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Autor(en): **Asadi, Rahil / Talebi, Ali Ashgar / Burckhardt, Daniel**

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## On the identity of the olive psyllids in Iran (Hemiptera, Psylloidea)

RAHIL ASADI<sup>1,4</sup>, ALI ASHGAR TALEBI<sup>1</sup>, DANIEL BURCKHARDT<sup>2</sup>, JAFAR KHALGANI<sup>3</sup>, YAGHOUB FATHIPOUR<sup>1</sup> & SAEID MOHARRAMIPOUR<sup>1</sup>

<sup>1</sup> Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, P. O. Box: 1415-336, Tehran, Iran.

<sup>2</sup> Naturhistorisches Museum, Augustinergasse 2, CH-4001 Basel, Switzerland.  
E-Mail: daniel.burckhardt@unibas.ch

<sup>3</sup> Agricultural Research, Education and Extension Organization, Ministry of Jihad-Keshavarzi, Keshavarz Boulevard, Tehran, Iran.

<sup>4</sup> E-Mail: rahil\_asadi@yahoo.com

Psyllids are probably the most serious pests of olive in Iran. Four names have been used for olive psyllids in Iran (*Euphyllura olivina*, *E. pakistanica*, *E. phillyreae* and *E. straminea*). During field surveys *E. straminea* was found in northern Iran (Provinces Gilan, Qazvin, Zanjan) and *E. pakistanica* in southern Iran (Province Fars). *E. olivina* and *E. phillyreae* do not occur in Iran. An identification table is provided for separating the morphologically similar *E. olivina*, *E. pakistanica* and *E. straminea*.

Keywords: Hemiptera, Psylloidea, *Euphyllura pakistanica*, *Euphyllura straminea*, olive pest, Iran, identification.

### INTRODUCTION

The olive (*Olea europaea* L.) is an economically important crop in Iran. In Fars (southern Iran), as well as Gilan, Qazvin and Zanjan (northern Iran) olive production is hampered by pests causing substantial losses in harvest. Olive psyllids are particularly harmful in the larval stages by removing plant sap and secreting honeydew. Honeydew serves as a medium for the growth of sooty mold which reduces photosynthesis (Zouiten & El Hadrami 2001). The infested trees are easily recognised by white flocculent waxy secretions which are excreted by the larvae (Abou-Kaf & Hamoudi 1999).

*Euphyllura olivina* (Costa) was recorded for the first time from Iran (southern provinces Fars and Kerman, northern province Gilan) by Farahbakhch & Moini (1975). Later Halperin *et al.* (1982) and Burckhardt & Lauterer (1993) added *E. straminea* Loginova. Gegechkori & Loginova (1990) mentioned *E. phillyreae* Foerster from Iran erroneously referring to Loginova (1972). According to Burckhardt & Lauterer (1993) the record of this species in Iran is doubtful. Noyes & Fallazadeh (2005) described an encyrtid parasitoid of *E. pakistanica* Loginova from the Fars province of Iran.

In summary, four names have been used for olive psyllids in Iran (*E. olivina*, *E. pakistanica*, *E. phillyreae* and *E. straminea*). Due to the continuous presence, high infestation and propagation rates resulting in fruit and bud loss, the psyllids are considered as the most important pests of olive trees in Iran. The objective of the present paper is to clarify the nomenclature and taxonomy of olive psyllids in Iran.

## MATERIAL AND METHODS

Surveys were conducted in olive orchards in 6 localities in southern Iran: province Fars (Fasa, Jahrom, Khafr, Sadra, Beiza and Shiraz) and 4 localities in northern Iran: province Gilan (Rudbar), province Qazvin (Qazvin) and province Zanzan (Zanzan, Tarom) (Tab. 1). Samples were collected in summer 2007 and spring 2008. The psyllids were identified by Daniel Burekhardt, Naturhistorisches Museum Basel, Switzerland (NHMB). For comparison material of *E. olivina* from France (NHMB) was studied and is illustrated below.

Tab. 1. Localities of surveyed olive orchards in southern (province Fars) and northern Iran (provinces Gilan, Qazvin and Zanzan) and sampled olive psyllid species (*Euphyllura*).

Province	locality	coordinates N/E in °	altitude in m above sea level	olive psyllid
Fars	Fasa	28.58/53.41	1370	<i>E. pakistanica</i>
Fars	Jahrom	29.92/53.33	1055	<i>E. pakistanica</i>
Fars	Khafr	29.03/53.60	1000	<i>E. pakistanica</i>
Fars	Shiraz	29.32/52.36	1550	<i>E. pakistanica</i>
Fars	Beiza	30.02/52.37	1598	<i>E. pakistanica</i>
Fars	Sadra	29.45/52.40	1580	<i>E. pakistanica</i>
Gilan	Rudbar	36.22/49.27	1230	<i>E. straminea</i>
Qazvin	Qazvin	36.15/50.30	1280	<i>E. straminea</i>
Zanzan	Zanzan	36.41/48.29	1350	<i>E. straminea</i>
Zanzan	Tarom	37.17/49.50	1250	<i>E. straminea</i>

## RESULTS

*Distribution*

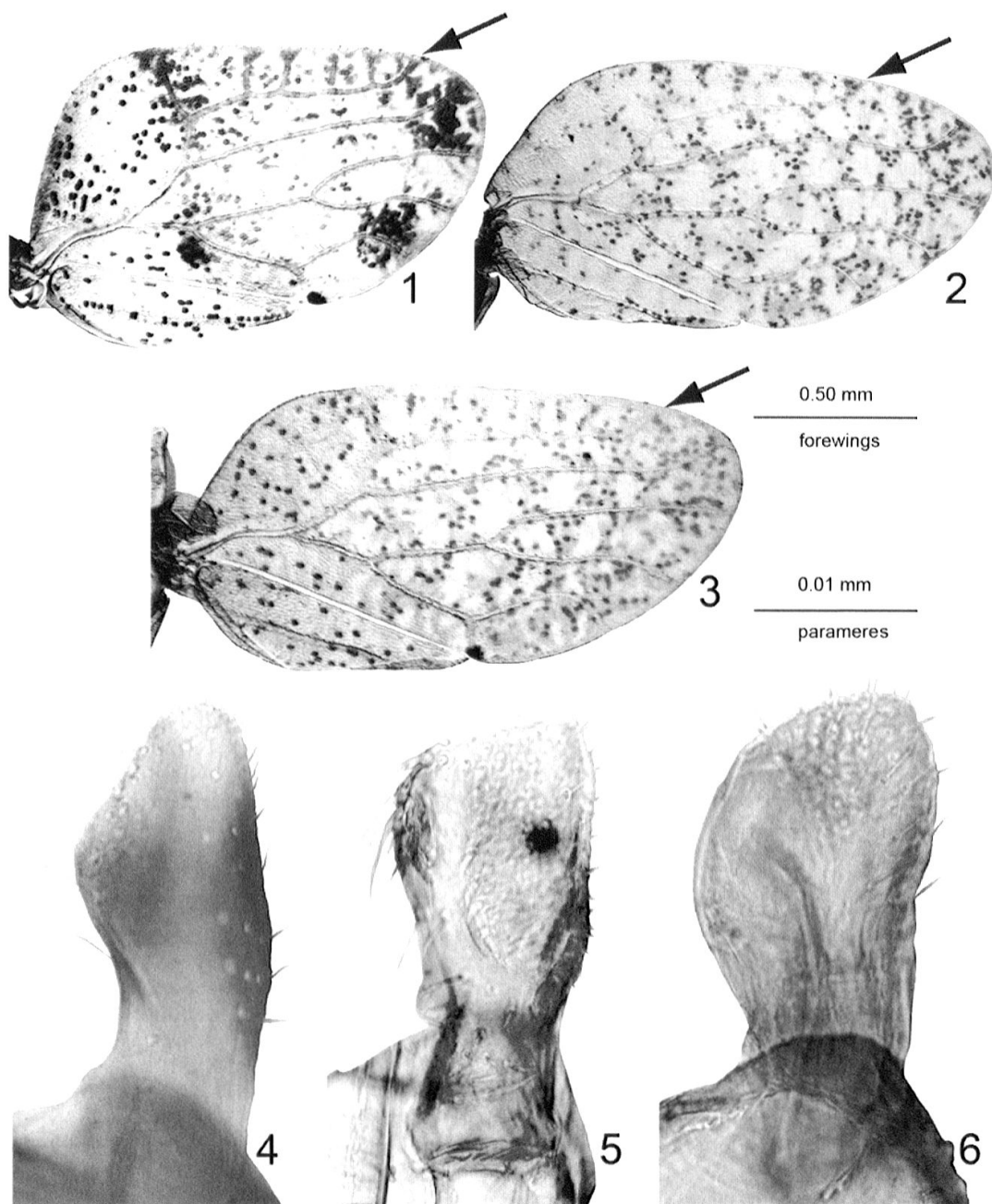
All specimens collected in southern Iran (province Fars) belong to *E. pakistanica*, whereas those from northern Iran (provinces Gilan, Qazvin and Zanzan) are *E. straminea* (Tab. 1). Each sample contained larval stages as well as adult females and males. In the present study we did not find *E. olivina*.

*Identification*

*Euphyllura olivina*, *E. pakistanica* and *E. straminea* are morphologically similar. They can be identified by the pterostigma venation in the forewing and the male paramere shape (Tab. 2; Figs 1–6).

## CONCLUSIONS

Four names have been used for olive psyllids in Iran (*Euphyllura olivina*, *E. pakistanica*, *E. phillyreae* and *E. straminea*). The present study documents the occurrence of *E. pakistanica* in southern and *E. straminea* in northern Iran, respectively. *E. olivina* and *E. phillyreae* do not occur in Iran. *E. pakistanica* was reported from Pakistan, India, Syria and Iran (Loginova 1973; Thakur *et al.* 1997; Noyes & Fallazadeh 2005). In India, it is the most important pest of olive (Virender *et al.* 2007). *E. olivina*, *E. straminea* and *E. phillyreae* are known from the mediterranean



Figs 1–6. Morphological characters of three *Euphyllura* spp. — 1, 4, *E. olivina*; 2, 5, *E. pakistanica*; 3, 6, *E. straminea*. — 1–3, Forewing, arrow indicating apex of pterostigma; 4–6, paramere, lateral view.

region, the most important region of olive cultivation (Abou-Kaf & Hamoudi 1999; Zouiten & El Hadrami 2001; Cotes *et al.* 2007; Kumral *et al.* 2008).

Our findings will be useful in biological control and integrated pest management (IPM) of olive trees in Iran. In fact, the first and crucial step in any IPM programme is to accurately identify the pests (Adams & Clark 1996).

Tab. 2. Morphological characters separating *Euphyllura olivina*, *E. pakistanica* and *E. straminea*.

Morphological characters	<i>E. olivina</i>	<i>E. pakistanica</i>	<i>E. straminea</i>
<b>forewing</b>	Fig. 1	Fig. 2	Fig. 3
pterostigma length	long, see arrow	short, see arrow	long, see arrow
number of veins on pterostigma	many	few or absent	many
<b>paramere</b>	Fig. 4	Fig. 5	Fig. 6
apex	subacute	obliquely truncate	obliquely truncate
foremargin	angular	sinuous	broadly rounded, convex

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