J Insect Biodivers Syst 03(3): 273–279

ISSN: 2423-8112

OPEN ACCESS

JOURNAL OF
INSECT BIODIVERSITY AND SYSTEMATICS

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Poplar tree blotch leaf-miner, *Fenusella hortulana* (Klug) (Hymenoptera: Tenthredinidae), a new pest of *Populus* in Iran with review of its geographical distribution

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Received:
09 August, 2017

Accepted:
02 October, 2017

Published:
06 October, 2017

Subject Editor:
Marko Prous

ABSTRACT. Poplar tree blotch leaf-miner, *Fenusella hortulana* (Klug, 1818) (Hym.: Tenthredinidae) is widely distributed in the West Palaearctic. During field surveys in the northwest of Iran, we recently found this species in Sarab, East-Azarbaijan Province. It was reared on *Populus nigra* Linnaeus. Its geographical distribution is mapped and some biological features are discussed.

Key words: Symphyta, sawfly, range extension, East-Azarbaijan, new pest, *Populus nigra*

Citation: Lotfalizadeh, H., Shiri, T & Liston, A.D. (2017) Poplar tree blotch leaf-miner, *Fenusella hortulana* (Klug) (Hymenoptera: Tenthredinidae), a new pest of *Populus* in Iran with review of its geographical distribution. *Journal of Insect Biodiversity and Systematics*, 3 (3), 273–279.

Introduction

Poplar trees (*Populus* spp.) are used worldwide in landscaping and agriculture, and have become known as "the trees of the people" (Gordon, 2001). They have a phenomenal potential for wood production. Therefore, they have an economic value when used for: 1) building homes; making tools and medicines, 2) protecting river banks, 3) windbreaks and shelterbelts, 4) the pulp and paper industry (Berguson, Eaton & Stanton, 2010), 5) provide environmental benefits such as phyto-remediation, soil carbon sequestration, reduction in sediment run-off, improvement in soil quality, and habitats for wildlife (Stanton et al., 2002). The most common recent uses have been for bioenergy, phytoremediation and watershed protection, and some argue that poplars could play an important role in solving twenty-first century economic and environmental problems as both human populations and greenhouse gas emissions rise (Gordon, 2001).

With growth rates from 5 to 10 feet per year (depending on the variety and location), poplars are some of the fastest growing temperate trees (Stanturf et al., 2001). Since Iran is located in arid and semi arid zones, and has little forest cover (less than 10%), poplar plantations play a major

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role, especially in the mountainous areas, with about 150,000 ha of *Populus nigra* and *P. alba* in cultivation (Alimohamadi, 2012).

These species have been attacked by numerous insect pests such as leaf beetles, aphids, xylophagous beetles and leaf miners (Lotfalizadeh & Ahmadi, 1998; Babmorad & Sadeghi, 2004; Abaii, 2009). Babmorad & Sadeghi (2004) reported 43 species of poplar pests, while Abaii (2009) listed 120 species in 11 orders and 45 families as pests of *Populus* spp. in Iran. Although Georgiev (2005) listed 300 phytophagous species from this host plant in Bulgaria, including ten Tenthredinidae (Hymenoptera) in eight genera. No tenthredinid species has been registered on *Populus* in Iran. Only a single lepidopterous leaf miner, *Phyllonorycter populifoliella* (Treitschke, 1833) (Lep.: Gracillariidae), has been recorded on *Populus* in Iran (Babmorad & Sadeghi, 2004; Zargaran et al., 2010; Sadeghi et al., 2011). *Fenusella hortulana* has recently been reported from Alborz province of Iran (Khayrandish et al., 2017). This paper reports the presence of this pest on poplar trees in Iran and its geographical distribution in the World.

Material and methods

Our recent study in the southeast of East-Azarbaijan Province showed that a local population of *Populus nigra* in Sarab (37°56'N & 47°38'E, 1701m), was seriously infested with a leaf miner. After rearing larvae in the laboratory we obtained some tenthredinid sawflies. They were examined and compared with descriptions and identification keys (Arru, 1967; Pschorn-Walcher, 1982; Zhelochovtsev, 1988).

Specimens are deposited in the insect collection of the Department of Plant Protection, East-Azarbaijan Research & Education Center for Agriculture & Natural Resources, Tabriz, Iran, and three females in the collection of the Senckenberg Deutsches Entomologisches Institute, Müncheberg, Germany.

To estimate infestation levels, on 1 June 2017 we sampled 50 branches with a total of about 1000 leaves.

Results

Collected specimens were identified as *Fenusella hortulana* (Klug). This is the first report of its serious local damage to *Populus nigra* in the country. Simultaneously, this is the first Tenthredinidae species recorded on *Populus* spp. in Iran, although Georgiev (2005) listed 10 species feeding on different poplar species and clones in Bulgaria.

***Fenusella hortulana* (Klug, 1818) (Hym.: Tenthredinidae)**

Material examined: Iran, East-Azarbaijan province, Sarab, 37°56'N & 47°38'E, 1701m, 5.May.2016 & 22.May.2017, T. Shiri leg., 8 ♀♀.

Diagnostic characters for the identification of *F. hortulana* (Figs 2A–D) are, briefly: clypeus, labrum, and mandible whitish; thorax with tegula, upper mesepisternum, and two spots on the mesoprescutum yellowish to light orange; legs yellowish-orange (except sometimes bases of coxae), pronotum with a V-shaped yellow mark; and abdomen black except sometimes pale apical margins of segments.

Our sampling on the first of June showed that about 12.10% of leaves were affected, that about 76% of leaves had only one mine with a surface about 1cm², and that the rest had two mines (Figs 1B–C). Compared to a severe infestation reported from Turkey (Erzurum) (Güçlü & Özbek, 1999) with up to 12 larvae in each leaf, it seems that infestation in Iran is not severe: it could be controlled with natural enemies, but needs to be kept under regular observation.

Geographical distribution (Fig. 3)**:** This pest was described based on female syntypes collected at Berlin, Germany. It is presumed to be native in the West Palaearctic, but has been introduced to Massachusetts, North America (Smith, 1971).

Figure 1. *Populus nigra* infested with *Fenusella hortulana*: **A**. Infested area in Sarab; **B**. Infested branch in close up; **C**. Infested leaf containing larvae, **D**. Mature mines.

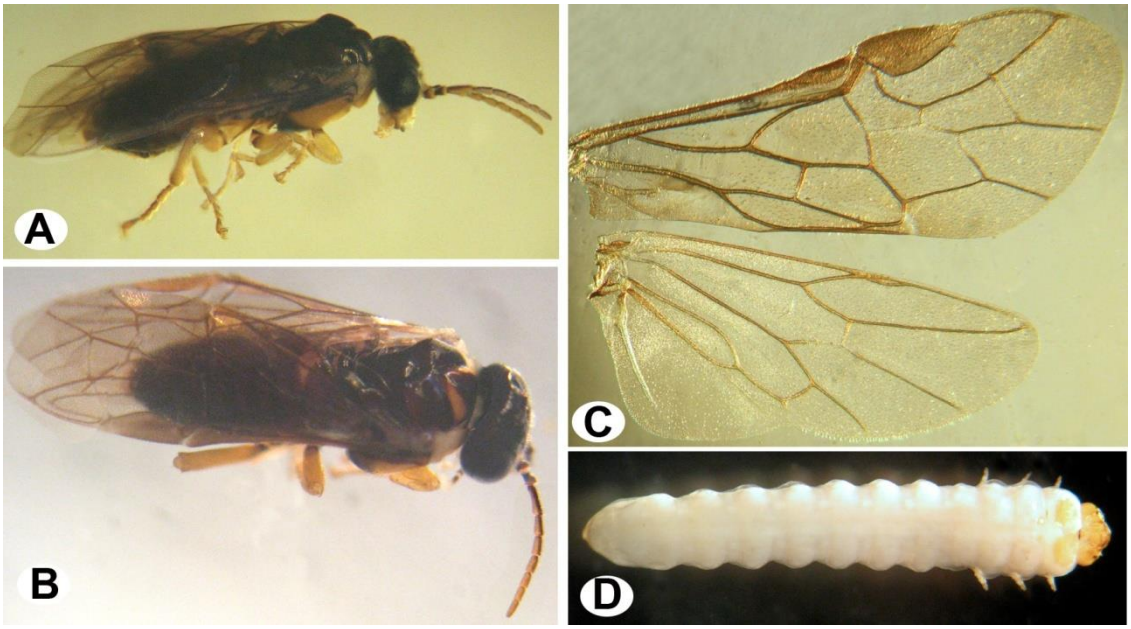

Figure 2. *Fenusella hortulana*: **A**. Adult in lateral view; **B.** Adult in dorsal view; **C**. Fore and hind wings; **D**. Final larval instar in dorsal view.

Figure 3. Worldwide distribution map of *Fenusella hortulana.*

There are records from many central and southern European countries, from Ireland in the West, to Romania and European Russia in the East, Spain and Italy in the South, and Denmark in the North (Taeger et al., 2006). In other parts of the West Palaearctic it has been recorded from the High Atlas Mts, Morocco (Lacourt, 1988); Bishkek and Tashkent, Kirgizia (Zhelochovtsev, 1988); Erzurum, Turkey, (Güçlü & Özbek, 1999); Alborz province, Iran (Khayrandish et al., 2017) and East-Azarbaijan province, Iran (current study) (Fig. 1A).

Discussion

This pest certainly reduces the green surface of leaves, but Arru (1967) mentioned that when numerous larvae occur in the same leaf, it can completely destroy it, causing defoliation of trees. The severe damage caused by this sawfly can expose poplar trees to subsequent attacks by other pests such as xylophagous insects.

Flight period of adults in the study area was from mid April until mid May. The same period was reported in the Netherlands (van Frankenhuyzen, 1974), but in Italy it was from late March to mid April (Arru, 1967). It has one generation annually in Iran, and a feeding period of about one month, as have European populations (Pschorn-Walcher, 1982). Larvae left the mines in early June. This falls within the period from mid May to mid June given for cocoon formation in Italy (Arru, 1967). This pest overwinters as a final larval instar in the studied area (Fig. 2D).

Acknowledgments

We thank Dr. D.R. Smith (USDA, ARS, Washington D.C., USA) for supporting us with some literatures and confirming of species identification.

Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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مینوز تاولی صنوبر *Fenusella hortulana* (Klug) (Hymenoptera: Tenthredinidae)، آفت جدید درختان صنوبر در ایران و مروری بر پراکنش جغرافیایی آن در دنیا

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تاریخ دریافت: ۱۸ مرداد ۱۳۹۶، تاریخ پذیرش: ۱۰ مهر ۱۳۹۶، تاریخ انتشار: ۱۴ مهر ۱۳۹۶

چکیده: مینوز تاولی صنوبر *Fenusella hortulana* (Klug, 1818) از زنبورهای خانواده Tenthredinidae به طور گسترده در غرب پالهآرکتیک پراکنش دارد. در طی مطالعات مزرعه‌ای در شمال‌غرب کشور، این گونه در اطراف شهرستان سراب از استان آذربایجان‌شرقی مشاهده شد. این آفت از روی درخت صنوبر، گونه *Populus nigra* Linnaeus پرورش داده شد. در این مقاله پراکنش جغرافیایی آن طی نقشه‌ای ارائه شده و برخی از مشخصات زیستی مشاهده شده در منطقه با سایر نقاط دنیا مقایسه گردید.

واژگان کلیدی: Symphyta، زنبورهای گیاه‌خوار، دامنه گسترش، آذربایجان‌شرقی، آفت جدید، *Populus nigra*.