New record of species complex of Chloropidae (Insecta: Diptera) from sugarcane fields in Iran

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This research was conducted in 2015 to determine the Chloropidae fauna of sugarcane fields in Khouzestan Province (Iran). Chloropid flies were collected using sweeping nets before harvesting of sugarcane varieties. As a result of this survey 10 species from two subfamilies were identified: Aphanotrigonum cinctellum (Zetterstedt 1848) and Oscinella pusilla (Meigen 1830) (subfamily Oscinellinae); Lasiosina herpini (Guérin-Ménéville 1843), L. paralittoralis (Dely-Draskovits 1981) Meromyza nigriventris (Macquart 1835), Thaumatomyia sulcifrons (Becker 1907), T. notata (Meigen 1830), T. glabra (Meigen 1830), Platycephyla umbraculata (Fabricius 1798) and P. rugosa (Nartshuk 1964) (subfamily Chloropinae). P. umbraculata and P. rugosa are new for Iran fauna and all species are new to Khouzestan Province. Besides them, we identified two genera Conioscinella sp. and Elachiptera sp.

Keywords: Diptera, Chloropidae, Iran, Sugarcane, New records.

Nouvelle description d’un complexe d’espèce de Chloropidae (Insecta: Diptera) sur la canne à sucre en Iran, identifié comme nouveaux ravageurs de cette culture.

Cette recherche a été conduite en 2015 pour déterminer la faune des Chloropidae de la canne à sucre dans la province du Khouzestan (Iran). Les mouches Chloropidae ont été collectées en utilisant des filets fauchoir avant la récolte des variétés de canne à sucre. Suite à ce suivi, 10 espèces de deux sous-familles ont été identifiées : Aphanotrigonum cinctellum (Zetterstedt 1848) et Oscinella pusilla (Meigen 1830) (sous-famille Oscinellinae); Lasiosina herpini (Guérin-Ménéville 1843), L. paralittoralis (Dely-Draskovits 1981) Meromyza nigriventris (Macquart 1835), Thaumatomyia sulcifrons (Becker 1907), T. notata (Meigen 1830), T. glabra (Meigen 1830), Platycephyla umbraculata (Fabricius 1798) et P. rugosa (Nartshuk 1964) (sous-famille Chloropinae). P. umbraculata et P. rugosa sont nouvelles pour la faune iranienne et toutes les espèces sont nouvelles pour la province de Khouzestan. À côté de ces espèces, nous avons identifié deux genres Conioscinella sp. et Elachiptera sp.

Mots-clés: Diptera, Chloropidae, Iran, Canne à sucre, Nouvelles descriptions.

1 INTRODUCTION

Sugarcane is a strategically cash crop in tropical and sub-tropical regions and this plant has an effective economical role in different countries producing sugar and ethanol (James, 2004). In the context of intensifying sugarcane production with new plantations, more diversity of cultivars, and the pressure of climate change and agricultural practices, the fauna of insects associated with sugarcane has evolved and changed. This is particularly the case in Iran, where in recent years; the number of insects found in sugarcane fields has increased. The family Chloropidae is one of the most species-rich families of Diptera with 204 genera and more than 2500 described species (Nartshu, 2012). These flies are widely distributed in different agro-ecosystems with the exception of Antarctica (Bazyar et al., 2015; Raspi, 1996). Chloropidae are small flies, usually 1.5-5 mm in length, rarely longer than 5 mm, black, yellow or
reddish, with or without black and reddish stripes (Sabrosky, 1989). They are usually named as grass flies or fruit flies and some species as sore gnats. Characteristically, chloropids have a large triangular plate on the front which this frontal triangle is obviously bare and polished (Sabrosky, 1989). Habitat of chloropid larvae is diversify, some of them are phytophagous on vegetative or generative parts of cereals and other monocotyledons (Poaceae, Cyperaceae, Juncaceae); some of larvae produce galls on plants and other species are saprophagous, and develop in damaged stems, fruits or in galls (Bazyar et al., 2015). Some of the Chloropidae are predators; larvae are carnivorous, live in ground among rhizome of plants and feed on root aphids (Nartshuk, 2012). Some of chloropid larvae are secondary invaders, sapro-phytophagous, developing in shoots of Poaceae, which are damaged by other insects. Also, some species including Platicephala, acts as biological control agent of Common Reed (Phragmites australis (Cav) Trin. ex Steud 1841).

Some genera of Chloropidae are important in human health which can transmit bacterial diseases and have a tendency to wounds (Deeming & Al-Dhafer, 2012; Sabrosky, 1941). This faunistic study is not only the first one in sugarcane fields in Iran but is the first report of Chloropidae from world fauna of sugarcane as well.

2 MATERIALS AND METHODS
The faunistic study was carried out at Salman Farsi Agro-industry Farms (48°35’ E, 31°8’ S) Ahwaz, Iran. All chloropid flies were collected by standard sweep nets in sugarcane fields (varieties IRC99-02 and CP69-1062) during September until November 2015. The collected chloropid samples were killed in a medium-size jar containing potassium cyanide. All killing insects were transmitted to vials which contained alcohol at 70 %. The collected flies were double pinned and labeled. Paper by Ismay & Nartshuk (2000) was used to identify material to the genera level, and Duda (1932) and more new revision of the different genera to identify the species level.

3 RESULTS
List of species
Subfamily Oecinellinae
Aphanotrigonum cinctellum (Zetterstedt 1848), 2 specimens.

Synonym Oscinis fasciella Zetterstedt 1855.
Distribution: Nearly the all the Palearctic Region, except high latitudes and north part of the Oriental Region.
Biology: Larvae secondary invaders, saprophytophagous.

Conioscina sp., 1 female.
Biology: larvae of the known species of the genus are phytophagous in shoots of Poaceae.

Elachiptera sp., 1 female.
Biology: Larvae secondary invaders, saprophytophagous, develop in shoots of Poaceae and Cyperaceae damaged by other insects. Occur in shoots of cereals as well (Bazyar, 2011).

Oscinella pusilla (Meigen 1830), 11 specimens
Description: Body black. Frons dull with smooth shining ocellar triangle, which extends front of frons. Postpedicel rounded. Genae a little wider than postpedicel. Scutum and scutellum black dusted. Pleuron mainly shining. Femora black, fore and mid tibiae yellow, hind tibia yellow with black band in the middle. Body length 1.5-2.0 mm.
Distribution: Common species. Nearly the all Palearctic Region.
Biology: Larvae phytophagous, develop in shoots of different grasses (Poaceae), pest of cereals (wheat, rye, barley) (Tschirnhaus & Nartshuk, 2012).

Subfamily Chloropinae
Lasiosina herpini (Guérin-Méneville 1843), 10 specimens (6 female, 4 male).
Synonym Lasiosina cinctipes auct, not Meigen 1830.
Description: Head broader than deep or long. Frons wider than long, yellow with black setae and setulae. Ocellar triangle extends by main part
a half on frons and continues as line front of frons, yellow with two black spots, one on ocellar tubercle and another romboi spot on apex. Genae wider than postpedicel. Postpedicel rounded, yellow, darkened around insertion of arista in male and black in female. Palpi yellow in male and black in female. Scutum yellow with 3 black thickly grey dusted stripes, scutellun yellow. Pleuron with four black marks. Triangular spot on katepisternum completely dusted or shining at anterior and posterior ends in some specimens. Abdomen covered with black setulae. Legs yellow. Body length 2.5-3.0 mm.

Distribution: Near all Palearctic Region, except high latitudes.

Biology: Larvae secondary invaders, saprophyphagos, develop in shoots of Poaceae, damaged by other insects. Occur in cereal shoots as well.

*Platyccephala umbraculata* (Fabricius 1794), 1 male, 1 female.


Description: Body yellowish brown. Frons as long as wide, slightly produced anteriorly. Prefrons with a median carina. Ocellar triangle large, smooth, occupies nearly all fronts, but lateral margins a little incurved, with median shallow, covered some small punctures with small setulae inserted from punctures. Postpedicel 3 times longer than deep, narrowed to apex. Apical segment of arista distinctly pubescent, white. Genae roughly wrinkled, behind as wide as eye. Vibrissal setae absent. Scutum shining, with brownish stripes, roughly punctured. Scutellum rounded behind with apical setae nearly a half as long as scutellum, subapical setae absent. Pleuron with pale punctures. Abdomen flattened, long narrow. Legs with thickened hind femora and curved hind tibiae. Body length 4-6 mm.

Distribution: Widely distributed in the Palearctic Region from Europe to Japan.

Biology: Larvae phytophagous, develop in shoots of Common Reed (*Phragmites australis*).

*Platycephala rugosa* (Nartshuk 1964), 1 female.

Scutellum rounded distally. Pleuron with pale punctures. Abdomen flattened, long narrow. Legs with faintly thickened hind femora. Body length 4-6 mm.  
Distribution: South-eastern part of Europe (Orenburg district), Kazakhstan, Middle Asia Nartshuk 2012).  

*Thaumatomyia glabra* (Meigen 1830), 2 specimens (1 female, 1 male).  
Description: Frons slightly longer than wide. Ocellar triangle large, mostly black, linearly yellow on sides and poster lateral cornes. Genae very broad. Postpedicel about 1.2 times as long as broad, distally brown, basally yellow. Only outer vertical setae distinct from head setae. Scutum glabrous with 3 broad black stripes, all of which extend to scutellum. Setulae covered scutum very minute. Scutellum flat, nearly bare, apical setae black approximated. Abdomen black dorsally. There is a large membranous vesicula between 5 tergite and epandrium. Body length 2.3-2.6 mm.  
Distribution: Nearctic species, widely distributed in the Palearctic Region.  
Biology: Larvae carnivorous live in ground among rhizome of plants and feed on root aphids.  

*Thaumatomyia notata* (Meigen 1830), 8 specimens (4 female, 4 male).  
Description: Frons nearly as long as wide. Ocellar triangle from black to yellow with median black stripes of different wide, with 2-3 roughly arranged rows setulae along lateral sides. Genae narrow, nearly 1/3 of postpedicel. Postpedicel nearly orbicular or sometimes very slightly broader than long, almost entirely black or brownish basally. Only outer and inner vertical setae rather strong from cephalic setae. Scutum with 5 black or partly or entirely reddish-yellow stripes not reaching scutellum. Scutellum flat, apical setae approximated. Pleuron with black or red spot on katepisternum. There are two membranous vesiculae between 5 tergite and epandrium. Body length 2.0-2.5 mm.  
Distribution: Multiregional species, occurs in the Palearctic, Oriental and Afrotopical Regions  
Biology: Larvae carnivorous live in ground among rhizome of plants and feed on root aphids.  

4 DISCUSSION  
In our study a total of 12 species were found and the complex of chloropid is shown in Figure 1. But two of them identified only at the genus level, as they were represented only by one female each. Two species which are marked by asterisk are new to Iranian Chloropidae fauna. All species not only are new to Khuzestan Province but all are reported for the first time from sugarcane as well.  

The most completed list of Iranian Chloropidae fauna was published by Bazyar et al. (2015). It contains 50 species from 20 genera (39 identified to species level). Examined materials were collected from sugarcane fields. We can compare our list with the list of Chloropidae, collected on agricultural localities, on *Medicago sativa* (L), *Hordeum* spp., *Vigna sinensis* (Endl), *Solanum tuberosum* (L), *Dacus carota* (L), *Beta vulgaris* (L), *Allium sepa* (L) and others in Makrazi Province of Iran (Rabieh et al., 2012). Six species from 12 (50 %) listed in Rabieh et al. paper's are found on sugarcane fields as well. Species *Lasiosina herpini*, *Meromyza nigriventris*, *Thaumatomyia glabra*, *T. notata* and *T. sulcifrons* are common in the agricultural landscape in other parts of the Palearctic Region (Nartshuk, 1971).  

Four groups of species ecologically different are distinguished in the examined material. Species *Aphanotrigonum cinctellum*, *Lasiosina herpini*, *L. paralittoralis* are secondary invaders, their larvae are saprophytophagous, develop in decaying plant tissues of plants, including cereals. They can develop on sugarcane plants damaged by other insects. Next group includes species with phytophagous larvae develop in shoots of cereals (wheat, barley) and wild grasses: *Oscinella pusilla* and *Meromyza nigriventris*. We found that *Meromyza nigriventris* caused webs on sugarcane leaves (Figure 2) and this species is reported here as a new pest of world sugarcane fauna.
M. nigriventris was earlier known as pest of wheat, larvae feed on yang shoots of cereals. Central leaf of shoots become yellow and dry, and then all shoots dry. We not found in the literature mention on M. nigriventris as a pest of sugarcane. Further studies on biology and ecology of this new pest are required.

The third group includes two species Platycephala umbraculata and P. rugosa with larvae, as far as known, develops on Common Reed (Phragmites australis). They are indifferent in sugarcane. Lastly fourth group contains three carnivorous species of the genus Thaumatomyia: T. glabra, T. notata and T. sulcifrons. Larvae of these species are, as far as known, predators of root aphids live in rhizome of plants. Larvae of another species of the same genus T. elongatula (Becker, 1910) feed on aphids which live on tree trunks and branches (It is necessary to conduct further observation on feeding behavior of larvae of T. glabra, T. notata and T. sulcifrons). Not improbably that larvae of these species can feed on larvae of whiteflies (Allerodidae) living on leaves of sugarcane.

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