Faunistic study of the fruit flies (Diptera, Tephritidae) in the United Arab Emirates, with a new record and an updated checklist

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ABSTRACT. Collecting of terphritid fruit flies at four sites in the United Arab Emirates (UAE), resulted in the presence of eleven species. *Capparimyia savastani* is reported for the first time from UAE fauna. The number of UAE Tephritidae fauna is increased to 34. The first checklist of fruit flies of UAE is also provided.

Key words: Fauna, Arabian Peninsula, Tephritidae, UAE, new record, checklist

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Introduction

With about 5,000 described valid species, the Tephritidae (true fruit flies) is one of the largest family of acalyptate Diptera (Pape et al., 2011). Most tephritid species are phytophagous and some species are serious pests in agricultural ecosystems (White & Elson-Harris, 1992). Some species are beneficial and effectively used in biological control programs (White & Elson-Harris, 1992).

UAE is a country in South West Asia covering an area of 83,600 km². It is bordered in the north by the Persian Gulf and Gulf of Oman; in the west by Saudi Arabia and in the east by Oman. It occupies a spectacular position near the junction of the Palaeartic and Afrotropical zoogeographic regions. The first taxonomic studies in the UAE fauna literature were mainly focused on insect pests (van Harten, 2005; White, 2006). Later, the number of species recorded from UAE was increased by Merz (2008, 2011) where he described *Euarestella korneyevi* Merz, 2011, *Euarestella vanharteni* Merz, 2008, *Oxyaciura nigra* Merz, 2008 and recorded dozens of species. Thirty-three species of fruit flies were known up to date from UAE. In the studies on fruit flies fauna of the UAE, several specimens of fruit flies were collected, and one species identified as a new record for UAE fauna.
Material and methods

Material was collected by a standard sweeping net. The main study site was the western flank of Jebel Hafeet, in Al Ain, UAE, where most of the specimens were collected in 2014, 2015, 2018 and 2020. The other sites were Wadi Wurayah, Fujairah, Green Mubazzarah and a private garden in Muwaiji, Al Ain. Collected material was stored in 75% isopropyl alcohol or pinned and deposited in the insect collection of Jalal Afshar Zoological Museum, University of Tehran, Iran (JAZM) and personal collection of the first author (SMNC). Species were identified according to Hendel (1927), Freidberg & Kugler (1989), White & Elson-Harris (1992), Merz (2002), De Meyer & Freidberg (2005) and White (2006). Morphological terminology follows White et al. (1999). Field photos (Fig. 1) were taken using Nikon D850 body with Nikon AF-S Micro Nikkor 105mm f/2.8G IF-ED VR, along with R1 Wireless Close-Up Speedlight System. Stack photos of pinned specimens (Fig. 3) were taken using Nikon D850 body, using Laowa 25mm f2.8 2.5X ultra-macro lens and Laowa 60mm f/2.8 2X ultra-macro lenses.

Results

The subfamilies, tribes and species are listed in alphabetic order. Detailed morphological descriptions are not given. For further information, refer to the works of Hendel (1927), White (2006), Freidberg & Kugler (1989) and Merz (2008).

Subfamily Trypetinae Loew, 1861

**Bactrocera zonata** (Saunders, 1842) (Fig. 2C, D)

Material examined: UAE, Ain Al Waal, Al Ain (24°4’14.81″ N, 55°44’49.54″ E), 1♀, 24.III.2020, swept on *Ochradenus aucheri*. leg. Huw Roberts (JAZM).

Distribution: This species is native to Oriental region (India, Bangladesh, Laos, Myanmar, Pakistan, Sri Lanka, Thailand and Vietnam) and later introduced to USA, North Africa (Libya, Egypt and Sudan), Mauritius and Réunion, Arabian Peninsula, Iran and Israel (Norbom et al., 1999; White, 2006; Merz, 2008; CABI, 2020).

Capparimyia savastani** (Martelli, 1911) (Fig. 2A, B)

Material examined: UAE, Ain Al Waal, Al Ain (24°4’14.81″ N, 55°44’49.54″ E), 1♂, 6.XII.2018, swept on *Capparis sinaica* Veillard. leg. Huw Roberts (SMNC).

Distribution: Spain, France, Italy, Greece, Malta, Cyprus, Morocco, Algeria, Tunisia, Libya, Egypt, Israel, Lebanon, Jordan, Iran, Oman, Yemen and Pakistan (Freidberg & Kugler 1989; Norrbom et al., 1999; Donati & Belcari, 2003; De Meyer & Freidberg, 2005; Merz et al., 2006; Miranda et al., 2008; Papachristos et al., 2009; Gahhari, 2013; Moussa & Yammouni, 2014; El-Harym & Belqat, 2017; Demetriou & Kryfos, 2020) (new record for UAE) (Fig. 1).

Host plants: *Capparis sinaica* Veillard, *C. spinosa* L. and *C. aegyptia* Lam. (Freidberg, 1990; Freidberg & Kugler, 1989).

Diagnosis: This species can be distinguished from other species of *Capparimyia* with the following characters: Arista pubescent; first flagellomere rounded apically; two pairs of orbital setae; black postpronotal spot restricted to the base of postpronotal seta; white medial scutal vitta extending anteriorly beyond transverse suture and joining posteriorly to white band in basal part of scutellum; white medial vitta extending anteriorly to or just beyond transverse suture; black apical scutellar spots narrowly separated along entire length (De Meyer & Freidberg, 2005).
Figure 1. Worldwide distribution map of *Capparimyia savastani* (Diptera: Tephritidae).

*Dacus ciliatus* Loew, 1862 (Figs. 3A, 2E, 2F)

**Material examined:** UAE, Ain Al Waal, Al Ain (24°4′14.81″ N, 55°44′49.54″ E), 1♂, 1♀, 15.I.2015, swept on *Calotropis procera* and *Ochradenus arabicus*; 1♂ 7.4.2020, same locality, leg. Huw Roberts (JAZM, SMNC).

**Distribution:** Senegal E to Somalia, S to South Africa, Madagascar, Arabian Peninsula, Egypt, Israel E to Burma (Norrbom et al., 1999; Merz, 2008).

**Remarks:** This species is similar to *D. frontalis* Becker; the distribution of these two species overlaps in many Afrotropical countries. The most important character to differentiate them is the color of anatergite and katatergite which are whitish yellow in *D. frontalis* (only katatergite is yellowish in *D. ciliatus*). Some specimens of *D. ciliatus* from Iran and Morocco showed intermediate coloration with small yellowish spot on anatergite (Mohamadzade & El Harym, unpublished data), and indicated that molecular analysis is needed to understand the taxonomic position of these possibly cryptic species.

*Dacus longistylus* Wiedemann, 1830 (Fig. 2G, H)

**Material examined:** UAE, Ain Al Waal, Al Ain (24°4′14.81″ N, 55°44′49.54″ E), 1♂, 2♀, 31.I.2020, swept on *Calotropis procera*, leg. Huw Roberts (JAZM).

**Distribution:** Africa, Middle East to Yemen (Norrbom et al., 1999; White, 2006).

*Dacus persicus* Hendel, 1927 (Fig. 3B)

**Specimens examined:** UAE, Ain Al Waal, Al Ain (24°4′14.81″ N, 55°44′49.54″ E), 1♂ 14.XII.2013; same locality, 1♀ 17.10.2014; same locality, 1♂, 1♀, 15.I.2015 (SMNC); same locality, 1♂ 17.XII.2015; Wadi Wurayah, Fujairah (24°5′50.93″ N, 55°45′8.63″ E), 1♀ 10.IV.2014, swept on *Calotropis procera*, leg. Huw Roberts (JAZM).
Figure 2. General habitus of fruit flies (Diptera: Tephritidae) collected in UAE. A-B. Capparimyia savastni, C-D. Bactrocera zonata, E-F. Dacus ciliatus, G-H. D. longistylus.
Distribution: Arabian Peninsula, Iran, Pakistan, India and Sri Lanka (Norrbom et al, 1999; Merz, 2008).
Remarks: This species is similar to *D. longistylus* but the wing marking is reduced and has shorter ovipositor than *D. longistylus* (in *D. pericus*, ovipositor is shorter than abdominal tergite 3-5 combined but in *D. longistylus* the ovipositor is as long as abdomen but there is a large variation in the length of ovipositor in both species). There is a variation in the presence of lateral postcutural yellow vitiae on the scutum of both species. They also have same host plant (*Calotropis procera*) but as White (2006) also suggested before, *D. persicus* might be a geographic variant of *D. longistylus* and the size variation may be due to differences between host fruits they consume in different geographic regions. Molecular analysis is needed to understand the taxonomic position of these possibly cryptic species.

Subfamily Tephritinae Newman, 1834

*Goniurellia lacerata* (Becker, 1913) (Fig. 3C, D)
Material examined: UAE, Ain Al Waal, Al Ain (24°4’14.81” N, 55°44’49.54” E), 1♀, 3.II.2015, swept on *Calotropis procera*, leg. Huw Roberts (SMNC).
Distribution: Egypt, Iran and UAE (Norrbom et al., 1999; Merz, 2008).

*Goniurellia octoradiata* Merz, 2002 (Fig. 3E)
Material examined: UAE, Ain Al Waal, Al Ain (24°4’14.81” N, 55°44’49.54” E), 1♂, 19.III.2014, swept on *Pulicaria glutinosa*; same locality, 1♂, 2.V.2020, leg. Huw Roberts (SMNC).
Distribution: Oman and UAE (Merz, 2002, 2008).

*Goniurellia tridens* (Hendel, 1910)
Material examined: UAE, Ain Al Waal, Al Ain (24°4’14.81” N, 55°44’49.54” E), 1♀, 16.XI.2015, leg. Huw Roberts (SMNC).
Distribution: Israel, Armenia, Turkmenistan, Uzbekistan, Iraq, Iran, Saudi Arabia, UAE, Pakistan and India (Zaitzev, 1947; Norrbom et al., 1999; Korneyev & Dirlbek, 2000; Merz & Dawah, 2005; Merz, 2008)

*Goniurellia* sp. (Fig. 3F)
Material examined: UAE, Ain Al Waal, Al Ain (24°4’14.81” N, 55°44’49.54” E), swept on *Pulicaria glutinosa*, 1♀, 18.III.2014, leg. Huw Roberts (SMNC).
Remarks: This specimen is morphologically and in wing pattern similar to the *G. octoradiata* Merz, but smaller hyaline spot in *r*₁ cell is penetrated into *r*₁⁺ and the abdominal tergites are pale reddish brown (dark gray in *G. octoradiata*). More material is needed in order to study the variability of different specimens.

*Metasphenisca negeviana* (Freidberg, 1974) (Fig. 3G)
Material examined: UAE, Green Mubazzarah, Al Ain (24°5’50.93” N, 55°45’8.63” E), 1♀, 8.IV.2010, found on *Blepharis ciliaris*, leg. Huw Roberts (SMNC).
Distribution: Israel, Egypt, Jordan, Saudi Arabia UAE, Yemen (Freidberg & Kugler, 1989; Korneyev & Dirlbek, 2000; Merz & Dawah, 2005; Merz et al, 2006; Merz, 2011)
Figure 3. General habitus of fruit flies (Diptera: Tephritidae) collected in UAE. A. Dacus ciliatus, B. D. persicus, C-D. Goniurellia lacerata, E. G. octoradiata, F. Goniurellia sp., G. Metasphenisca negeviana, H. Trupanea pulcherrima.
Trupanea pulcherrima (Efflatoun, 1924) (Fig. 3H)

Material examined: UAE, Ain Al Waal, Al Ain (24°4′14.81″ N, 55°44′49.54″ E), 2♀, 6.II.2014, swept on Ochradenus arabicus, leg. Huw Roberts (JAZM, SMNC).

Distribution: Algeria, Tunisia, Egypt, Israel, Saudi Arabia, UAE and Iran (Norrbom et al., 1999; Merz, 2008; El Harym & Belqat, 2017).

Discussion
In this study eleven species of fruit flies were collected from 3 sites in the UAE. Ten of them were identified at species level, and one species of Goniurella remains unnamed. Merz (2011) also reported that several undescribed Goniurella are represented in the UAE but the brief descriptions of those samples differ to the newly collected one in this study. Capparimyia savastani is newly reported for UAE and the checklist of the family Tephritidae in UAE increases to 34 species (Table 1). Based on the distribution map (Fig. 1), it is predicted that this species can be distributed in other Mediterranean region and the Middle East countries.

Table 1. Checklist of the fruit flies (Diptera: Tephritidae) of UAE.

| No. | Species                                      | References          |
|-----|----------------------------------------------|---------------------|
|     | Subfamily Trypetinae                         |                     |
| 1   | Bactrocera cucurbitae (Coquillett, 1899)     | Merz, 2011          |
| 2   | Bactrocera dorsalis (Hendel, 1912)           | van Harten, 2005    |
| 3   | Bactrocera zonata (Saunders, 1842)           | White, 2006         |
| 4   | Capparimyia savastani (Martelli 1911)        | Present study       |
| 5   | Carponya incompleta (Becker, 1903)           | van Harten, 2005    |
| 6   | Carponya vesuviana Costa, 1854               | van Harten, 2005    |
| 7   | Dacus ciliatus Loew, 1862                    | van Harten, 2005    |
| 8   | Dacus longistylus Wiedemann, 1830            | van Harten, 2005    |
| 9   | Dacus persicus Hendel, 1927                  | White, 2006         |
| 10  | Dacus semisphaerius Becker, 1903             | Merz, 2008          |
| 11  | Dacus vertebratus Bezzi, 1908                | van Harten, 2005    |
| 12  | Neokeratitis efflatouni (Hendel, 1931)       | Merz, 2008          |
|     | Subfamily Tephritinae                        |                     |
| 13  | Acanthiophilus helianthi (Rossi, 1794)       | Merz, 2008          |
| 14  | Aciaura afghana (Hering, 1961)               | Merz, 2008          |
| 15  | Euarestella korneyevi Merz, 2011             | Merz, 2011          |
| 16  | Euarestella sp. near kugleri Freidberg, 1974 | Merz, 2008          |
| 17  | Euarestella vanharteni Merz, 2008            | Merz, 2008          |
| 18  | Goniurella lacerata (Becker, 1913)           | Merz, 2008          |
| 19  | Goniurella longicauda Freidberg, 1980        | Merz, 2008          |
| 20  | Goniurella octoradiata Merz, 2002            | Merz, 2008          |
| 21  | Goniurella tridens (Hendel, 1910)            | Merz, 2008          |
| 22  | Hyalotephritis planiscutellata (Becker, 1903)| Merz, 2008          |
| 23  | Katonaia aida Hering, 1938                   | Merz, 2008          |
Table 1. Continued.

| No. | Species | References |
|-----|---------|------------|
| 24  | Metasphenisca negeviana (Freidberg, 1974) | Merz, 2011 |
| 25  | Metasphenisca sp. near tetrachaeta (Bezzi, 1918) | Merz, 2008 |
| 26  | Oxyaciura nigra Merz, 2008 | Merz, 2008 |
| 27  | Oxyaciura tibialis (Robineau-Desvoidy, 1830) | Merz, 2008 |
| 28  | Rhochmopterum sp. | Merz, 2011 |
| 29  | Schistopterus moebiusi Becker, 1903 | Merz, 2008 |
| 30  | Sphaeniscus trifasciatus Korneyev & J. Dirlbek, 2000 | Merz, 2011 |
| 31  | Trupanea amoena (Frauenfeld, 1857) | Merz, 2008 |
| 32  | Trupanea pulcherrima (Efflatoun, 1924) | Merz, 2008 |
| 33  | Trupanea stellata (Fuesslin, 1775) | van Harten, 2005 |
| 34  | Trupanea tubulata Munro, 1964 | Merz, 2011 |

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Conflict of Interests

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

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A new record and checklist of fruit flies in UAE

مطالعه از نوع مگس‌های میوه (Diptera: Tephritidae) در امارات متحده عربی، همراه با گزارش جدید یک گونه و چک‌لیست گونه‌ها

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چکیده: براساس بررسی انجام شده روی فون مگس‌های خانواده Tephritidae در Capparimyia savastani گروه گیاهپزشکی، دانشکده کشاورزی، واحد ورامین-پیشوا، دانشگاه آزاد اسلامی، ورامین، ایران.

واژگان کلیدی: فون، شبه جزیره عربستان، Tephritidae، امارات متحده عربی، گزارش جدید، چک‌لیست