# First Record of the Poplar Lace Bug, *Monosteira unicostata* (Mulsant & Rey, 1852) (Hemiptera: Tingidae), from Jordan

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## Abstract

The poplar lace bug, *Monosteira unicostata* (Mulsant & Rey, 1852) (Hemiptera: Tingidae) is recorded for the first time from Jordan. It was found in many localities in Amman associated with the predator *Oenopia conglobata* (Linnaeus, 1758) (Coleoptera: Coccineliidae) which is also recorded for the first time in Jordan. In addition, a predatory bug, *Anthocoris* sp. (Hemiptera: Anthocoridae) was observed consuming the immatures of the lace bug.

**Key words:** New records, Coccineliidae, Anthocoridae.

# Introduction

Monosteira unicostata is found in the Euro-Mediterranean region, North Africa, and parts of Asia (Drake and Ruhoff, 1965, Péricart 1983, Tolga and Yoldas 2019). It is a major pest of almond trees growing Euro-Mediterranean region, but it is not established so far in the United States and Australia. Since it was reported in British Columbia, Canada (Scudder 2013), in Argentina (Carpintero et al., 2017), and in Chile (Campodonico et al., 2021), it could be a potential threat to almonds worldwide (Rijal et al., 2021). Costas et al., (2020) recorded M. unicostata from the Iberian Peninsula, Balearic Islands and Canary Islands. Djazouli et al., (2009) recorded it on Populus nigra L. in Algeria and Talhouk (1977) recorded it from Lebanon. Gennaro and Giorcelli (2019) mentioned that it was found in Italy since 1970s causing defoliations in nurseries and young plantations. Pfiricart et al., (1993)

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listed fifty-four species of Tingidae from Palestine considering *M. unicostata* as a noxious species. They recorded the lace bug on *Populus, Salix, Amygdalus, Crataegus, Cydonia, Prunus, Pyrus* and mentioned that it occurred from April to October on *Populus* and *Salix.* 

Mustafa *et al.*, (2020) studied the population density of *M. unicostata* in Istanbul Province (Turkey) on *Populus deltoides* Bartr., white poplar, *Poplar alba* L. and black poplar, *Populus nigra* L. Adults appeared at the beginning of June,and their numbers continued to increase until they disappeared in the middle of October during 2019. Its population peak was in July. *Populus deltoides* Bartr. was the most susceptible followed by *Populus nigra* L., and white poplar, *Populus alba* L.

González-Núñez (2015) studied the use of Kaolin and potassium soap with thyme essential oil to control *Monosteira unicostata* and other phytophagous arthropods of almond trees in organic orchards in Spain.

Arab (1996) studied the life cycle of *M. unicostata* and its control under field conditions in Syria. Lace bugs emerged from the winter diapause during early spring when the average temperature was around 16°C. They had three-four generations per year. Bolu (2007) studied the population dynamics of lace bugs and their natural enemies in almond orchards of Turkey. He recorded *Monosteira lobulifera* Reuter, 1888, *M. unicostata* (Mulsant and Rey, 1852) and *Stephanitis pyri* (Fabricius, 1775) and twenty-four predatory beetle (Coleoptera: Coccinellidae) species and five predatory bugs (Hemiptera: Lygaeidae, Anthocoridae, Nabidae, and Mioridae). Mustafa *et al.*, (2014) studied the population density of *Monosteira unicostata buccata* Horváth, 1902 in a field study at Koysinjaq city (Iraq, Erbil Province) during 2013 on the black poplar, *Populus nigra* L., Euphratic poplar, *Populus euphratica* Oliv. and Willow trees, *Salix acmophylla*. Adults appeared in the middle of May, and its population increased to a peak in July and August and then disappeared in the second week of December. *Salix acmophylla* was the most susceptible species followed by *Populus euphratica* Oliv. and *Populus nigra* L.

The objective of this paper is to officially record the poplar lace bug, *Monosteira unicostata* (Mulsant and Rey, 1852) in Jordan, and its associated predators: the ladybird beetle, *Oenopia conglobata* (Linnaeus, 1758), and a minute pirate bug, *Anthocoris* sp. (Hemiptera: Anthocoridae).

### **Materials and Methods**

Infested poplar leaves were first collected on 30/6/2021 from Al Rabiya, Amman. Observations on other poplar trees in several areas in Amman were conducted. Natural enemies associated with poplar lace bug were also collected. Adult insects of the pest and its natural enemies were mounted on cards to take digital images by a sixty-five mm Macro lens attached to Canon (Canon Inc., Tokyo, Japan) 5D Mark IV. A continuous light source was used from a LED ring light. Helicon Focus (HeliconSoft, Kharkiv, Ukraine) Stacking software was used to reach the required depth of field. Voucher specimens were preserved at the University of Jordan Insects Museum.

#### Results

The bugs feeding on the poplar leaves were identified as the poplar lace bug, *Monosteira unicostata* (Mulsant and Rey, 1852) (Hemiptera: Tingidae) (Figures 1 and 2). This species is recorded from Jordan for the first time. Adults are 2.0 - 2.8 mm long, 0.65 - 0.70 mm wide, and pale brown with black ventral side. The head is reddish-brown, with prominent eyes, and four-segmented antennae. The hemelytra are heavily reticulated and with small brownish spots along their margins. First and second instar nymphs dark-brown, while third to fifth instars are lighter in color and have wing pads (Figure 3) (Talhouk 1977, Neal and Schaefer 2000).

The predator, Oenopia conglobate (Linnaeus, 1758) (Coleoptera: Coccineliidae), was frequently observed on leaves infested with the poplar lace bug (Figure 4). This species is recorded for the first time in Jordan. This lady bird beetle was identified according to the key of Khormizi and Nedvěd (2020) and following Oldřich et al., (2020) description: the elytral background pink or ochraceous, with the black pattern consisting of up to eight pairs of spots in five transverse rows (pattern 2-2-1-2-1) and a narrow black stripe at the suture. The spots are often confluent or fused in European individuals, while they are mostly small and separated in Middle Eastern individuals. The pronotum is white with seven black spots (Oldřich et al., 2020). Oenopia conglobata is found in Asia (China -Xinjiang, Iraq, Lebanon, Syria, Turkey, and Uzbekistan), Europe (Bulgaria, Czechia, Federal Republic of Yugoslavia, France, Germany, Greece, Italy, Lithuania, Norway, Poland, Serbia, and Montenegro), and North America (United States-Texas) (CABI, 2022).

In addition, a minute pirate bug, *Anthocoris* sp. (Hemiptera: Anthocoridae) was seen consuming the immatures of the lace bug (Figure 5).

#### Discussion

*Monosteira unicostata* is a major pest of almonds growing in the Euro-Mediterranean region (Scudder 2013) so searching for this pest in all almond-producing areas is required. The insect life cycle and losses affecting almond trees have been studied in Portugal. The peak of eggs was observed during June and July. The peak of nymphs was recorded



**Figure 1.** An Adult of *Monosteira unicostata* (Mulsant and Rey, 1852).



**Figure 2**. *Monosteira unicostata* (Mulsant and Rey, 1852) feeding on poplar.



Figure 3. Fifth nymphal instar of *Monosteira unicostata* (Mulsant and Rey, 1852).



**Figure 4.** *Oenopia conglobata* (Linnaeus, 1758) (Coleoptera: Coccineliidae) associated with *Monosteira unicostata* (Mulsant and Rey, 1852).

in the first two weeks of August. The peak of adults was observed at the end of July and beginning of August (Pereira *et al.*, 2008). The poplar lace bug annual generations, its distribution, degree of infestation, damage caused, and other natural enemies need full investigation in Jordan. The susceptibility of poplar clones in Jordan for the poplar lace bug should be evaluated. The susceptibility of five poplar clones (*Populus deltoides*)



**Figure 5**. *Anthocoris sp.* (Hemiptera: Anthocoridae) (Dorsal and lateral views) which was seen consuming the immatures of the lace bug.

Batr. —Lux clone; *Populus nigra* L.—58-861 clone and *Populus* × *canadensis* Mönch. —Luisa Avanzo, I-214 and Adige clones) to *Melampsora* sp. fungus and the poplar lace were investigated. Adige and Lux were most tolerant (Fernàndez-Martínez *et. al.* 2013).

The poplar lace bug is expected to reproduce faster in warmer regions in Jordan such as the Jordan Valley and the adjacent areas. Sánchez-Ramos *et al.*, (2017) studied the reproduction, longevity, and life table parameters of *M. unicostata* at constant temperatures of 22, 25, 28, 31, 34 and 37°C, 60  $\pm$  10% relative humidity, and under a L16:D8 photoperiod. The optimum temperature for population increase was predicted at 34.1°C, at which the population doubling time was found to be 3.6 days. Lower and upper thresholds for *M. unicostata* were 14.8 and 38.8°C, respectively. Accordingly, the poplar lace bug is considered a serious pest in the Mediterranean basin with a high-potential risk in a global warming scenario.

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