become important in terms of economic entomology. Moreover, new plantations in the region in recent years, in particular the intensive plantation of *Pinus brutia*, and the transfer of these seedlings from the regions such as Kahramanmaraş, support the claim that the species will spread, in future, into larger areas. For this reason, it is necessary to carry out detailed studies in the forthcoming years by evaluating the possibility of damages of the species in forest areas and other cultivated plants.

## Conclusion

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