

NEW RECORDS OF TEPHRITIDAE (DIPTERA) FROM SAUDI ARABIA WITH SOME BIOLOGICAL INFORMATION, GEOGRAPHICAL DISTRIBUTION AND TAXONOMIC FEATURES.

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ABSTRACT

Twelve species of Tephritidae are identified and recorded from a variety of localities in Saudi Arabia. Three species are recorded for the first time. Biological information, distribution and taxonomic remarks have been given.

INTRODUCTION

The family Tephritidae (the true fruit flies) is a member of the superfamily Tephritoidea within the Diptera order (Colless and McAlpine 1991). Tephritidae is a large family, it contains more than 4500 species, about 100 of them of economic important (White and Elson-Harris, 1992; Merz and Dawah 2005). The species of Tephritidae can be recognized as the wings are normally banded or pictured and the vein subcosta sharply angled (Chinery 1986). Species of Tephritidae are pests on fruit, flowers, seeds, leaves, stem and root tissue (White and Elson-Harris, 1992; Merz and Dawah 2005). On the positive side seventeen species of Tephritidae have been used in the biological control of noxious weeds (e.g., thistles and knapweed) (Van Driesche and Bellows, 1996). Recently, Merz and Dawah (2005) described a new genus, six new species of Tephritidae and recorded 40 new records for Saudi Arabia. Al-Ahmadi & Salem (1999) listed 12 species of Tephritidae in Saudi Arabia. Freidberg and Kugler (1989) recorded six species from Saudi Arabia. In addition to this four species listed in various publications. Therefore, the total number of Tephritidae recorded from Saudi Arabia is sixty six. Merz and Dawah (2005) study has markedly increased the knowledge of the distribution and taxonomy of fruit flies in Saudi Arabia. However, the results of their study stem from the samples of Tephritidae collected by Professor Dawah from the Aseer area of the South West. The aim of this paper is to present our investigation on Tephritidae samples collected from different parts of Saudi Arabia-mainly around Riyadh.

MATERIAL AND METHODS

Collection of flies

This study is based on examination of more than 200 unsorted specimens of Tephritidae from the Arabian National Museum of Arthropods, Ministry of Agriculture, Riyadh; and the Plant Protection Department Collection, College of Food and Agricultural Sciences, King Saud University, Riyadh. These specimens were collected from different localities around Riyadh Province (See table 1).

Identification of flies

Insects were identified at the National Museum of Wales, Cardiff (NMWC). Specimens were identified to species level using mainly Merz and Dawah (2005) and also by comparison with reliably identified specimens in NMWC.

Deposition of the specimens

Voucher specimens of all species encountered have been deposited in the National Museum of Wales, Cardiff (NMWC). Specimens were also deposited in the Arabian National Museum of Arthropods, Ministry of Agriculture, Riyadh; and the Plant Protection Department Collection, College of Food and Agricultural Sciences, King Saud University, Riyadh.

Distribution and nomenclature

The distribution sections and nomenclature of the species are based on Norrbom *et al.* (1999a and 1999b). When the species were not present in the above, I used Merz (1999).

Biology of the flies

Information on the biology of each species was obtained from White & Elson-Harris (1992) or other references given. In some cases, the biological information is mentioned on the generic level because of the lack of information on the individual species.

Illustrations

No illustrations were included in this study because all the recorded species were described and illustrated by the describers. However, in order to show the general features of some of the species involved in this study, photographs were taken in the NMGC. These were of the most common species of the true flies

recorded in this study using images from a video camera and "Synaptics Automontage" software to produce a montage image.

TABLE (I)
Collecting Sites in Saudi Arabia

No.	Locality	Coordinates
1	Ad dar'iyah	24.40N/46.35E
2	Al' Amnariyah	24.47N/46.25E
3	Al Hufuf	25.15N/49.32E
4	Al Kharj	24.13N/47.15E
5	Al'Uyaynah	24.53N/46.22E
6	Riyadh	24.36N/46.45E
7	Az Zulfi	26.17N/44.46E
8	Dirab	24.26N/46.39E
9	Huraymila	25.12N/46.10E
10	Irqah	24.43N/46.36E
11	Jizan	16.55N/42.39E
12	Najran	17.30N/44.20E
13	Wadi Laban	24.38N/46.40E

RESULTS

In this study three known species of Tephritidae (some of them of economic importance) are identified and recorded for the first time (see Table 2). Biological information and distribution of these species are included.

Subfamily Trypetinae

Tribe Carpomyini

Subtribe Carpomyina

1- *Carpomya incompleta* (Backer, 1903)

Material: Riyadh, (3 ♀, 3 ♂), 4-IV-1981, (4 ♀) (from *Zizyphus* fruits) 20-V-1983, A. Talhouk.

Distribution: southern Europe, Israel, Iraq, Egypt, Sudan, Ethiopia, and Saudi Arabia, first recorded from Saudi Arabia by Al-Ahmadi and Salem (1999)

Host plant: *Zizyphus* spp., *Zizyphus spina christi*, *Flacourtia cataphracta*, *Zizyphus sativa* (Freidberg & Kugler, 1989).

Pest status: Pest in some part of the world (White & Elson-Harris, 1992).

TABLE (II)

The checklist of Saudi Arabian Tephritidae. This checklist of Tephritidae of Saudi Arabia has been made following B. Merz and H. Dawah in their paper "Fruit flies (Diptera, Tephritidae) from Saudi Arabia". Classification according to Norrbom *et al.* (1999a, b), but species are listed in alphabetical order within the tribe. Abbreviations column "Source" as follow: 1= Al-Ahmadi & Salem (1999); 2= Freidberg & Kugler (1989); 3 = Merz & Dawah (2005); 4= Shalaby (1961); 5= White & Elson-Harris (1992); 6= Anonymous (2002).

Name	Source
Subfamily Trypetinae	
Tribe Carpomyini	
Subtribe Carpomyina	
<i>Carpomya incompleta</i> (Becker, 1903)	1, 3, Present study
Subtribe Notommatina	
<i>Notomma mutilum</i> (Bezzi, 1923)	Present study
Tribe Dacini	
Subtribe Ceratitidina	
<i>Capparimyia savastani</i> (Martelli, 1911)	Present study
<i>Ceratitis capitata</i> (Wiedemann, 1824)	1,4,5, Present study
Subtribe Dacina	
<i>Bactrocera (s. str.) zonata</i> (Saunders, 1842)	3, 6, Present study
<i>Dacus (Didacus) ciliatus</i> Loew, 1862	1,4, Present study
<i>Dacus (Leptoxyda) longistylus</i> Wiedemann, 1830	1, 3, Present study
Subfamily Tephritinae	
Tribe Tephritini	
<i>Acanthiophilus helianthi</i> (Rossi, 1794)	1, Present study
<i>Goniurellia longicauda</i> Freidberg, 1980	Present study
<i>Trupanea amoena</i> (Frauenfeld, 1857)	1, 3, Present study
<i>Trupanea pseudamoena</i> Freidberg, 1974	2, 3, Present study
<i>Trupanea stellata</i> (Fuessly, 1775)	1, Present study

Subtribe Notommatina

2- *Notomma mutilum* (Bezzi, 1923) (Figure 1, 2)

Material: Dirab, 6 km SW of Riyadh, (2) (Light trap), 21-X-1985.

Distribution: Egypt, Israel, New recorded from Saudi Arabia.

Host plant: Acacia-trees.

Pest status: make twig-galls on Acacia-trees.

Remarks: when alive the species (as all other *Notomma*) are entirely green, almost shining green.

Tribe Dacini

Subtribe Ceratitidina

3- *Capparimyia savastani* (Martelli, 1911) (Figure 3)

Material: Riyadh, (on *Capparis* fruits)(4 ♀, 3 ♂), 6-XI -1978, A Talhouk. Ad dar'iyah, 15 Km. NW. Riyadh, (on *Capparis cartilaginea*), (7 ♀, 3 ♂), 15-XII-1984, A. Talhouk.

Distribution: Italy, Algeria, Libya, Tunisia, France, Malta, Egypt, Israel, Pakistan and Oman. New recorded from Saudi Arabia.

Diagnosis: *Capparimyia savastani* is most similar to *C. aenigma*. Pale basal band on scutellum extended medially to apex, whereas in *C. aenigma* the pale basal band on scutellum restricted to no more than one third of its length. Also pale medial stripe on mesonotum extending anteriorly almost to neck, the transverse part of the pale stripe connected to an outer pale stripe that extends forward to suture, whereas in *C. aenigma* pale medial stripe on mesonotum extending forwards to just short of the suture and without continuous pale bands linking transverse prescutellar to suture.

Host plant: flower buds of *Capparis spinosa*, *Capparis aegyptia* and *Capparis cartilaginea* (De Meyer & Freidberg, 2005).

Pest status: it is a potential pest of caper (White & Elson-Harris, 1992).

4- *Ceratitis capitata* (Wiedemann, 1824)

Material: two ♀ specimens from King Saud University Museum without locality labels.

Distribution: this species is widespread, it recorded from Algeria, Angola, Benin, Burkina Faso, Burundi, Cameroun, Congo, Ethiopia, Gabon, Ghana, Guinea, Ivory Coast, Kenya, Liberia, Libya, Malawi, Mali, Morocco, Mozambique, Niger, Nigeria, Senegal, South Africa, Sudan, Tanzania, Togo, Tunisia, Uganda, Zaire, Zimbabwe, Atlantic Islands, Australia, Central America, Europe, Indian Ocean, North America but have been eradicated (Cunningham, 1989b; Lorraine & Chambers, 1989), Oriental Asia, Pacific Ocean, South America, West Indies, Middle East: Jordan, Israel, Lebanon, Syria, Turkey, Egypt, and Saudi Arabia (White & Elson-Harris, 1992).

Host plant: this species is widespread and most serious pest in the entire family which has many host plants, from Middle East this species has been recorded in Apple, Avocado, Common Fig, Common guava, date palm, English walnut, feijoa, grapefruit, huesito, Java Palm, Mango, Papaya, peach, pear, plum, quince, sapodilla, sour orange, strawberry guava, Surinam cherry, sweet orange,

tangerine, water apple, white sapote, and *Solanum incanum* (White & Elson-Harris, 1992).

Pest status: the most serious pest in the entire family.

Subtribe Dacina

5- *Bactrocera* (*s. str.*) *zonata* (Saunders, 1842)

Material: Gizan, South Part of Saudi Arabia, (3 ♀, 1 ♂) (on Guava), 1-V-1993; Al Hufuf, eastern Saudi Arabia, (1 ♀, 1 ♂) (on citrus fruits), 11-I-1982. A. Talhouk.

Distribution: Afrotropical, Oriental, Australasian-Oceanian. Pakistan, India, Sri Lanka, Bangladesh, Burma, Thailand, Egypt, Oman, Saudi Arabia, Israel, United Arab Emirates, Iran, Yemen, (Carroll et al., 2002; Merz & Dawah, 2005)

Host plant: Reared on different families of plants (White & Elson-Harris, 1992).

Pest status: pest in some part of the world (White & Elson-Harris, 1992).

6- *Dacus* (*Didacus*) *ciliatus* Loew, 1862

Material: Dirab, 6 km SW of Riyadh, (2♀), 24-XI 1986; Wadi laban west of Riyadh, (1 ♀) (on cucumber) 11-XI 1989, (1 ♀, 4 ♂) (on Letuce) 20-I-1990, M. Salem; Ad dar'iyah, 15 Km. NW. Riyadh. (1 ♀) (on squash), Oraiga west of Riyadh (3 ♀) (on Cow pea), 18-XI- 1989, M. Salem; Riyadh, (6 ♀, 4 ♂) (on *Calotopis procera*, Asclpiadaceae), 18- XII 1989, A.Z. Al-Ahmadi; (31 ♀, 39 ♂), (13-V-1978, 20,24,29-IV-1980, 12, 16-VII-1980, 24-IX-1980, 16-VII-1987), A. Talhouk.

Distribution: Southern Palearctic, Afrotropical, Oriental. Senegal East to Somalia, South to South Africa, Madagascar; introduced Mauritius, Reunion, Saint Helena, Arabia, Yemen, Egypt, Israel, Iran, Pakistan, India, Bangladesh (Carroll et al., 2002)

Host plants: *Calotopis procera*, Cucumber, Squash (*C. Pepo*), (*C. vulgaris*). Lettuce.

Pest status: pest of cucurbit crops (Hancock, 1989)

7- *Dacus* (*Leptoxyda*) *longistylus* Wiedemann, 1830

Material: Najran, (3 ♀, 2 ♂), 1-XII- 1980, A. Talhouk; Al Kharj, 80Km. S. Riyadh. (2 ♀, 1 ♂), 12-XII-1980, E.L. Tilkian; Riyadh, (1 ♀) (from *Calotopis procera*, Asclpiadaceae), 1-XII-1989, M. Salem

Distribution: Afrotropical. Senegal, Nigeria, Egypt to Mozambique, Yemen, Saudi Arabia (Carroll et al., 2002).

Host plants: Sodom apple (*Calotropis procera*, Asclepiadaceae) (Merz & Dawah, 2005), also in Saudi Arabia collected by Dr. M. Salem from *Calotropis procera*. Asclepiadaceae

Pest status: can be used as a biological control because of the toxicity of Sodom apple to livestock (White & Elson-Harrin, 1992)

Subfamily Tephritinae

Tribe Tephritini

8- *Acanthophilus helianthi* (Rossi, 1794)

Material: Wadi laban, Riyadh, (1 ♂), 21-XI-1990, M. Alsaleh; Ad dar'iyah 5 Km. NW. Riyadh, (1 ♀), 19-VI-1987, M. Abdulrahman; Dirab, 4Km. SW. Riyadh, (1 ♂), 12-I- 1987, M. Abdulrahman; Al'Uyaynah, 45 Km. NW. Riyadh, (1 ♂) (Alfalfa), 11-V-1990, M. Alsaleh; Huraymila, 130 Km. N. Riyadh, (1 ♀), 23-IV-1987, A. Alahmadi; (1 ♀, 1 ♂) without label.

Distribution: Palearctic, Afrotropical, Oriental. Europe, Russia, Central Asia, Mongolia, China (Xinjiang, Beijing), Madeira Is., Canary Is., Sudan, Ethiopia, Kenya, Israel, Iran, Afghanistan, Pakistan, India, Thailand (Carroll *et al.*, 2002), first recorded from Saudi Arabia by Al-Ahmadi & Salem 1999.

Host plants: Safflower (*Carthamus tinctorius* L., Asteraceae) in Europe, globe artichokes (*Cynara scolymus*) in Egypt, sunflower (*Helianthus annuus*) in Italy (White & Elson-Harris, 1992), and in Saudi Arabia recorded from watercress (*Nasturtium officinale*, Cruciferae) flowers, and Alfalfa.

Pest status: Serious pest on Safflower (*Carthamus tinctorius* L., Asteraceae) can damage up to 95% of the flower heads (Anon., 1963).

9- *Goniurellia longicauda* Freidberg, 1980 (Figure 4)

Material: Riyadh, (1 ♀, 3 ♂), 16-V- 1977, A. Talhouk; ((3 ♀, 2 ♂)) on watercress *Nasturtium officinale* (Cruciferae), 13,21-XI-1990, M. Alsaleh & A. AlQarni; Dirab, 4Km. SW. Riyadh, (1 ♂) (Alfalfa), 13-X-1986, (1 ♀) (on grasses) 10-XI-1986, (2 ♂) 17-XI, 8-XII-1989, A. Alahmadi; Ad dar'iyah 5 Km. NW. Riyadh, (1 ♂) (onion) 15-IV- 1989, A. Alahmadi; Al Al Hufuf, Eastern province of Saudi Arabia, (1 ♀, 1 ♂), 15-X-1980, A. Talhouk. Al'Uyaynah 45k. NW. Riyadh, (1 ♀, 1 ♂) (on watercress *Nasturtium officinale* , Cruciferae), 21,28-XI-1990, A. AlQarni.

Distribution: Palaearctic; Europe; Canary Is., French mainland, Afro-tropical region; North Africa; Near East, Asian Turkey, Caucasian Russian republics,

Georgia, Armenia, Azerbaidjan, Lebanon, Syria, Israel, Jordan, Sinai Peninsula (Egypt), Arabian peninsula, Iran, Iraq; New from Saudi Arabia.

Host plant: In Saudi Arabia this species found on watercress (*Nasturtium officinale*, Cruciferae), Alfalfa, grasses, and onion.

Pest status: not a pest species.

10- *Trupanea amoena* (Frauenfeld, 1857)

Material: Riyadh, Ad dar'iyah, King Saud University, Agriculture training field, (1 ♀, 4 ♂), 8-V- 2007, H. AlDhafer; Wadi laban west of Riyadh, (1 ♀), 21-XI 1990, M. Alsaleh; Al'Uyaynah, 45 Km. NW of Riyadh, (1 ♀) (from green pepper), 28-XI- 1990, A. Alqarni.

Distribution: Widespread, Palearctic, Afrotropical, Oriental.

Host plants: this species attack various species of sunflowers of the family Asteraceae such as *Achillea*, *Carthamus*, *Ethulia*, *Lactuca*, *Launaea*, *Leontodom*, *Picris* and *Sonchus* (Freidberg & Kugler, 1989; Merz, 1994; Merz and Dawah, 2005; Munro, 1964), also in Saudi Arabia collected from green pepper (*Capsicum annum*)

Pest status: minor pest on *Calendula officinalis* (Asteraceae) (Merz and Dawah, 2005).

11- *Trupanea pseudoamoena* Freidberg, 1974

Material: Al'Ammariyah, 43 Km. NW. Riyadh, (1 ♀) (from lettuce) 28-XI-1990, M. Alsaleh

Distribution: Near East

Host plant: *Pulicaria crispa* (Asteraceae) (Freidberg & Kugler, 1989), from Saudi Arabia collected from Lettuce

Pest status: Not pest.

12- *Trupanea stellata* (Fuesslin, 1775)

Material: Riyadh, (1 ♀), 16-V- 1977, A. Talhouk; Dirab, 4 Km. SW. Riyadh, (1 ♀, 1 ♂) (on Alfalfa), 1-XI- 1989, M. Salem, Al'Ammariyah, 43 Km. NW. Riyadh, (1 ♀) (on grape), 24-X-1992, K. Almotlaq; Ad dar'iyah 5 Km. NW. Riyadh, (1 ♂) (from lettuce), 24-III- 1989, A.Z. Alahmadi; Az Zulfi, Zulfi Street, 300 Km. N. Riyadh, (1 ♂) 18- XII-1975; Al Hufuf, Eastern Saudi Arabia, (8 ♀, 8 ♂) (15-X-1980; 30-XI-1982), A. Talhouk.

Distribution: Palearctic, from British Islands and Eastern Scandinavia to Mongolia and China, South to Canary Island, North Africa, Middle East, Iran & India (Carroll *et al.* 2002), first recorded from Saudi Arabia by Al-Ahmadi & Salem (1999)

Host plant: this species was reared on *Senecio jacobaea* L. (Asteraceae), it has been recorded associating with weeds such as *Cardaria draba*; *Senecio jacobaea*.

From Saudi Arabia it was collected from Alfalfa, grape, and lettuce.

Pest status: not pest.



Figure 1. *Capparimyia savastani* (Martelli, 1911) Figure 2. *Notomma mutilum* (Bezzi, 1923)

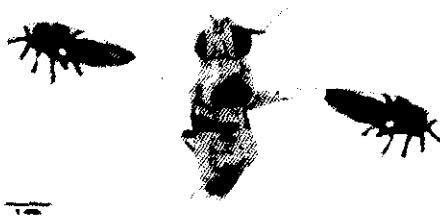


Figure 3. *Notomma mutilum* (Bezzi, 1923) Figure 4. *Goniurellia longicauda* Freidberg, 1980

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