

Thrips Pests on Ornamental Plants in Mahallat, Markazi Province, Iran

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Thrips specimens were collected in the year 2014 on different ornamental plants from Mahallat (Markazi Province), Iran. In this study, 11 species in six genera and three different families of Thysanoptera were collected and identified. The scientific names of thrips species are as follow: *Melanthrips knechteli*, *M. pallidior*, *Frankliniella intonsa*, *F. occidentalis*, *Microcephalothrips abdominalis*, *Tenothrips discolor*, *T. latoides*, *Thrips meridionalis*, *T. nigropilosus*, *T. tabaci*, and *Haplothrips reuteri*. Among them, seven species are newly recorded for the fauna of Markazi Province. A high number of two harmful thrips, *Thrips tabaci* and *Frankliniella occidentalis* were found in all of flowers and ornamental plants. An identification key for phytophagous thrips is also given.

Abstract

Keywords: *Frankliniella occidentalis*, Mahallat, Iran, Ornamental plants, *Thrips tabaci*.

INTRODUCTION

Of the more than 6000 recognized species of thrips (Insecta: Thysanoptera) a few hundred are recorded attacking cultivated plants. A number of species have become key pests in a wide range of agricultural and horticultural crops. During the past decades, the losses of agricultural and horticultural produce caused by thrips increased considerably, resulting in losses of millions of dollars (ThripsWiki, 2015). Damage may be the result of direct feeding on leaves, flowers or fruits, transmission of viruses, as well as product contamination (Mound and Teulon, 1995). During the last decades thrips have become pests in many cultivated crops throughout Europe elsewhere in the world (Mound and Marullo, 1996). Despite postharvest and quarantine procedures, thrips species are spreading worldwide very quickly. They have become the number one key pests in many greenhouse and field crops, especially vegetables and ornamentals (Mound, 2013).

Many different kinds of insects and mites i.e. tetranychid mites, aphids, thrips etc. feed on ornamental plants (Mirab-balou *et al.*, 2009). Amongst them, thrips species are as important pests on ornamental plants, because of the small size of thrips, life stages and rapid movement make it difficult to detect these insects in fresh vegetation, and they also can transmit viruses on different plants (Silagyi and Dixon, 2006). About 20 thrips species are widely distributed on ornamental plants in the world, and are the most important pests on these plants; one of them is chilli thrips, *Scirtothrips dorsalis* (Ludwig *et al.*, 2007).

In Iran, more than 200 thrips species were recorded (Mirab-balou, 2013), but few of them are important pests on ornamental plants, such as *Thrips tabaci*, *Frankliniella occidentalis* and *F. intonsa* (Mirab-balou, 2011). The faunistic survey of Thysanoptera in Kerman and study of population density of active species on rose flowers have been done by Kheyrandish Koshkoei (2000); thrips species associated with ornamental plants and field crops in Gorgan region (Gilasian, 2000) and fauna of Thysanoptera on ornamental plants in Tehran was studied by Jalili-Moghadam and Azmayesh-fard (2004). In this study, the wholly thrips species associated with ornamental plants and flowers in Mahallat are represented, especially those phytophagous species.

MATERIALS AND METHODS

Survey and collection

The survey and collection was restricted to Flowers and Ornamental Plants Research Institute of Iran, Mahallat (Markazi Province), during the year 2014. All ornamental plants and flowers were monitored and sampled during spring and summer seasons. In this relation, thrips specimens (larvae and adults) were collected every two weeks by shaking flowers and leaves to white dish and specimens were kept in 70% alcohol ethanol and then transferred to laboratory.

Identification of Slide-Mounted specimens

In this study, more than 1,000 thrips specimens were collected. Only adult thrips were used for identification. The method for preparing and mounting thrips on slides follows Mirab-balou and Chen (2010). Adult thrips species were identified by first author (see <http://thrips.info/wiki/Mirab-balou>). Species identity was confirmed by comparison with already identified slide-mounted material held at the collection of Department of Plant Protection, College of Agriculture, Ilam University, Iran (ILAMU); the Institute of Insect Sciences, Zhejiang University, Hangzhou, China (ZJUH); and the Insect Collection of Department of Entomology, South China Agricultural University (SCAU). All specimens are deposited in the collection of Department of Plant Protection, College of Agriculture, Ilam University, Iran (ILAMU).

RESULTS AND DISCUSSION

The current world checklist of Thysanoptera (Thrips) contains about 6000 species (see Mirab-balou *et al.*, 2011). Common species associated with ornamental plants as their hosts are primarily in three of the nine Thysanoptera families i.e. Phlaeothripidae, Aeolothripidae and Thrip-

Table 1. Thrips species associated with flowers and ornamental plants in Mahallat (2014).

Suborder	Family	Scientific name
Terebrantia	Melanthripidae	<i>Melanthrips knechteli</i>
		<i>Melanthrips pallidior</i>
Tubulifera	Thripidae	<i>Frankliniella intonsa</i>
		<i>Frankliniella occidentalis</i>
		<i>Microcephalothrips abdominalis</i>
		<i>Tenothrips discolor</i>
		<i>Tenothrips latoides</i>
		<i>Thrips meridionalis</i>
		<i>Thrips nigropilosus</i>
	Phlaeothripidae	<i>Thrips tabaci</i>
		<i>Haplothrips reuteri</i>

idae. Most species of Phlaeothripidae feed on fungi and live on leaf litter or dead wood. A few species feed on higher plants, and some are pests of ornamentals. Most species of Aeolothripidae are predatory on mites and other small arthropods, and these sometimes inhabit ornamentals. The species that feed on higher plants are mostly in the family Thripidae, including most of the species that feed on ornamental plants. In this study, a total of 11 species in 6 genera and 3 different families of Thysanoptera were collected and identified from Mahallat (Table 1), with high population of *Thrips tabaci* and *Frankliniella occidentalis* on each ornamental plant.

In addition, two predatory thrips, *Aeolothrips intermedius* (Aeolothripidae) and *Scolothrips longicornis* (Thripidae) were also collected in low number and they can feed on phytophagous thrips and tetranychid mites. The banded thrips, *A. intermedius* Bagnall is now considered cosmopolitan (Riudavets, 1995), and is regarded in Iran as the most common species of the genus *Aeolothrips* (Mirab-balou, 2011). It is habitually floricolous. In fact, *A. intermedius* is common in many biocenoses of cultivated and wild plants where, in the flowers, larvae exhibit primarily predatory behaviour while the adults are fed also on pollen (Riudavets, 1995). The second species, *S. longicornis* Priesner is an important predator of several spider mite species (Aydemir and Toros, 1990). This species has been reported from several regions including the Middle East, India and North America and was also recorded in many places in Iran (Mirab-balou, 2013). A key is constructed for identification of 11 phytophagous thrips in Mahallat.

Key to phytophagous thrips on ornamental plants in Mahallat, Iran

- A.** Fore wings surface smooth and without veins and setae; terminal abdominal segment tube-like; female without an external ovipositor.....(**Suborder Tubulifera**) **Phlaeothripidae**
 - Bases of fore wing sub-basal setae arranged in a triangle; antennal segment III with two sensorial; tube long; distal cilia of fore wing with surface rough.....*Haplothrips reuteri*
a. Fore wings surface with microtrichia and with veins and setae; terminal abdominal segment not tubular; female with saw-like ovipositor.....(**Suborder Terebrantia**) **B**
B. Ovipositor curved upwards. Antennae 9-segmented. Fore wings relatively broad, with tips rounded.....(**Melanthripidae**)
 - Sense lines of the antennal segments III & IV of the ventral widely across the dorsal side; sensory areas broad, and much widened at their tips. Only sternite III with one pair of discal setae.....*Melanthrips knechteli*
 - Sensory areas on antennal segments III & IV short, and exactly circumpolar, semi-circularly following the apical margin of the segments. Abdominal sternite III with 2–3 and IV with 1–2 pairs of discal setae.....*Melanthrips pallidior*
b. Ovipositor curved usually downward. Antennae 6- to 9-segmented. Fore wings pointed at

- apex.....(Thripidae)
1. Pronotum with six pairs of very long setae.....*Scolothrips longicornis*
 - Pronotum with 0 to 5 pairs of major setae.....2
2. Abdominal tergites V–VIII each with a lateral ctenidium.....3
 - Abdominal tergites V–VIII without ctenidia.....*Tenothrips (T. discolor, T. latoides)*
3. Ctenidia on tergite VIII posteromesad to spiracle; ocellar setae I absent; median metanotal setae situated at anterior or behind anterior margin.....4
 - Ctenidia on tergite VIII antero-lateral to spiracle; ocellar setae I present; median metanotal setae situated at anterior margin.....*Frankliniella (F. intonsa, F. occidentalis)*
4. Abdominal tergites with large dentate craspeda on posterior margin.....*Microcephalothrips abdominalis*
 - Abdominal tergites without large dentate craspeda on posterior margin, but often with small teeth on posterior margin.....*Thrips (T. mridionalis, T. nigropilosus, T. tabaci)*

***Frankliniella intonsa* (Trybom)**

This species (Fig. 2) is a flower-dwelling thrips species infesting many flowering plants belonging to different orders and families (Atakan *et al.*, 1999). In this study, it was collected on different ornamental plants i.e. rose, aconite, Persian Iris, shirley poppy, carnation, sun rose, and Lady Banks' Rose.

Distribution. Iran (widely distributed); widespread around the world (Mirab-balou, 2013).

***Frankliniella occidentalis* (Pergande)**

Western Flower Thrips, *F. occidentalis* (Fig. 3) originated from the western part of the United States, and it was recorded as a pest for the first time in 1895 in California on apricot and was subsequently described by Pergande in 1895. This species is the most serious pest in *Frankliniella* worldwide (Kirk and Terry, 2004). It is considered the most destructive insect pest of ornamental plants due to direct feeding damage to plant parts such as foliage and flowers, and indirect damage by vectoring the tospoviruses (Cloyd, 2009). This species is being recorded for the first time from the Markazi Province, and was collected in high number on different ornamental plants in Mahallat, especially on plants family Rosaceae.

Distribution. Iran (Markazi, Tehran, Khuzestan, Hamedan, Zanjan, Azarbaijan-e-Sharghi, Alborz, Qazvin) (Mirab-balou, 2013); widespread around the world (Mirab-balou *et al.*, 2011).

***Haplothrips reuteri* (Karny)**

Several species of Haplothrips are associated with flowers and ornamental plants, but in this study, only one species, *H. reuteri* (Fig. 9) was collected on different ornamental plants, especially on plants family Asteraceae. *H. reuteri* is widely distributed and common on flowers (Mirab-balou *et al.*, 2012). In this study, both females and males of *H. reuteri* were collected on Persian iris, rose, carnation, common sunflower, chamomile, tagetes, red sage, coreopsis, gazania, and sun rose.

Distribution. Iran (widely distributed) (Mirab-balou, 2013); China, Russia, Mongolia, India, Pakistan, Europae, Sudan, Egypt (Mirab-balou *et al.*, 2011).

***Melanthrips knechteli* (Priesner)**

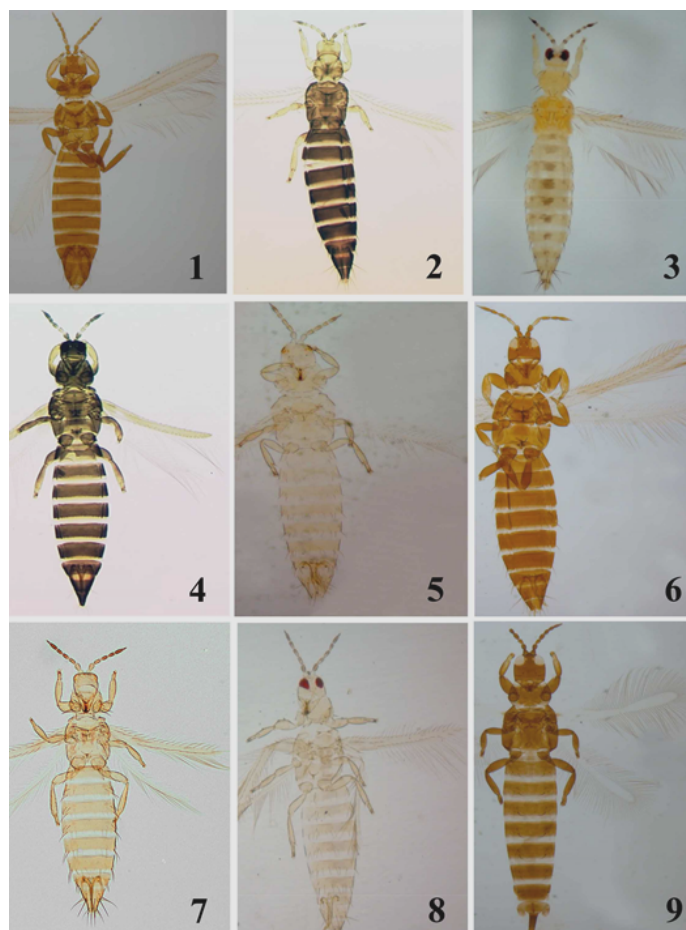
This species was collected in low number on German iris (Iridaceae) (Fig. 1), and here is being recorded for the first time from the Markazi Province.

Distribution. Iran (Markazi, Hamedan, Kermanshah, Golestan); Turkey, Bulgaria, Romania, Albania, Czech Republic, Spain (Mirab-balou, 2013).

***Melanthrips pallidior* (Priesner)**

This species was collected on German iris (Iridaceae) and common sunflower (Asteraceae), and here is being recorded for the first time from the Markazi Province.

Distribution. Iran (Markazi, Golestan, Khorasan-e-Shomali, Khuzestan, Tehran, Alborz, Ker-



Figs 1–9. Thrips species associated with ornamental plants: (1) *Melanthrips knechteli*, (2) *Frankliniella intonsa*, (3) *Frankliniella occidentalis*, (4) *Microcephalothrips abdominalis*, (5) *Tenothrips discolor*, (6) *Thrips meridionalis*, (7) *Thrips nigropilosus*, (8) *Thrips tabaci*, and (9) *Haplothrips reuteri*. (Original).

man, Hamedan, Kermanshah); China, Russia, Turkey, Palestine, Cyprus, Italy, Albania, Yugoslavia, Bulgaria, Switzerland, Romania, Austria, Slovakia, Germany and North Africa (Mirab-balou, 2013).

***Microcephalothrips abdominalis* (Crawford)**

This species (Fig. 4) is the only species recognized in the genus *Microcephalothrips*, and here is being recorded for the first time from the Markazi Province. Many ornamental species from family Asteraceae (e.g. *Bidens formosa*, *Chrysanthemum*, *Helianthus*, *Pyrethrum*, *Tagetes*, *Zinnia*) are the common host of *M. abdominalis*. In Asia, its presence is reported on Orchidaceae, and also on tea and rice crops. In this study, it was collected on common sunflower, chamomile, tagetes, begonia, and giant onion.

Distribution. Iran (Markazi, Khuzestan, Teharn, Alborz, Golestan, Fars, Guilan, Hamedan); China (including Taiwan), Korea, India, Guam, Sri Lanka, Philippines, Indonesia, Egypt, Australia, New Zealand, USA, Canada, Cuba, Argentina, Mexico (Mirab-balou *et al.*, 2011; Mirab-balou, 2013).

***Tenothrips discolor* (Karny)**

This species (Fig. 5) was collected on sun rose, and here is being recorded for the first time from the Markazi Province.

Distribution. Iran (Markazi, Khuzestan, Mazandaran, Hamedan, Kermanshah, Fars, Khorasan-e-Shomali, Azarbaijan-e-Gharbi, Alborz); Kyrgyzstan, Canary Islands, Austria, France, Spain (Mirab-balou, 2013).

***Tenothrips latoides* (Pelikán)**

This species was collected on different varieties of rose flowers, and here is being recorded for the first time from the Markazi Province.

Distribution. Iran (Markazi, Khorasan-e-Shomali, Hamedan, Kordestan); Tajikistan (Mirab-balou, 2013).

***Thrips meridionalis* (Priesner)**

This species (Fig. 6) was collected on various Rosaceae, Fabaceae, Asteraceae and Asparagaceae in Mahallat.

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

***Thrips nigropilosus* Uzel**

This species (Fig. 7) was collected on common sunflower and agrimony, and here is being recorded for the first time from the Markazi Province.

Distribution. Iran (Markazi, Khuzestan, Khorasan–e–Shomali, Guilan, Hamedan); China, Japan, Turkey, Russia, Egypt, Ethiopia, Kenya, Tanzania, Australia, Europae, Fiji, Hawaii, New Zealand, Canada, USA (Mirab-balou, 2013).

***Thrips tabaci* Lindeman**

This species (Fig. 8) is now almost cosmopolitan, although rare in the humid tropics and subtropics. *T. tabaci* is a major pest of greenhouse crops, such as cucumber, sweet pepper, chrysanthemum and many ornamental plants (Pourian *et al.*, 2009). In this study, it was collected with large population on each plant in Mahallat.

Distribution. Iran (widespread); across all the countries (Mirab-balou *et al.*, 2011, Mirab-balou, 2013).

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