

## THE *MEGALUROTHRIPS* GENUS-GROUP IN IRAN (THYSANOPTERA: THIRIPIDAE)

Majid Mirab-balou & Xue-xin Chen\*

\* Institute of Insect Sciences, Zhejiang University, 268 Kaixuan Road, Hangzhou 310029, CHINA. E-mail: xxchen@zju.edu.cn

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ABSTRACT: The genus *Megalurothrips* Bagnall of *Megalurothrips* genus-group (Thysanoptera: Thripidae) is recorded in Iran for the first time. This is the third member of this group recorded from Iran after *Odontothrips* and *Pezothrips*, two genera previously reported in Iran. *Odontothrips loti* (Haliday) is newly recorded for fauna of Iran. A key is provided to distinguish these three genera, with comments on each genus and its species. The list of their host plants and map of distribution in Iran is given, respectively.

KEY WORDS: Thripidae, *Megalurothrips* genus-group, *Megalurothrips*, *Odontothrips*, *Pezothrips*, key, new record, host plants, Iran.

The family Thripidae is currently interpreted as comprising rather more than 2000 described species, which are grouped into four subfamilies, i.e. Panchaetothripinae, Dendrothripinae, Sericothripinae and Thripinae with 125/35, 95/13, 140/3 and 1700/225 species/genera, respectively (Masumoto, 2010). Currently, eight genus-groups are used instead of the formal tribal classification, as follows: *Anaphothrips* genus-group, *Frankliniella* genus-group, *Thrips* genus-group, *Megalurothrips* genus-group, *Taeniothrips* genus-group, *Mycterothrips* genus-group, *Scirtothrips* genus-group and *Trichromothrips* genus-group (Mound & Palmer, 1981; Masumoto & Okajima, 2005, 2006, 2007; Mound & Masumoto, 2009).

*Megalurothrips* genus-group now comprises six genera, i.e. *Ceratothripodes*, *Ceratothrips*, *Megalurothrips*, *Pezothrips*, *Odontothripella* and *Odontothrips* (Mound & Palmer, 1981). Mound & Palmer (1981) indicated the following characters for this group: Antennae 8-segmented (Fig. 24); ocellar setae pair I present (Figs. 12-14); median metanotal setae at anterior margin (Fig. 16); metanotal spinula absent (Fig. 15); tergite VIII with posteromarginal comb usually interrupted (Figs. 18, 25); and sternal discal setae absent (Figs. 19, 26).

In Iran only two genera have been recorded within *Megalurothrips* genus-group, i.e. *Odontothrips* and *Pezothrips* with three and one species, respectively (Mound, 2011). In this paper, *Megalurothrips* Bagnall, the third member of this group is recorded in Iran for the first time. In addition, a fourth species of genus *Odontothrips*, namely *O. loti* (Haliday), is recorded for the first time for fauna of Iran. A key is provided to distinguish these three genera, with comments on each genus and their species. The list of their host plants (Table 1) and map of distribution in Iran (Fig. 28) is given, respectively.

### MATERIALS AND METHODS

The specimens were collected from different sites of Iran during 2008-2010 by using sweep net and also by shaking the host-plants over a white plate and using a small brush for transfer thrips to 70% alcohol. The method for preparing and mounting thrips on slides follows Mirab-balou & Chen (2010). All descriptions, measurements and photos were made with a Leica DM IRB

microscope and with a Leica Image 1000 system. All specimens are deposited in the Institute of Insect Sciences, Zhejiang University, Hangzhou, China (ZJUH).

### Key to genera of *Megalurothrips* group in Iran

1. Upper vein in forewing with long gap of setal row and two setae at distal half (Fig. 6); male with numerous small glandular areas on sternites III-VII (Fig. 27)..... *Pezothrips Karny*
- Upper vein in forewing without long gap of setal row, or with short gap near apex and two distal setae (Fig. 7); male without glandular area on abdominal sternites (Fig. 19).... 2
2. Antennal segment VI sense cone with enlarged base (Fig. 24); fore tibiae usually with 1 or 2 claw-like processes at apex; fore tarsi often with 1 or 2 small tubercles (Figs. 8, 10-11)..... *Odontothrips Amyot & Serville*
- Antennal segment VI with normal sense cone (Fig. 3); fore tibiae without claws (Fig. 9)... *Megalurothrips Bagnall*

### I. Genus *Megalurothrips* Bagnall, 1915 (New record)

This genus has thirteen species (Mound, 2011) that all breed in the flowers of Fabaceae and some are pests of cultivated legumes (Masumoto, 2010). This genus, the third member of *Megalurothrips* genus-group in Iran, is recorded here for the first time. This genus is distinguished by the following characters: Head wider than long, with transverse striations posteriorly (Fig. 14); interocellar setae longest; postocular setae developed; eyes large, about half as long as head (Fig. 14); antennal segment I with a pair of dorso-apical setae (Fig. 5), III and IV each with large forked sense cones (Fig. 4); pronotum with developed posteroangular setae; forewing banded, with upper vein almost complete or interrupted beyond middle; posterior vein with complete row of setae; mesosternal spinula present (Fig. 15); abdominal tergite VIII with a patch of microtrichia anterior to the spiracle (Fig. 18); tergite IX not completely divided longitudinally; and sternites without discal setae. In this genus, only *M. distalis* is collected from Iran.

#### *Megalurothrips distalis* (Karny, 1913) (New record)

**Diagnosis.** *Female macroptera.* Body dark brown; antennae 8-segmented, with long sense cones on segments III and IV (Fig. 4); segments III and IV subequal in length (Fig. 4); distal segment III brown; head and prothorax wider than long (Fig. 14); eyes normal, ocellar setae pair III placed near the front ocelli and 3-4 times as long as the distance between their bases; maxillary palpi 3-segmented (Fig. 17) pronotum with long posteroangular and posteromarginal setae; forewings with brown cross-bands, basal portion pale, distal apex brown; with 2 distal setae and 13-18 basal setae on upper vein. Fore femora brown with pale apices, fore tibiae uniformly light brown, all tarsi yellowish. Metanotum with widely spaced, transverse striate; median setae situated at anterior margin, campaniform sensilla present. Median setae on abdominal tergites short and close together or far apart; tergite VIII with comb of microtrichia on posterior margin interrupted medially (Fig. 18); tergites IX and X each with long, dark apical setae and pointed at apex. Sternite VII with median pair of posteromarginal setae anterior to posterior margin. Ovipositor well developed. Male with numerous lanceolate, sternal discal setae.

**Measurements of female in  $\mu\text{m}$  (width).** Body 2150 (420). Head 198 (150), compound eye 85; distance between to compound eyes 65. Antenna 365; I 35 (37), II 45 (28), III 66 (26), IV 76(26), V 36 (18), VI 57 (28), VII 11 (6) and VIII 13 (4); maxillary palpi 65. Pronotum 190 (255); antero-angular setae 28, posteroangular setae 65; forewing 1000; hind wing 880; abdominal tergite IX setae 170, X 78.

**Material examined. IRAN: Hamedan Province:** Charmsazi, 3♀ from marguerite (*Leucanthemum vulgare*), 15.vi.2009; coll. M. Mirab-balou; ZJUH.

**Distribution.** Iran (Hamedan Province); China, Korea, India, Indonesia, Sri Lanka, Philippines, Fiji (Reyes, 1994; Mirab-balou et al., 2011).

### II. Genus *Pezothrips* Karny, 1907

This genus includes nine species in the world (Mound, 2011), of which one species, namely *P. bactrianus* (Pelikan), has been reported from Iran (zur Strassen, 2003).

### ***Pezothrips bactrianus* (Pelikan, 1968)**

**Diagnosis.** Body brown to dark brown, fore tibiae and tarsus yellow, middle and hind legs brown to dark brown; antennal segment III yellow, the rest brown. Head with three pairs of ocellar setae. Pronotum with two pairs of long posteroangular setae and four posteromarginal setae; metanotum with median setae situated at anterior margin, campaniform sensilla present; mesothorax furca with spinula; forewing with two distal setae, clavus with five setae (Fig. 6). Abdominal tergites II-V with S1setae shorter and weaker than S2; tergite VIII with complete comb; sternites without discal setae; sternite VII with median setae clearly anterior to posterior margin. Male with numerous small glandular areas on sternites III-VII (cf. Fig. 27); tergite IX with two thick setae in middle.

**Material examined. IRAN: Kermanshah Province:** Mahidasht, 1♀ from wheat, 1♀ from sunflower, 14.vi.2009; Choqa Narges, 1♂ from sunflower, 14.vi.2009. **Hamedan Province:** Juraqan, 3♀ from *Viola odorata*, 14.v.2009; Robot-e Sheverin, 16♀ 2♂ from *Centaurea* sp., 8.vi.2009.

**Distribution.** Iran (Hamedan and Kermanshah provinces); Turkey, Tajikistan (zur Strassen, 2003).

### **III. Genus *Odontothrips* Amyot & Serville, 1843**

The genus *Odontothrips* included 30 species in the world (Mound, 2011), three of which have been recorded from Iran (Mound, 2011). A key is provided for identifying these species in Iran, including a newly recorded species, *O. loti* (Haliday).

#### **Key to species of *Odontothrips* in Iran**

[\* included from published descriptions]

1. Distal fore tarsal segment with one or two small hooks or tubercles on inner margin (Figs. 8, 11)..... **2**
  - Distal fore tarsal segment without small hooks or tubercles (Fig. 10)..... **3**
2. Fore tibia with one stout claw (Fig. 11); abdominal tergites II-VIII weakly striate lateral to the median setae only; male genitalia with a single pair of stout endothelial spines (Fig. 22)..... **loti (Haliday)**
  - Fore tibia without stout claw (Fig. 8); distal fore tarsal segment with one or two small hooks or tubercles on inner margin (Fig. 8); median area of pronotum of males and females without lines of sculpture (Fig. 20); male genitalia with 3-4 pairs of endothelial spines, the distal 2-3 pairs set apart from the basal pair, which are usually larger (Fig. 23)..... **meliloti Priesner**
3. Forewings distinctly shaded (Fig. 7); apex of fore tibia with two small teeth (Fig. 10); antennal segment II dark, III pale; male with two pairs of fairly stout endothelial spines on the genitalia..... **confusus Priesner**
  - Forewings pale except at the extreme apex; pronotum and abdominal tergites II-VIII without lines of sculpture medially..... **phlomidinus Priesner**

#### ***Odontothrips loti* (Haliday, 1852) (New record)**

This species was identified based on the descriptions by Pitkin (1972), Han (1997), zur Strassen (2003) and Hoddle et al. (2010).

**Diagnosis.** *Female macroptera.* Body brownish to dark brown, tarsi paler, antennal segment III yellow, IV light brown (Fig. 1); forewings brown with white transverse band sub-basally. Head wider than long, ocellar setae pair III arising on or just outside anterior margins of ocellar triangle. Pronotum with 2 pairs of long posteroangular setae and 4 pairs of posteromarginal setae; apex of fore tibiae with small claw near outer margin (Fig. 11); metanotum with median setae long situated at anterior margin, campaniform sensilla present; mesothoracic furca with spinula; forewing upper vein with small gap sub-apically; second vein with complete row of setae. Abdominal tergites without sculpture medially; VIII with posteromarginal comb broadly interrupted medially; sternites without discal setae, median pair of marginal setae on sternite VII arise far in front of margin.

*Male macroptera.* Male smaller than female, with a pair of small stout setae on tergite IX (cf. Fig. 21); sternites without glandular areas; genitalia with two stout spines (Fig. 22).

**Measurements of female in  $\mu\text{m}$  (width).** Body 1710 (460). Head 130 (200), compound eye 80; distance between to compound eyes 60. Antenna 360; I 23 (25), II 29

(22), III 45 (19), IV 43(16), V 26 (14), VI 41 (17), VII 8 (5) and VIII 14 (4). Pronotum 170 (250); posteroangular setae 70; forewing 820 (70); hind wing 730(50).

**Measurements of male in  $\mu\text{m}$  (width).** Body 1500 (360). Head 115 (185); Antenna 270; Pronotum 140 (220); forewing 730 (65); hind wing 640 (50).

**Material examined. IRAN: Zanjan Province:** Yengijeh, 1♀ 3♂ from *Securigera varia*, 25.vi.2009.

**Distribution.** Iran (Zanjan Province); China, Russia, North America, Europe, Japan (zur Strassen, 2003; Mirab-balou et al., 2011).

### ***Odontothrips confusus* Priesner, 1926**

This species was identified based on the descriptions by Pitkin (1972) and zur Strassen (2003). It distributes in most part of Iran (Fig. 28) and inhabits inflorescences of alfalfa and clover (Table 1). This species is distinguished from its congeners by the following characters: Antennal segment II dark, III pale; forewing lower vein with 14-15 setae; and fore tarsi without tubercles but fore tibiae with two small denticles on inner side of apex.

**Material examined. IRAN: Hamedan Province:** Abbasabad, 6♀ 8♂ from alfalfa (*Medicago sativa*), 2♀ from *Cicer arietinum*, 20.vii.2009; 1♀ from wheat, 8.vi.2009; Aliabad-e Varkaneh, 1♀ from wheat, 8.vi.2009; Amzajerd, 1♀ from potato, 28.vi.2009; AsadAbad, 1♀ from *Melilotus officinalis*, 2♀ 1♂ from *Plantago major*, 9.vi.2009; Azandarian, 4♀ 2♂ from alfalfa, 18.vii.2009; Cheshmeh Malek, 1♂ from *Cynodon dactylon*, 25.v.2009; Eram Bld., 1♀ from *M. officinalis*, 23.vi.2009; Eram Bld., 3♀ 1♂ from alfalfa, 1♀ from *Aster* sp., 1♂ from *Verbascum* sp., 6♀ 4♂ from *Trifolium pratense* 22.vii.2009; Ganjnameh, 2♀ 1♂ from *Lotus goebelia*, 20.vi.2009; Ganjnameh, 4♀ 3♂ from alfalfa, 17.vii.2009, 4♀ 1♂ from *Trifolium pratense*; Heydareh, 8♀ 2♂ from alfalfa, 13.vii.2009; Heydareh-ye Qazi Khan, 3♀ 2♂ from alfalfa, 14.vii.2009, 1♀ from *Cuscuta* sp., 14.vii.2009; Kurijan, 1♀ from alfalfa, 7.vii.2009; Literature College, 2♀ from alfalfa, 19.v.2008; Nahavand (Gian), 1♀ from *Echium vulgare*, 3♀ from alfalfa, 4.vii.2009; Ostadan, 1♀ from *Euphorbia* sp., 29.vi.2009; Qahavand, 1♀ from *Centaurea solstitialis*, 4.v.2009, 1♀ from alfalfa, 7.viii.2010; Robat-e Sheverin, 1♀ from *M. officinalis*, 8.vi.2008; Saïdieh, 7♀ from *Onobrychis vicifolia*, 1♀ from *Dactylis glomerata*, 4♀ 1♂ from alfalfa, 1♀ from *Euphorbia* sp., 1♀ 2♂ from *Lolium perenne*, 1♂ from *Convolvulus arvensis*, 3.vi.2009; Tuysarkan, 6♀ 1♂ from alfalfa, 16.vii.2009; YeknAbad, 2♀ from alfalfa, 25.v.2008. **Kordestan Province:** Bijar, 7♀ from alfalfa, 12.vii.2009. **Qazvin Province:** Takestan, 2♀ from *Onopordon acanthium*, 30.vi.2009. **Zanjan Province:** Yengijeh, 1♀ 1♂ from *Achillea millefolium*, 2♀ 1♂ from wheat, 1♂ from *Convolvulus arvensis*, 25.vi.2009.

**Distribution.** Iran (Fars, Kerman, Yazd, Golestan, Lorestan, Alborz, Khorasan-e-shomali, Hamedan, Kordestan, Qazvin and Zanjan Provinces) (Minaei & Alich, 2000; Kheyrandish Koshkoei et al., 2000; Teraz & Kheyrandish Koshkoei, 2002; Mohaghegh & Kheyrandish Koshkoei, 2002; Jafari & Fallahzadeh, 2004; Alavi, 2004; Pirafka et al., 2006); China, Hungary, Germany, Czechoslovakia (zur Strassen, 2003; Mirab-balou et al., 2011).

### ***Odontothrips meliloti* Priesner, 1951**

This species was identified based on the descriptions by Pitkin (1972) and zur Strassen (2003). It was reported in Iran for the first time by Minaei et al. (2002) from Fars Province. This species is distinguished from its congeners by the following characters: Antennal segment III yellow, IV brown with basal yellow (Fig. 2); pronotum without lines of sculpture medially in both sexes; and base of sense cone on antennal segment VI greatly enlarged, maximum diameter more than one-third of total length of the sense cone.

**Material examined. IRAN: Hamedan Province:** Eram Bld., 6♀ 1♂ from *Melilotus officinalis*, 5.vi.2009; Ghaeem Sq., 1♀ from *Poa bulbosa*, 15.v.2008; Heydareh-ye Qazi Khan, 1♀ from *M. officinalis*, 14.vii.2010; Literature College, 1♀ 1♂ from *Medicago hispida*, 19.v.2008; Sadd-e-Ekbatan, 2♀ 2♂ from *M. officinalis*, 7.vi.2009; YeknAbad, 1♀ from *Glycyrrhiza glabra*, 19.v.2009. **Kermanshah Province:** Huker, 1♂ from wheat, 15.vi.2009. **Kordestan Province:** Bijar, 2♀ from *M. officinalis*, 1♀ from *Sisymbrium irio*, 12.vii.2009. **Qazvin Province:** Takestan, 1♂ from *Onopordon acanthium*, 30.vi.2009. **Zanjan Province:** Yengijeh, 1♀ from *Achillea millefolium*, 25.vi.2009.

**Distribution.** Iran (Fars, Hamedan, Kermanshah, Kordestan, Qazvin and Zanjan Provinces); China, Southern England, France, Germany, Hungary, Czechoslovakia (Minaei et al., 2002; zur Strassen, 2003; Mirab-balou et al. 2011).

### ***Odontothrips phlomidinus* Priesner, 1954**

This species has been recorded from Northern Fars Province (Ardekan Mountains) by Priesner (1954). Pitkin (1972) stated the following characters for distinguishing this species: lack small hooks or tubercles on the distal tarsal segment of the fore tarsal; forewings pale except the extreme apex as in *O. elbaensis*, from which it may be distinguished by the absence of lines of sculpture medially on the pronotum and abdominal tergites II-VIII.

**Distribution.** Iran (Fars Province) (Priesner, 1954; Pitkin, 1972).

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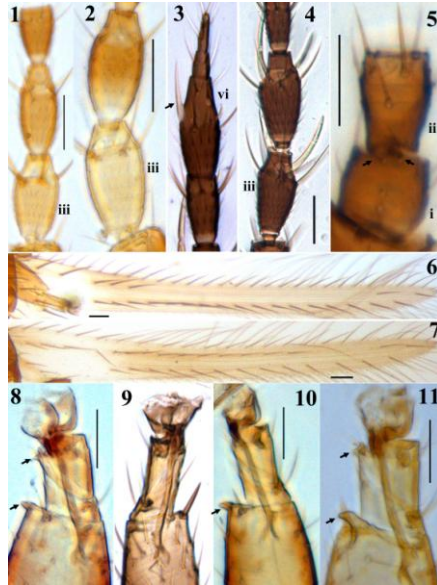
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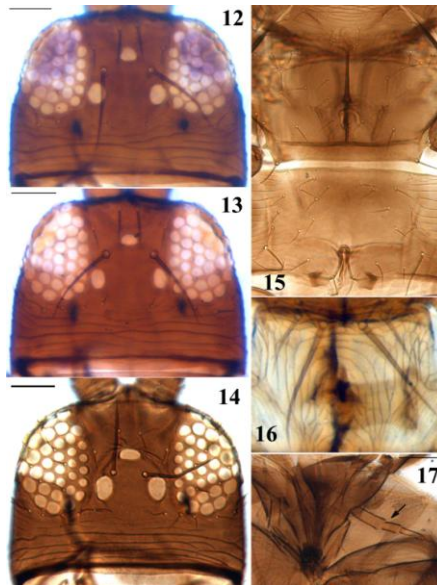
Table 1. Host plants of species of *Megalurothrips* genus-group in Iran.

Host Plants		Thrips species					
Family	Scientific name	1	2	3	4	5	6
<b>ASTERACEAE</b>	<i>Leucanthemum vulgare</i>	+					
	<i>Helianthus annuus</i>		+				
	<i>Centaurea</i> sp.		+	+			
	<i>Onopordon acanthium</i>					+	
	<i>Achillea milefolium</i>				+	+	
	<i>Aster</i> sp.					+	
<b>BORAGINACEAE</b>	<i>Echium vulgare</i>					+	
<b>CONVOLVULACEAE</b>	<i>Cuscuta</i> sp.					+	
	<i>Convolvulus arvensis</i>					+	
<b>CRUCIFERA</b>	<i>Sisymbrium irio</i>						+
<b>EUPHORBIACEAE</b>	<i>Euphorbia</i> spp.				+		
<b>FABACEAE</b>	<i>Securigera varia</i>						+
	<i>Onobrychis vicifolia</i>				+		
	<i>Astragalus</i> sp.				+		
	<i>Melilotus officinalis</i>				+	+	
	<i>Medicago hispida</i>					+	
	<i>Medicago sativa</i>				+	+	
	<i>Glycyrrhiza glabra</i>				+	+	
	<i>Cicer arietinum</i>				+		
	<i>Trifolium pratense</i>				+		
	<i>Lotus goebelia</i>				+		
	<i>Triticum sativum</i>		+	+		+	
<b>GRAMINEAE</b>	<i>Poa bulbosa</i>						+
	<i>Cynodon dactylon</i>				+		
	<i>Dactylis glomerata</i>				+		
	<i>Lolium perenne</i>				+		
<b>LAMIACEAE</b>	<i>Phlomis</i> sp.						+
<b>PLANTAGINACEAE</b>	<i>Plantago major</i>				+		
<b>SCROPHULARIACEAE</b>	<i>Verbascum</i> sp.				+		
<b>SOLANACEAE</b>	<i>Solanum tuberosum</i>				+		
<b>VIOLACEAE</b>	<i>Viola odorata</i>		+				

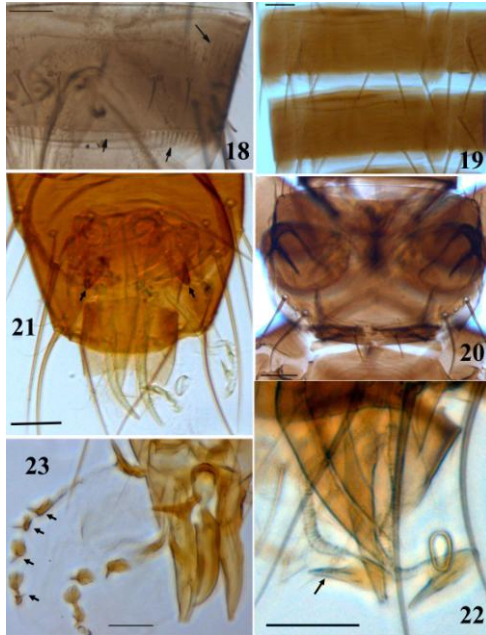
(1) *M. distalis*, (2) *P. bactrianus*, (3) *O. confusus*, (4) *O. meliloti*, (5) *O. loti*, (6) *O. phlomidinus*.



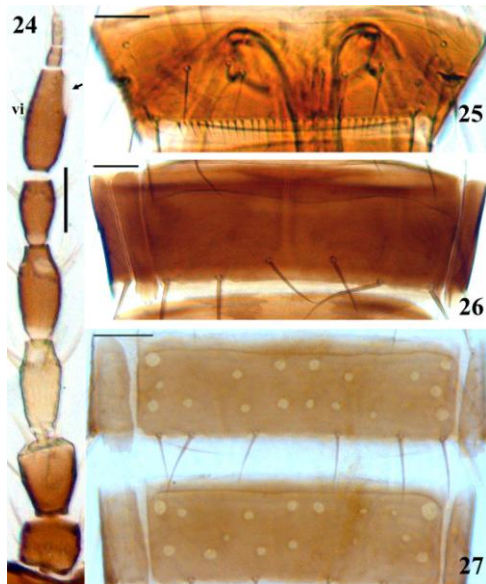
Figures 1-11. *Megalurothrips* genus-group. (1) *O. loti*, antennal segments III-V; (2) *O. meliloti*, antennal segments III-IV; 3-5: *M. distalis*: (3) antennal segments V-VIII, (4) antennal segments III-IV, (5) antennal segments I-II; 6-7: Forewing: (6) *P. kellyanus*, (7) *O. confusus*; 8-11: Fore tibiae- and tarsus: (8) *O. meliloti*, (9) *M. distalis*, (10) *O. confusus*, (11) *O. loti*. (Scale bar= 30  $\mu$ m).



Figures 12-17. *Megalurothrips* genus-group. 12-14: Head: (12) *O. confusus*, (13) *O. meliloti*, (14) *M. distalis*; (15) *M. distalis*, meso- and mrtasternum; (16) *O. confusus*, metanotum; (17) *M. distalis*, maxillary palpi. (Scale bar= 30  $\mu$ m).



Figures 18-23. *Megalurothrips* genus-group. (18) *M. distalis*, tergite VIII; (19) *O. confusus*, sternites VI-VII (male); (20) *O. meliloti*, pronotum; (21) *O. confusus*, tergites IX-X (male); (22) *O. loti*, male genitalia; (23) *O. meliloti*, male genitalia. (Scale bar= 30  $\mu$ m).



Figures 24-27. *Megalurothrips* genus-group. (24) *O. confusus*, antennae; (25) *P. bactrianus*, tergite VIII; (26) *O. confusus*, sternite VII; (27) *P. kellyanus*, sternites V-VI (male). (Scale bar= 30  $\mu$ m).



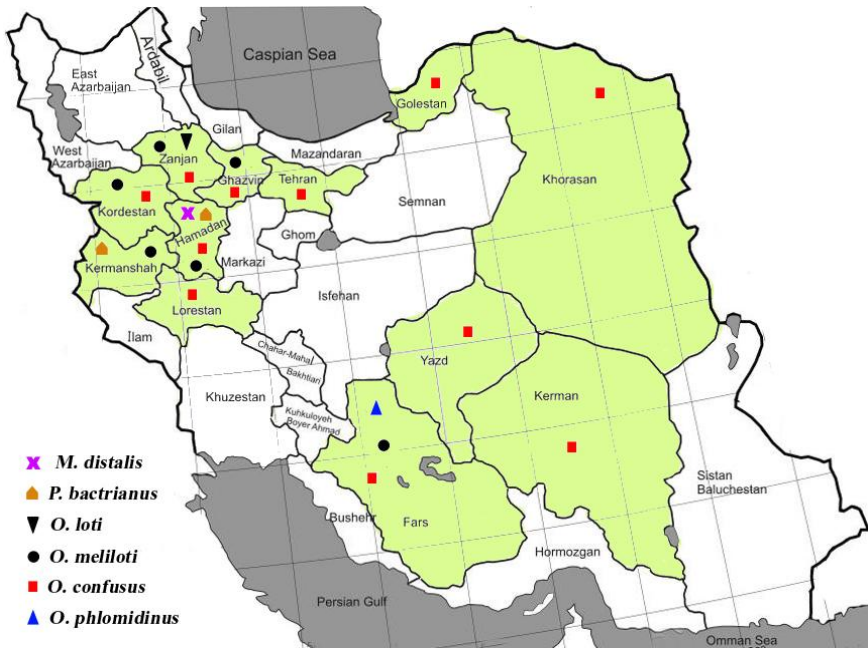


Figure 28. Distribution of *Megalurothrips* genus-groups in Iran.