

# Faunistic study of Thysanoptera (Insecta) in Khorasan-e- Razavi Province, north-east Iran

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The Thysanoptera fauna of Iran are still very incompletely known. As a result of the study of thrips fauna in different localities of Khorasan-e-Razavi province during 2012-2014, a total of 45 species in 20 genera and 3 families are recorded for this area. Among them, 43 species are newly recorded for the fauna of this province; and *Pezothrips dianthi* is newly recorded for the fauna of Iran. This is the second species of the genus *Pezothrips* which is recorded from Iran. Distribution in Iran and world distribution are presented for all the species as well as some taxonomic notes for the newly recorded species. Khorasan-e-Razavi is a large province with various geographical elements, hence it is expected that there are still a large number of thrips species remain to be discovered in various parts of this province.

**Key words:** Thrips, Thysanoptera fauna, new record, Khorasan-e-Razavi, Iran.

## INTRODUCTION

Thysanoptera with approximately 6000 known species is one of the insect orders with worldwide distribution. The presence of a single mandible as well as an eversible pretarsal bladder (arolium) separate thrips from other insects. This order is divided into two suborders: Terebrantia and Tubulifera with a blunt/angled- and a tube-like body end, respectively (Bukhman et al., 2012; Mehle & Trdan, 2012). The Terebrantia consists of eight families, of which four, i.e. Aeolothripidae (23 species in four genera), Melanthripidae (seven species in two genera), Stenurothripidae (one species) and Thripidae (138 species in 37 genera), have been reported from Iran (Alavi et al., 2013; Minaei, 2013; Mirab-balou, 2013). Phlaeothripidae, the only family in the suborder Tubulifera, is the richest family of Thysanoptera according to the number of species as well as diversity in habitat (Mound, 2005; ThripsWiki, 2014). This family includes two subfamilies, Idolothripinae and Phlaeothripinae. So far, four species from four genera of Idolothripinae and 41 species belonging to 15 genera of Phlaeothripinae have been reported in Iran (Minaei, 2013; Mirab-balou, 2013).

Khorasan-e-Razavi is one of the 31 provinces of Iran; located in north-eastern of this country and covers an area of 144,681 km<sup>2</sup>. It borders North Khorasan province and Turkmenistan in the north, Semnan province in the west, South Khorasan province in the south and Afghanistan and Turkmenistan in the east. In comparison to other parts of Iran, a little work has been done on Thysanoptera fauna of Khorasan-e-Razavi; therefore, the current research is focused on the mentioned area to determine thrips species of this region as a contribution to the knowledge of thrips fauna of this province.

## MATERIAL AND METHODS

Thrips specimens were collected at different localities in Khorasan-e- Razavi province (Table 1), during 2012-2014. The specimens were captured by shaking and beating herbaceous plants, bushes, branches of trees as well as leaf litter beneath the trees onto a white plastic tray, and then adult thrips picked up using a moistened fine brush. The specimens were stored in vials containing AGA fluid

(60% alcohol, 10 parts; glacial acetic acid, 1 part; glycerin, 1 part). The thrips were mounted onto slides in Canada balsam Media. The identifications were done using some reliable keys (Mound et al., 1976; zur Strassen, 2003; Minaei et al. 2007; Minaei and Mound, 2008; Mirab-balou et al., 2012; Mirab-balou et al., 2013) and comparing the specimens with the confirmed ones in the Hayk Mirzayans Insect Museum (HMIM), Iranian Research Institute of Plant Protection, Tehran. Specimens were mostly confirmed by the second author and a few by Jalil Alavi from Agriculture and Natural Resources Research Center of Khorasan-e Shomali Province. All specimens were deposited in the Entomological Museum of Plant Protection Department at Ferdowsi University of Mashhad and HMIM, Tehran, Iran.

**TABLE 1.** Longitude and altitude of different collection sites in Khorasan-e-Razavi Province.

Locality	Latitude, Altitude
Boojan	36°24'N, 58°58'E
Chenaran	36.6456° N, 59.1211° E
Golmakan	36°28'51"N, 59°09'26"E
Kalat	34°11'54"N, 58°32'40"E
Khaf	34°11'54"N, 58°32'40"E
Quchan	37°06'22"N, 58°30'34"E
Mashhad, Mellat Park	36°19'15" N 59°32'14" E
Neyshabour	36°12'48"N, 58°47'45"E
Ferdowsi University of Mashhad	36.3075° N, 59.5286° E
Agricultural research station	36°16'N, 59°36'E
Sartalkh village	36°20'00" N 59°42'23" E
Shirhesar	36°20'00"N, 59°42'23"E
Sabzevar	36°12'45"N 57°40'55"E
Tandooreh National Park	37.4° N, 59.1° E
Torbat-e Heydarieh	35°16'26"N, 59°13'10"E
Torbat-e-Jam	35.2439° N 60.6225° E
Torqabeh	36°18'37"N, 59°22'25"E
Torogh	36.13° N 59.40° E
Zoshk	36.3289° N 59.1875° E

## RESULTS

A total of 45 species belonging to 20 genera in three families were collected and identified in the current study on the fauna of Khorasan-e-Razavi province in north-eastern Iran, during 2012-2014. (M: Male, F: Female)

### Suborder Terebrantia

#### Family Aeolothripidae Uzel, 1895

This family includes 198 extant species in 23 genera (ThripsWiki, 2014), of which 23 species belonging to 4 genera were recognized in Iran (Minaei, 2013).

#### Genus *Aeolothrips* Haliday, 1836

##### *Aeolothrips gloriosus* Bagnall, 1914

**Material examined:** Golmakan (36°28'51" N 59°09'26" E), on *Cucurbita pepo* (Cucurbitaceae), 1♂, 9.VII.2012, Leg. L. Fekrat.

**Distribution:** widespread in Mediterranean area, Britain (ThripsWiki, 2014); Iran (Hamedan, Golestan, Zanjan) (Bhatti et al., 2009; Mirab-balou, 2013).

***Aeolothrips mongolicus* Pelikán, 1985**

**Material examined:** Mashhad, Ferdowsi University of Mashhad (36.3075° N, 59.5286° E), on *Hordeum morinum* (Poaceae), 1♀, 1♂, 6.V.2012, Leg. L. Fekrat; Torbat-e Heydarieh (35°16'26" N 59°13'10" E), on *Triticum aestivum* (Poaceae), 7♀, 2♂, 5.VI.2012, Leg. L. Fekrat.

**Distribution:** China, Mongolia (Yang et al., 1993); Iran (Khuzestan, Golestan, Khorasan-e-Shomali, Fars) (Bhatti et al., 2009; Mirab-balou, 2013).

***Aeolothrips versicolor* Uzel, 1895**

**Material examined:** Neyshabour (36°12'48" N 58°47'45" E), on *Artemisia abrotanum* (Compositae), 1♀, 2♂, 16.VII.2012, Leg. L. Fekrat.

**Distribution:** England, Russia, Czech Republic, Hungary, former Yugoslavia, Finland, Norway, North America (zur Strassen 2003; ThripsWiki, 2014); Iran (Fars, Isfahan, Hamedan) (Bhatti, 2009; Mirab-balou, 2013).

**Family Thripidae Stevens, 1829**

This family is the second largest family of Thysanoptera with rather more than 2000 species (Thripswiki, 2014). In Iran, 140 species in 47 genera of this family have been recorded (Alavi et al. 2013; Morab-balou, 2013).

**Subfamily Dendrothripinae Priesner, 1925**

So far, 92 species in 11 genera have been recognized in this subfamily worldwide (Thripswiki, 2014), of which 5 species in 2 genera have been recorded from Iran (Minaei, 2013).

**Genus *Dendrothrips* Uzel, 1895*****Dendrothrips saltator* Uzel, 1895**

**Material examined:** Neyshabour (36°12'48" N 58°47'45" E), *Heracleum persicum* (Apiaceae), 2♀, 10.VII.2012, Leg. L. Fekrat.

**Distribution:** Europe, Russia, North-West India (Mound et al., 1976; Lone, 1986); Iran (Kerman, Hamedan, Khorasan-e-Shomali, Khuzestan, Kerman) (Bhatti et al., 2009; Mirab-balou, 2013).

**Subfamily Sericothripinae Karny, 1921**

Currently, 152 species in three genera are recognized in this subfamily worldwide (ThripsWiki, 2014), of which four species in two genus have been recorded from Iran (Mirab-balou, 2013).

**Genus *Neohydatothrips* John, 1929*****Neohydatothrips gracilicornis* (Williams, 1916)**

**Material examined:** Kalat (34°11'54" N 58°32'40" E), on *Medicago sativa* (Fabaceae), 1♀, 2.VII.2012, Leg. L. Fekrat.

**Distribution:** Europe, Morocco, Turkey, Israel, China, Japan (zur Strassen, 2003; Wang, 2007); Iran (Tehran, Golestan, Khorasan-e-Shomali, Hamedan, Zanjan) (Bhatti et al., 2009; Mirab-balou, 2013).

**Subfamily Thripinae Stephens, 1829**

Currently, this subfamily includes 1668 species in 235 genera throughout the world (ThripsWiki, 2014), of which 113 species in 35 genera have been recognized in Iran (Alavi, 2013; Minaei, 2013).

**Genus *Anaphothrips* Uzel, 1895*****Anaphothrips obscurus* (Müller, 1776)**

**Material examined:** Neyshabour, Sartalkh village (36°05'56" N 59°04'42" E), on *Triticum aestivum*, 4♀, 12.VI.2012, Leg. L. Fekrat; Shirhesar (36°20'00" N 59°42'23" E), on *Triticum aestivum*, 3♀, 29.IV.2012, Leg. L. Fekrat.

**Distribution:** Widespread around the world in temperate and sub-tropical areas (Moritz et al., 2004); Iran (Khorasan-e-Shomali, Khuzestan, Kerman, Fars, Golestan, Hamedan) (Mirab-balou, 2013).

***Anaphothrips sudanensis* Trybom, 1911**

**Material examined:** Sabzevar (36°12'45" N 57°40'55" E), on *Zea mays* (Poaceae), 1♀, 12.VI.2012, Leg. L. Fekrat.

**Distribution:** Apparently worldwide in tropical and sub-tropical countries, but probably originally from some part of Meso-America (Moritz et al., 2004); Iran (Golestan, Hamedan, Khorasan-e-Shomali) (Bhatti et al., 2009; Mirab-balou 2013).

**Genus *Aptinothrips* Haliday, 1836**

***Aptinothrips rufus* (Haliday, 1836)**

**Material examined:** Tandooreh National Park, on *Onobrychis melantoricha* (Fabaceae), 1♀; 14.VI.2013, Leg. L. Fekrat.

**Distribution:** cosmopolitan (zur Strassen, 2003); Iran (Khorasan-e-Shomali, Tehran, Golestan, Kerman, Hamedan, Kermanshah, Zanjan, Alborz, Azarbaijan-e-Sharghi) (Bhatti et al., 2009; Mirab-balou, 2013).

**Genus *Chirothrips* Haliday, 1836**

***Chirothrips manicatus* (Haliday, 1836)**

**Material examined:** Khaf (34°11'54" N 58°32'40" E), on *Paeonia* sp. (Paeoniaceae), 4♀, 2M, 10.VII.2013, Leg. L. Fekrat.

**Distribution:** Widespread around the world in temperate areas (Moritz et al., 2004); Iran (Alborz, Hamedan, Kermanshah, Azarbaijan-e-Sharghi, Kerman, Golestan, Khuzestan, Yazd, Khorasan-e-Shomali, Guilan) (Bhatti et al., 2009; Mirab-balou, 2013).

***Chirothrips molestus* Priesner, 1926**

**Material examined:** Tandooreh National Park, on *Borago officinalis* (Boraginaceae), 1♀, 14.VI.2013, Leg. L. Fekrat; Tandooreh National Park, on *Onobrychis melantoricha* (Fabaceae), 10♀, 14.VI.2013, Leg. L. Fekrat; Neyshabour (36°12'48" N 58°47'45" E), on *Acroptilon repens* (Asteraceae), 1♀, 28.VII.2013, Leg. L. Fekrat.

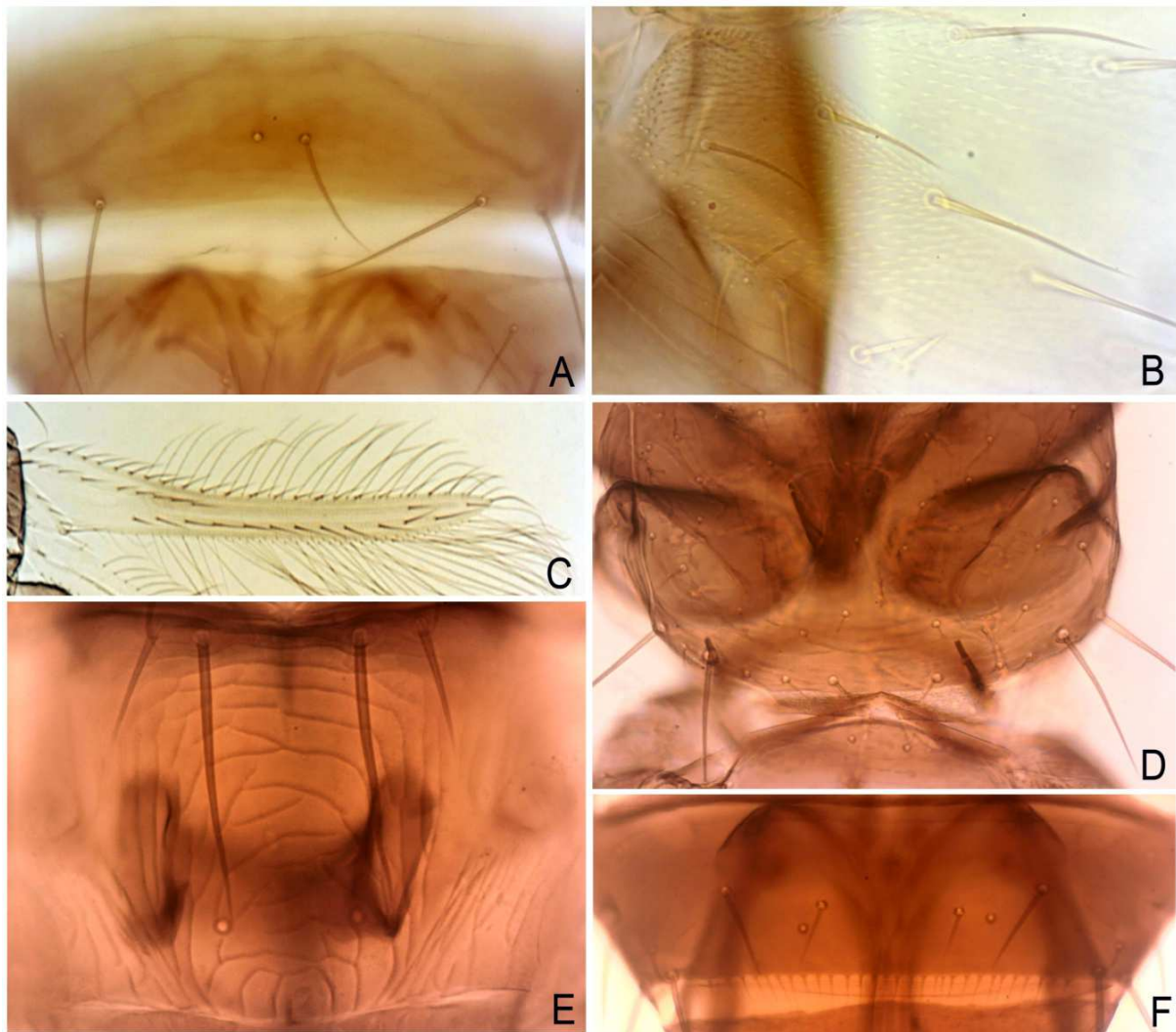
**Distribution:** Euro-Siberian (zur Strassen, 2003); Iran (Khorasan-e-Shomali, Golestan, Mazandaran) (Bhatti et al., 2009; Mirab-balou, 2013).

**Genus *Eremiothrips* Priesner, 1950**

***Eremiothrips dubius* (Priesner, 1933)**

**Material examined:** Mashhad, Torogh (36.13° N 59.40° E), on *Amaranthus* sp. (Amaranthaceae), 1♀, 22.IX.2012, Leg. L. Fekrat.

**Distribution:** Canary Islands, Morocco, Spain (Bhatti et al., 2003; Ramezani et al., 2009); Iran (Kerman, Yazd, Hamedan, Alborz) (Mirab-balou, 2013).



**FIGURE 1.** *Pezothrips dianthi*, female: A. abdominal sternite VII; B. clavus; C. forewing; D. pronotum; E. metanotum; F. abdominal tergite VIII.

***Eremiothrips taghizadehi* (zur Strassen, 1975)**

**Material examined:** Mashhad, Agricultural Research Station (36.16° N 59.38° E), on *Cucumis sativus* (Cucurbitaceae), 1♀, 10.V.2012, Leg. L. Fekrat; Neyshabour (36°12'48" N 58°47'45" E), on *Amaranthus retroflexus* (Amaranthaceae), 3♀, Leg. L. Fekrat.

**Distribution:** Spain, Iran (Fars, Golestan, Tehran, Khuzestan) (zur Strassen, 2003; Ramezani et al., 2009; Minaei, 2012).

**Genus *Frankliniella* Karny, 1910**

***Frankliniella intonsa* (Trybom, 1895)**

**Material examined:** Neyshabour, Boojan (36°24' N 58°58' E), on *Medicago sativa*, 1♀, 12.VI.2012, Leg. L. Fekrat; Mashhad (36.16° N 59.38° E), on *Achillea millefolium* (Asteraceae), 1♀, 10.VI.2012, Leg. L. Fekrat; Mashhad, Agricultural Research Station (36.16° N 59.38° E), on *Stellaria media* (Caryophyllaceae), 1♀, 2M, 18.V.2012, Leg. L. Fekrat; Sabzevar (36°12'45" N 57°40'55" E), on *Zea mays*, 2♀, 12.VI.2012, Leg. L. Fekrat.

**Distribution:** Widespread across Europe from Russia to Turkey, Britain and Spain, and extending east through Mongolia to Japan, Korea, Taiwan and Philippines, but in North America known only from British Columbia and Washington State (Moritz et al., 2004); Iran (Hamedan, Khuzestan, Fars, Kerman, Golestan, Tehran, Alborz, Guilan, Khorasan-e-Shomali, Mazandaran, Kermanshah, Qazvin, Zanjan, Kordestan, Azarbaijan-e-Sharghi, Azarbaijan-e- Gharbi) (Mirab-balou, 2013).

***Frankliniella occidentalis* (Pergande, 1895)**

**Material examined:** Mashhad Agricultural Research Station (36.16° N 59.38° E), on *Robinia pseudoacacia* (Fabaceae), 5♀, 1♂, 5.V.2012, on *Achillea millefolium*, 6♀, 5M, 30.VIII.2012, on *Cucumis sativus*, 6♀, 3M, 7.VIII.2012, Leg. L. Fekrat; Mashhad, Ferdowsi University of Mashhad (36.3075° N, 59.5286° E), on *Rosa hybrid* (Rosaceae), 10♀, 3♂, 7.IX.2012, Leg. L. Fekrat; Mashhad, Mellat Park (36°19'15" N 59°32'14" E), on *Calla Aethiopica* (Araceae), 14♀, 8♂, 8.V.2012, Leg. L. Fekrat; Zoshk (36.3289° N 59.1875° E), on *Melia azedarach* (Meliaceae), 3♀, 1.VI.2012, Leg. L. Fekrat; Torqabeh (36°18'37" N 59°22'25" E); on *Calendula persica* (Asteraceae), 5♀, 2♂, 17.IX.2012, Leg. L. Fekrat.

**Distribution:** widespread around the world (Kirk & Terry, 2004; Moritz et al., 2004); Iran (Tehran, Khuzestan, Hamedan, Zanjan, Azarbaijan-e-Sharghi, Alborz, Qazvin) (Mirab-balou, 2013).

***Frankliniella pallida* (Uzel, 1895)**

**Material examined:** Quchan (37°06'22" N 58°30'34" E), on *Medicago sativa*, 1♀, 14.VI.2012, Leg. L. Fekrat.

**Distribution:** Europe (Austria, France, Czech Republic), China, , Tunisia, (zur Strassen, 2003; Mirab-balou et al., 2011); Iran (Khuzestan, Fars, Lorestan, Tehran, Khorasan-e-Shomali, Hamedan, Kermanshah, Alborz, Kordestan, Qazvin, Zanjan) (Mirab-balou, 2013).

***Frankliniella tenuicornis* (Uzel, 1895)**

**Material examined:** Kalat (29°01'33.01" N 66°35'23.83" E), on *Sorghum bicolor* (Poaceae), 2♀, 2.VII.2012, Leg. L. Fekrat; Mashhad (36.16° N 59.38° E), on *Salvia officinalis* (Lamiaceae), 1♀, 18.V.2012, Leg. L. Fekrat.

**Distribution:** Widespread in Europe, from Russia and Britain to Spain, Turkey and Libya, and extending through Mongolia to China and Japan; also throughout USA (Moritz et al., 2004); Iran (Fars, Golestan, Isfahan, Tehran, Alborz, Guilan, Khorasan-e-Shomali, Mazandaran, Hamedan, Kermanshah, Azarbaijan-e-Sharghi) (Mirab-balou, 2013).

**Genus *Limothrips* Haliday, 1836**

***Limothrips angulicornis* Jablonowski, 1894**

**Material examined:** Kalat (29°01'33" N 66°35'23" E), on *Sorghum bicolor*, 1♀, 2.VII.2012, Leg. L. Fekrat; Neyshabour (36°12'48" N 58°47'45" E), on *Cucurbita pepo*, 1♀, 2.VII.2012, Leg. L. Fekrat.

**Distribution:** Widespread in central and southern Europe, introduced to California and to SE Australia (Moritz et al., 2004); Iran (Khuzestan, Hamedan, Azarbaijan-e-Sharghi, Kerman, Mazandaran, Khorasan-e-Shomali, Alborz, Azarbaijan-e-Gharbi, Golestan, Fars) (Mirab-balou, 2013).

**Genus *Microcephalothrips* Bagnall, 1926**

***Microcephalothrips abdominalis* (D. L. Crawford, 1910)**

**Material examined:** Mashhad, Agricultural Research Station (36.16° N 59.38° E), on *Cucumis sativus*, 4♀, 7.VIII.2012, Leg. L. Fekrat; Torqabeh (36°18'37" N 59°22'25" E), on *Calendula persica*, 4♀, 17.IX.2012, Leg. L. Fekrat.

**Distribution:** Turkey, Israel, Egypt, Slovenia, Italy, Canary Islands, USA, China and other countries in the tropics and subtropics (zur Strassen, 2003; Mirab-balou et al., 2011); Iran (Khuzestan, Teharn, Alborz, Golestan, Fars, Guilan, Hamedan) (Mirab-balou, 2013).

**Genus *Mycterothrips* Trybom, 1910**

***Mycterothrips tschirkunae* (Yakhontov, 1961)**

**Material examined:** Neyshabour (36°12'48" N 58°47'45" E), on *Hypericum perforatum* (Clusiaceae), 1♀, 24.VI.2013, Leg. N. Gholami.

**Distribution:** Tajikistan, Uzbekistan, Turkey (Alavi et al., 2013); Iran (Khorasan-e-Shomali, Khuzestan, Tehran) (Mirab-balou, 2013).

**Genus *Odontothrips* Amyot & Serville, 1843**

***Odontothrips confusus* Priesner, 1926**

**Material examined:** Golmakan (36°28'51" N 59°09'26" E), on *Medicago sativa*, 5♀, 1♂, 17.V.2012, Leg. L. Fekrat; Neyshabour (36°12'48" N 58°47'45" E), on *Medicago sativa*, 2♀, 1♂, 12.VI.2012, Leg. L. Fekrat.

**Distribution:** Euro-Siberian, China, Hungary, Germany, Czech Republic (zur Strassen, 2003; Mirab-balou and Chen, 2011), Iran (Fars, Kerman, Yazd, Golestan, Lorestan, Alborz, Khorasan-e-Shomali, Hamedan, Kordestan, Qazvin, Zanzan) (Mirab-balou and Chen, 2011).

**Genus *Pezothrips* Karny, 1907**

***Pezothrips bactrianus* (Pelikán, 1968)**

**Material examined:** Quchan (37°06'22" N 58°30'34" E), on *Triticum aestivum*, 2♀, 1♂, 14.VI.2012, Leg. L. Fekrat; Torbat-e Heydarieh (35°16'26" N 59°13'10" E), on *Centaurea cyanus* (Asteraceae), 1♀, 1♂, 5.VIII.2012, Leg. L. Fekrat.

**Distribution:** China, Turkey, Tajikistan (zur Strassen, 2003; Mirab-balou and Chen, 2011); Iran (Hamedan, Kermanshah) (Mirab-balou and Chen, 2011).

***Pezothrips dianthi* Priesner, 1921\***

**(Figure 1, A-F)**

**Material examined:** Quchan (37°06'22" N 58°30'34" E), on *Triticum aestivum*, 2♀, 1♂, 14.VI.2012, Leg. L. Fekrat.

**Distribution:** Widespread in eastern and central Europe, also Spain, Morocco and Egypt; recorded in some parts of North America including Iowa and North Dakota (Morita et al., 2004). This species is newly recorded for Iranian thrips fauna.

**Diagnosis:** Body color brown, tarsi, most of fore tibiae, antennal segment III and base of IV yellow; forewings light brown, basal quarter pale (Figure 1.C); Antennae 8-segmented, VIII longer than VII; III with 2 stout dark dorsal setae; III & IV sense cones forked; Head as wide as long, 3 pairs of ocellar setae; Postocular setae small; Pronotum with 2 pairs of posteroangular setae, posterior margin with 3 pairs of small setae (Figure 1.D); Metanotum with campaniform sensillae and irregularly reticulate sculpture, median setae arise at anterior margin (Figure 2.E); Forewing first vein with 2 setae on distal half, second vein with 10 to 12 setae (Figure 1.C), clavus with one discal seta (Figure 1.B); Tergites without ctenidia; tergite VIII with complete comb of long slender microtrichia (Figure 1.F); Sternites without discal setae, median pair of marginal setae ( $S_1$ ) on sternite VII close to each other, far from posterior margin (Figure 1.A).

**Genus *Rubiothrips* Schliephake, 1975**

***Rubiothrips vitis* (Priesner, 1933)**

**Material examined:** Mashhad, Ferdowsi University of Mashhad (36.3075° N 59.5286° E), on *Vitis vinifera* (Vitaceae), 9♀, 4.VI.2012, Leg. L. Fekrat.

**Distribution:** Turkey, Israel, Hungary, Romania, Bulgaria, Greece (zur Strassen, 2003); Iran (Azarbaijan-e-Gharbi, Kermanshah) (Mirab-balou, 2013).

**Genus *Sitothrips* Priesner, 1931**

***Sitothrips arabicus* Priesner, 1931**

**Material examined:** Quchan (37°06'22" N 58°30'34" E), on *Triticum aestivum*, 3♀, 14.VI.2012, Leg. L. Fekrat.

**Distribution:** Egypt, Turkey, Cyprus, Israel, Libya, Georgia, Morocco, Sicily (zur Strassen, 2003); Iran (Fars, Golestan, Kerman, Khorasan-e-Shomali, Khuzestan, Hamedan, Kermanshah, Kordestan, Azarbaijan-e-Sharghi) (Mirab-balou, 2013).

**Genus *Tenothrips* Bhatti, 1967**

***Tenothrips discolor* (Karny, 1907)**

**Material examined:** Neyshabour (36°12'48" N 58°47'45" E), on *Hypericum perforatum* (Clusiaceae), 2♀, 24.VI.2013, Leg. N. Gholami.

**Distribution:** Ponto-Mediterranean, Kyrgyzstan, Canary Islands (zur Strassen, 2003); Iran (Khuzestan, Mazandaran, Hamedan, Kermanshah, Fars, Khorasan-e-Shomali, Azarbaijan-e-Gharbi, Alborz) (Mirab-balou, 2013).

***Tenothrips frici* (Uzel, 1895)**

**Material examined:** Golmakan (36°28'51" N 59°09'26" E), on *Capsella bursa-pastoris* (Brassicaceae), 2♀, 9.V.2012, Leg. L. Fekrat; Kalat (34°11'54" N 58°32'40" E); on *Cucurbita* sp. (Cucurbitaceae), 3♀, 3.VII.2012, Leg. L. Fekrat.

**Distribution:** Kazakhstan, Austria, Czech Republic, Romania, Hungary, Australia, India (ThripsWiki, 2014); Iran (Fars, Khuzestan, Khorasan-e-Shomali, Guilan, Mazandaran, Hamedan, Kermanshah, Qazvin, Azarbaijan-e-Sharghi, Zanjan, Lorestan, Markazi, Ghom, Ardabil, Kordestan) (Mirab-balou, 2013).

***Tenothrips latoides* (Pelikán, 1968)**

**Material examined:** Mashhad, Ferdowsi University of Mashhad (36.3075° N, 59.5286° E), on *Elaeagnus angustifolia* (Elaeagnaceae), 14♀, 18.V.2012, on *Philadelphus coronaries* (Philadelphaceae), 1M, 3.IX.2012, Leg. L. Fekrat; Neyshabour (36°12'48" N 58°47'45" E), on *Vitis vinifera*, 5♀, 12.IX.2012, Leg. L. Fekrat.

**Distribution:** Tajikistan (Pelikán, 1968); Iran (Khorasan-e-Shomali, Hamedan, Kordestan) (Mirab-balou, 2013).

**Genus *Thrips* Linnaeus, 1758**

***Thrips albopilosus* Uzel, 1895**

**Material examined:** Tandooreh National Park, on *Onobrychis* sp. (Fabaceae), 1♀, 14.VI.2013, on *Ferula persica* (Apiaceae), 1♀, 14.VI.2013. Leg. L. Fekrat.

**Distribution:** Europe, West Siberian (zur Strassen, 2003), USA (Nickle, 2006); Iran (Hamedan, Kermanshah, Kordestan) (Khanjani & Mirab-balou, 2005).

***Thrips atratus* Haliday, 1836**

**Material examined:** Mashhad, Agricultural research station (36°16'N, 59°36'E), on *Salvia officinalis*, 2♀, 1M, 18.V.2012, Leg. L. Fekrat.



**Distribution:** China, Korea, Mongolia (Mirab-balou et al., 2011), widespread across Europe from Siberia to Turkey, Cyprus and the Azores, also Canada and the northern States of USA (Moritz et al., 2004); Iran (Khorasan-e-Shomali, Golestan, Tehran, Markazi, Kerman, Yazd, Hamedan, Kermanshah, Kordestan, Mazandaran, Zanjan) (Mirab-balou, 2013).

***Thrips fraudulentus* (Priesner, 1954)**

**Material examined:** Neyshabour (36°12'48" N 58°47'45" E), on *Soponaria officinalis* (Caryophyllaceae), 2♀, 10.VII.2013, Leg. N. Gholami.

**Distribution:** Iran (Fars, Hamedan, Qazvin) (Mirab-balou, 2013).

***Thrips major* Uzel, 1895**

**Material examined:** Tandooreh National Park, on *Onobrychis* sp., 1♀, 14.VI.2013. Leg. L. Fekrat.

**Distribution:** China, Mongolia (Mirab-balou et al., 2011), widespread across Europe from Sweden and Siberia to Algeria and the Canary Islands (Moritz et al., 2004); Iran (Khorasan–e–Shomali, Golestan, Khuzestan, Tehran, Fars, Kerman, Mazandarn, Hamedan, Alborz) (Mirab-balou, 2013).

***Thrips meridionalis* (Priesner, 1926)**

**Material examined:** Mashhad, Ferdowsi University of Mashhad, (36.3075° N, 59.5286° E), on *Philadelphus coronaries* (Philadelphaceae), 11♀, 5♂, 3.IX.2012, on *Elaeagnus angustifolia* (Elaeagnaceae), 17♀, 4♂, 18.V.2012, on *Filipendula ulmaria* (Rosaceae), 10♀, 2♂, 9.V.2012, on *Trifolium* sp. (Fabaceae), 3♀, 2♂, 3.VI.2012, on *Melia azedarach* (Meliaceae), 4♀, 2♂, 1.VI.2012, Leg. L. Fekrat; Golmakan (36°28'51" N 59°09'26" E), on *Vitis venifera*, 2♀, 2♂, 9.VII.2012, Leg. L. Fekrat; Torbat-e-Heydarieh (35°16'26" N 59°13'10" E), on *Descurainia Sophia* (Brassicaceae), 18♀, 10♂, 5.VI.2012, on *Medicago sativa*, 4♀, 3♂, 5.VI.2012, Leg. L. Fekrat.

**Distribution:** Georgia, Armenia, Turkey, Cyprus, Lebanon, Israel, South Ukraine, Europe, Northern India, Iraq (zur Strassen, 2003); Iran (Khorasan-e-Shomali, Golestan, Fars, Khuzestan, Lorestan, Tehran, Markazi, Kerman, Yazd, Mazandaran, Hamedan, Kermanshah, Zanjan, Alborz) (Mirab-balou, 2013).

**Remarks:** This species is very similar to *Thrips vulgatissimus* Haliday, 1836 and no consistent structural differences is found between them; however *T. meridionalis* can be distinguished from the latter species by the forewing being dark, antennal segment III with sides only weakly convex, and 2-3 discal setae on pleurotergites (zur Strassen, 2003).

***Thrips physapus* Linnaeus, 1758**

**Material examined:** Mashhad (36.16° N 59.38° E), on *Cydonia oblonga* (Rosaceae), 1♀, 18.V.2012, Leg. L. Fekrat.

**Distribution:** Europe, Morocco, Russia (Siberia), Mongolia (zur Strassen, 2003); Iran (Tehran, Markazi, Khorasan-e-Shomali, Hamedan, Zanjan, Kordestan, Qazvin) (Mirab-balou, 2013).

***Thrips pillichii* Priesner, 1924**

**Material examined:** Tandooreh National Park, on *Artemisia* sp. (Asteraceae), 1♀, 14.VI.2013, Leg. L. Fekrat.

**Distribution:** China (Mirab-balou et al., 2011), Turkey, Ukraine, Romania, Norway, Hungary, Germany, France, England, Austria, Spain, Netherland, Czech Republic (Nickle, 2006); Iran (Khorasan-e-Shomali, Tehran, Markazi, Kerman) (Mirab-balou, 2013).

***Thrips tabaci* Lindeman, 1889**

**Material examined:** Shirhesar (36°20'00" N 59°42'23" E), on *Centaurea cyanus* (Asteraceae), 3♀, 29.V.2012, on *Achillea millefolium*, 5♀, 29.V.2012, Leg. L. Fekrat; Kalat (29°01'33.01" N 66°35'23.83" E), on *Cucurbita maxima* (Cucurbitaceae), 6♀, 2.VII.2012, Leg. L. Fekrat; Neyshabour (36°12'48" N 58°47'45" E), on *Beta vulgaris* (Chenopodiaceae), 14♀, 1♂, 12.VI.2012, on *Cucurbita pepo*, 2♀, 12.VI.2012, Leg. L. Fekrat; Mashhad (36.16° N 59.38° E), on *Robinia pseudoacacia*, 4♀, 5.V.2012, on *Beta vulgaris*, 5♀, 20.VI.2012, Leg. L. Fekrat; Zoshk (36.3289° N, 59.1875° E), on *Glycyrrhiza glabra* (Fabaceae), 7♀, 18.V.2012, Leg. L. Fekrat; Mashhad, on *Foeniculum vulgare* (Apiaceae), 4♀, 23.IX.2012, on *Tanacetum parthenium* (Asteraceae), 15♀, 18.V.2012, on *Amarantus* sp. (Amaranthaceae), 5♀, 23.IX.2012, on *Chaenomeles japonica* (Rosaceae), 3♀, 9.V.2012, on *Elaeagnus angustifolia* (Elaeagnaceae), 3♀, 18.V.2012, on *Matricaria chamomilla* (Asteraceae), 8♀, 18.V.2012, Leg. L. Fekrat; Quchan (37°06'22" N 58°30'34" E), on *Daucus carota*, 4♀, 14.VI.2012, on *Peganum harmala* (Zygophyllaceae), 2♀, 13.V.2012, Leg. L. Fekrat; Torbat-e-Heydarieh (35°16'26" N 59°13'10" E), on *Peganum harmala* (Nitrariaceae), 8♀, 5.VI.2012, on *Solanum lycopersicum* (Solanaceae), 5♀, 1♂, 5.V.2012, on *Helianthus annuus* (Asteraceae), 2♀, 5.VI.2012, Leg. L. Fekrat; Torbat-e-Jam, (35.2439° N 60.6225° E), on *Descurania Sophia*, 5♀, 28.VI.2012, Leg. L. Fekrat; Sabzevar (36°12'45" N 57°40'55" E), on *Zea mays*, 4♀, 1♂, 12.VI.2012, on *Pisum sativum* (Fabaceae), 11♀, 1♂, 12.VI.2012, Leg. L. Fekrat.

**Distribution:** All around the world (Moritz et al., 2004); Iran (widespread) (Mirab-balou, 2013)

**Suborder Tubulifera****Family Phlaeothripidae Uzel, 1895**

This is the largest family of Thysanoptera and includes about 3550 species in 460 genera (ThripsWiki, 2014), of which 45 species in 19 genera have been reported from Iran (Minaei, 2013).

**Subfamily Phlaeothripinae Uzel, 1895**

Currently, 41 species from 15 genera of this subfamily have been recorded from Iran (Minaei, 2013).

**Genus *Haplothrips* Amyot & Serville, 1843*****Haplothrips (Haplothrips) caespitis* Priesner, 1936**

**Material examined:** Tandooreh National Park, on *Borago officinalis* (Boraginaceae); 1♂, 14.VI.2013, Leg. L. Fekrat.

**Distribution:** Sudan (ThripsWiki, 2014); Iran (Khuzestan, Hamedan) (Bhatti et al., 2009; Mirab-balou, 2013).

***Haplothrips (Trybomiella) clarisetis* Priesner, 1930**

**Material examined:** Tandooreh National Park, on *Onobrychis* sp. (Fabaceae), 2♀, 1♂, 14.VI.2013, on *Astragalus gossypinus* (Fabaceae), 1♀, 14.VI.2013, on *Borago officinalis*, 2♀, 14.VI.2013, Leg. L. Fekrat.

**Distribution:** Egypt, Sudan, Iran (Kerman, Yazd, Khorasan-e-Shomali, Tehran, Fars, Mazandaran) (Minaei and Mound, 2008; Bhatti et al., 2009; Mirab-balou, 2013).

***Haplothrips (Haplothrips) globiceps* Bagnall, 1934**

**Material examined:** Khorasan-e-Jonobi, Birjand (32°32' N 58°50' E), on *Amygdalus* sp., 1♀, 23.VI.2013, Leg. A. Honarmand.

**Distribution:** Turkey (Minaei and Mound, 2008); Iran (Tehran Fars, Alborz, Hamedan) (Minaei and Mound, 2008; Bhatti et al., 2009).

***Haplothrips (Haplothrips) leucanthemi (Schrank, 1781)***

**Material examined:** Kalat, (34°11'54" N 58°32'40" E); on *Sorghum bicolor*, 1♀, 2.VI.2012, Leg. L. Fekrat; Chenaran (36.6456° N, 59.1211° E), on *Achillea millefolium*, 1♀, 30.VIII.2012, Leg. L. Fekrat.

**Distribution:** China, Argentina, Chile, North America, Australia (Minaei and Mound, 2008; Hoddle et al., 2012); Iran (Hamedan, Kermanshah, Fars, Ardabil, Mazandaran) (Bhatti et al., 2009; Mirab-balou, 2013).

***Haplothrips (Haplothrips) maroccanus Priesner, 1950***

**Material examined:** Kalat (34°11'54" N 58°32'40" E); on *Sorghum bicolor*, 1♀, 2.VI.2012, Leg. L. Fekrat.

**Distribution:** Morocco (ThripsWiki, 2014); Iran (Khuzestan, Fars, Tehran) (Minaei and Mound, 2008; Bhatti et al., 2009).

***Haplothrips (Haplothrips) reuteri (Karny, 1907)***

**Material examined:** Tandooreh National Park, on *Onobrychis* sp., 9♀, 5M, 14.VI.2013, on *Borago officinalis*, 2♀, 14.VI.2013, Leg. L. Fekrat.

**Distribution:** Europe, (especially South and East), Asia minor, India, Sudan, Yemen, Caucasia, Siberia, Egypt (Priesner, 1964), China, Mongolia, Pakistan (Mirab-balou et al., 2011); Iran (Fars, Qazvin, Ghom, Kerman, Khorasan-e-Jonubi, Khuzestan, Lorestan, Mazandaran, Tehran, Zanjan, Yazd, Golestan, Alborz, Hamedan, Kermanshah, Azarbaijan-e-Sharghi, Azarbaijan-e-Gharbi, Markazi, Kordestan) (Mirab-balou, 2013).

***Haplothrips (Haplothrips) subtilissimus (Haliday, 1852)***

**Material examined:** Khorasan-e-Jonubi, Birjand (32°32' N 58°50' E), on *Pyrus* sp. (Rosaceae), 1♀, 20.IV.2013, Leg. A. Honarmand.

**Distribution:** China, Japan, Central Asia, Europe, North America (Mirab-balou et al., 2011); Iran (Hamedan, Fars, Tehran) (Mirab-balou, 2013).

***Haplothrips (Haplothrips) tritici (Kurdjumov, 1912)***

**Material examined:** Neyshabour (36°12'48" N 58°47'45" E), on *Triticum aestivum*, 6♀, 12.3.2013, Leg. N. Gholami; Mashhad (36.16° N 59.38° E), on *Triticum aestivum*, 11♀, 2♂, 6.V.2012, Leg. L. Fekrat; Chenaran (36.6456° N, 59.1211° E), on *Centaurea cyanus* (Asteraceae), 3♀, 1♂, 6.V.2012, Leg. L. Fekrat.

**Distribution:** China, Russia, Korea, widespread in central and eastern Europe, southwards to the Mediterranean (Moritz et al., 2001); Iran (Tehran, Kerman, Yazd, Azarbaijan-e-Gharbi, Kermanshah, Azarbaijan-e-Sharghi, Semnan, Zanjan, Khuzestan, Isfahan, Kordestan, Fars, Chaharmahal-va-Bakhtiary, Khorasan-e-Shomali, Lorestan, Golestan, Alborz, Mazandaran, Hamedan, Qazvin, Ghom) (Mirab-balou, 2013).

**Genus *Neoheegeria* Schmutz, 1909*****Neoheegeria dalmatica* Schmutz, 1909**

**Material examined:** Tandooreh National Park, on *Borago officinalis*, 1♀, 14.VIII.2014, Leg. L. Fekrat.

**Distribution:** Turkey, Uzbekistan, Algeria, Iran (Hamedan, Fars, Khuzestan, Mazandaran, Tehran) (Minaei and Mound 2008; Mirab-balou, 2013).

**Genus *Plicothrips* Bhatti, 1979*****Plicothrips apicalis* (Bagnall, 1915)**

**Material examined:** Mashhad, Ferdowi University of Mashhad (36.3075° N, 59.5286° E), leaf litter under *Platanus orientalis*, 3♀, 7.X.2013, Leg. N. Miramirkhani.

Distribution: China (Mirab-balou et al., 2011), India (Mound, 1968); Iran (Khuzestan, Khorasan-e-Shomali) (Mirab-balou, 2013).

## DISCUSSION

Except some reports based on incidental collections, the Thysanoptera fauna of northeastern Iran is little known. The results of this research indicate that the thrips fauna of northeastern Iran is diverse and comprise some interesting species. This study revealed 45 Thysanoptera species which 43 species were new records for Khorasan-e Razavi province and one was new record for the fauna of Iran. Among the collected specimens, the most common and abundant species based on the number of sampled specimens were *Thrips meridionalis* and *Thrips tabaci*. Among Terebrantia, in terms of the number of collected species in each genus, *Thrips* and *Frankliniella* are ranked first and second, respectively. With respect to this fact that within the 35 genera of Thripinae which are currently listed from Iran, some genera like *Thrips* and *Frankliniella* are widely distributed and live in various flowers (Mirab-balou et al., 2013); therefore it is expected that most of our collected specimens belong to these two genera. Jalali Sendi et al. (2011) studied the Thysanoptera fauna of Guilan province; they collected 17 species belonging to 3 families which among them, the genus *Hoplothrips* Amyot & Serville were newly recorded for the Iranian fauna (species unknown). Mirab-balou et al. (2014) studied the fauna of Thysanoptera in Abdanan (Ilam province) and reported 13 species from 7 genera in 4 different families. As in our study, most of the collected species in their studies belonged to the family Thripidae and the genus *Thrips*. In the investigation on Thysanoptera fauna of Bojnourd, Alavi & Kamali (2003) collected 53 species belonging to 23 genera and three families, of which 29 species are those also collected in the current study. This may mostly due to the climatic similarity between these two adjacent provinces, Khorasan-e-Shomali and Khorasan-e-Razavi.

It is noteworthy that due to a high level of behavioral diversity among Thysanoptera, adults of many species may land on a wide range of plants that they cannot breed or even feed on them. Consequently, the mere presence of adults on a plant, even in large numbers, might not be an indication of a host association (Mound, 2013). So, it is not quite reasonable to assume that all the association between the thrips species and plants they collected and recorded here are really exist.

Khorasan-e-Razavi is a large province with a diverse climate having different habitats, so it is expected that a large number of thrips species remain to be discovered in various parts of this province. Surely vast samplings within all regions of northeastern Iran and also other parts of this country will result in several new records and even new species.

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