

The *Thrips* genus-group (Thysanoptera: Thripidae) in Iran

K. Minaei^{1,*}, P. Azemayesh Fard¹ and L. A. Mound²

1- Plant Protection Department, Faculty of Horticultural Science and Plant Protection, College of Agriculture and Natural Resources, University of Tehran, Iran, 2- CSIRO Entomology, GPO Box 1700, Canberra, ACT, Australia, E-mail: laurence.mound@csiro.au

*Corresponding author, E-mail: kminaei@ut.ac.ir

Abstract

The monobasic genus *Sphaeropothrips* is recorded in Iran for the first time. This is the fourth member of the *Thrips* genus-group recorded from Iran, and a key is provided to distinguish these four genera. Information about these four genera is provided, and some problems in the recognition of true host-plant associations in Iran are discussed.

Key words: *Sphaeropothrips vittipennis*, *Thrips* genus-group, rice, Iran, Mazandaran province

چکیده

جنس تک گونه‌ای *Sphaeropothrips* برای اولین بار از ایران گزارش می‌شود. این جنس چهارمین عضو گروه جنس *Thrips* می‌باشد که تاکنون از ایران گزارش شده‌اند. کلیدی جهت تشخیص این چهار جنس ارائه می‌شود. همچنین اطلاعاتی در مورد این چهار جنس و برخی مشکلات در تشخیص میزبان گیاهی واقعی بال ریشکداران ایران مورد بحث قرار می‌گیرند. واژگان کلیدی: *Sphaeropothrips vittipennis* گروه جنس *Thrips*، برنج، ایران، استان مازندران

Introduction

The known species of Thysanoptera are classified into nine families (Mound, 2002a). However, 93 percent of these species are placed in either the Thripidae or the Phlaeothripidae, and it is members of these two families that are normally found on crops (Mound, 1997). Mound & Palmer (1981) listed a series of Thripidae genera as members of the *Thrips* genus-group and allowing for subsequent synonymies (Bhatti & Mound, 1981), this group now comprises the following 14 genera: *Baliothrips* Uzel, *Bolacothrips* Uzel, *Bournierothrips* Bhatti, *Ctenidothrips* Priesner, *Ernothrips* Bhatti, *Fulmekiola* Karny, *Larothrips* Pitkin, *Microcephalothrips* Bagnall, *Rhinothripiella* zur Strassen, *Sphaeropothrips* Priesner, *Stenchaetothrips* Bagnall, *Stenothrips* Uzel, *Thrips* Linnaeus and *Toxonothrips* Moulton. Members of this group are characterized by the following character states: head with ocellar setae I absent, abdominal tergites V-VIII with paired ctenidia laterally, tergite VIII with ctenidia posteromedial to the spiracles, tergites VI-VII discal setae S2 usually larger than S1 and S3 (Mound, 2002b; Mound & Masumoto, 2005).

So far a total of 162 species of Thysanoptera have been reported from Iran (Bhatti *et al.*, 2003; Hasani & Fallahzadeh, 2005), of which 100 species in 40 genera are members of the family Thripidae. Amongst these genera the following three are members of the *Thrips* genus-group: *Microcephalothrips*, *Stenothrips* and *Thrips*. In this paper, an additional genus in this group is reported for the first time from Iran, and a key to separate these four genera provided.

Materials and Methods

The single specimen of *Thrips* genus-group discussed below was collected, together with several specimens of the Phlaeothripidae, *Haplothrips aculeatus* (Haliday), by beating ears of rice (*Oryza sativa*) onto a plastic tray. The specimen was removed with a fine brush into a collecting vial containing AGA, a mixture of 60% ethyl alcohol (10 parts), glycerine (1 part) and glacial acetic acid (1 part). A microscopic slide mount was prepared using a form of the protocol given in Mound & Kibby (1998).

Results

Sphaeropothrips vittipennis (Bagnall)

Baliothrips vittipennis Bagnall, 1927, 574-575

Sphaeropothrips inauditus Priesner, 1928, 322

A single female of this species was collected from the ears of rice at Chalous (Mazandaran province), and this is the first report of *Sphaeropothrips* in Iran. This female was compared with specimens of this species from Japan, and also with the available published descriptions. The only member of the genus, this species has been recorded from Poland, northern Germany, France, England, Austria, Hungary, Czechoslovakia, Egypt, and India (zur Strassen, 2003). Moreover, specimens of both sexes have been studied recently from Okinawa (Japan), through the courtesy of Kazushige Minoura (Naha Plant Protection Station, Okinawa, Japan). This thrips is grass-living, and the genus *Sphaeropothrips* was at one time synonymised with another grass associated genus, *Baliothrips* (see Bhatti & Mound, 1981). However, these genera were distinguished by Bhatti & Mound (1981); see also zur Strassen (2003).

Diagnosis – Body brown, antennal segments III and IV pale-brown, tarsi and apices of tibiae yellow, forewings pale but with darker bands medially and at apex. Head about as long as wide, projecting slightly in front of eyes, width narrower across cheeks than across eyes, and cheeks with a notch behind eyes (fig. 1); ocellar setae pair II and III small, II arising anterolateral to ocellar triangle, shorter than III; III arising within or on anterior margins of ocellar triangle; three pairs of post ocular setae arranged in a transverse line, but postocular setae I often displaced toward ocelli. Antennae 7-segmented, with forked sensorium on segments III and IV. Pronotum anterior margin with 5 pairs of small setae (fig.1); one pair of midlateral setae almost as long as two pairs of posteroangulars. Tarsi 2-segmented; mesonotum transversely reticulate; metanotum longitudinally reticulate, median paired setae

distant from anterior margin, campaniform sensilla usually absent; wings fully developed, first vein with wide interval in setal row before 2 setae near apex, clavus with 4 or 5 marginal setae. Abdominal tergites V-VIII with paired lateral ctenidia, on tergite VIII situated mesad of spiracle; tergite VIII posterior margin with irregular row of small microtrichia laterally; setae on tergites IX and X stout; tergum X longitudinally split incomplete. Abdominal sternites without discal setae; sternites III-VI usually with 3 but sometimes with 4 pairs of marginal setae. Male with tibiae more extensively yellow; sternites III-VII each with broad glandular area.

Material examined – Iran: Mazandaran province, Chalous, 1 ♀ from *Oryza sativa* (Poaceae), 1.viii.2005. Japan: Okinawa, Ginowan, 3 ♀ from *Ipomoea aquatica* (Convolvulaceae), 5.II.2005; 3 ♂ from Gramineae, 26.iii.2005, (K. Minoura).

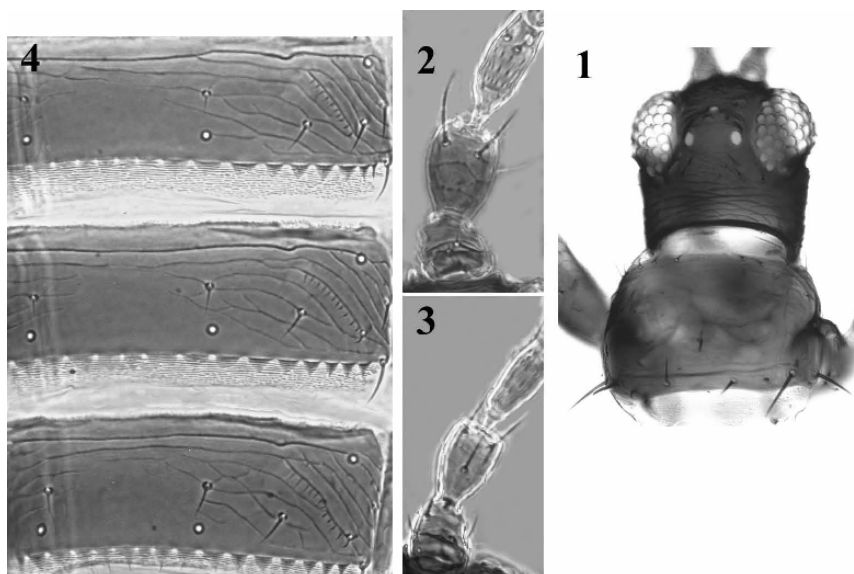
Key to genera of *Thrips* group

1. Mesothoracic sternopleural sutures absent; antennal segment II without dorsal seta basad of campaniform sensilla (fig. 2). *Sphaeropothrips*
- Mesothoracic sternopleural sutures present; antennal segment II with dorsal seta basad of campaniform sensilla (fig. 3) **2**
2. Abdominal tergites with a craspedum of large triangular teeth on posterior margin (fig. 4); head unusually small; pronotal posteroangular setae scarcely longer than posteromarginal setae *Microcephalothrips*
- Abdominal tergites without a craspedum; head not unusually small; pronotum with 2 pairs of elongate posteroangular setae **3**
3. The second pair of postocular setae inserted far back of the others; setae S3 to S5 on abdominal tergites III to V arranged in a straight line with S4 posteriad of the level of S5; tergite VIII with comb; antennae 7-segmented *Stenothrips*
- The second pair of postocular setae not displaced to the posterior; setae S3 to S5 on abdominal tergites III to V arranged in a triangle with S4 forming the mesial angle; tergite VIII with or without comb antennae 7 or 8-segmented *Thrips*

The four genera of *Thrips*-group in Iran

The genus *Thrips* is the most species-rich genus in the order Thysanoptera, with 280 species worldwide (Mound & Masumoto, 2005). In contrast, the three other genera

considered in this paper, *Microcephalothrips*, *Stenothrips* and *Sphaeropothrips*, each have only one species.



Figures 1-4. 1. *Sphaeropothrips vittipennis*, head and pronotum, 2. *S. vittipennis*, antennal segments I-III, 3. *Stenothrips graminum*, antennal segments I-III, 4. *Microcephalothrips abdominalis*, abdominal tergites V-VII.

Microcephalothrips abdominalis (Crawford DL) is the only species recognised in this genus. Nine synonyms of this species are already established, and three further species that are listed by Mound (2005) from China were distinguished on character states that are known to be variable within individual populations, and these species probably also represent *M. abdominalis*. This thrips breeds particularly in the flowers of sunflowers, *Helianthus annuus*, but also in some other Asteraceae (Moritz *et al.*, 2001). It has been mentioned as a vector of tobacco streak virus (Greber *et al.*, 1991), and recorded in Iran from Golestan, Khuzestan, Markazi and Tehran provinces in various plants including ornamental flowers (Cheraghian & Hojat, 1998; Gilasian *et al.*, 2000; Bagheri *et al.*, 2002; Jalili Moghadam & Azmayesh Fard, 2004; Ghotbi *et al.*, 2005). Adults of this species were also collected recently on Tobacco at

Tirtash Tobacco Research Institute (Mazandaran province) by H. Khateri (personal communication).

Stenothrips graminum Uzel, the common European "oat thrips", breeds in *Avena*, *Hordeum* and *Triticum* (all Poaceae) (Priesner, 1965; zur Strassen, 2003). In contrast, Dordaie *et al.*, (2000) report this species (as "*Stenothrips* sp." but presumably the species is *S. graminum* because the genus is monobasic) as an important pest of poplar trees in East-Azarbaidjan province. However, these authors present insufficient data for this remarkable host-association of a grass thrips to be substantiated (see below under discussion). Moreover, *S. graminum* has been recorded by Alavi (2000) (as *Baliothrips graminum*) and Gilasian *et al.*, (2000) from Golestan province.

The genus *Thrips* includes 22 species recorded from Iran (Bhatti *et al.*, 2003). Several of these species are considered crop pests in various parts of the world, such as *T. angusticeps* Uzel, *T. flavus* Schrank, *T. hawaiiensis* (Morgan), *T. meridionalis* Priesner, and *T. tabaci* Lindeman (Moritz *et al.*, 2001). The latter species is well known as the most important pest of onion crops in Iran (Bournier & Couilloud, 1969; Hassanzadeh-Salmasi, 1995), and is a vector of Tospovirus diseases on some crops around the world (Mound, 2002a). Recently, transmission of cineraria (*Senecio* sp.) isolate of TSWV has been confirmed by *T. tabaci* in Fars province, Iran (Rasoulpour & Izadpanah, 2003), and also some tospoviruses were detected in populations of *T. tabaci* collected from ornamental plants in Tehran and Markazi Provinces (Ghotbi *et al.*, 2003).

Discussion

The Thysanoptera fauna of Iran contains elements mostly from the western oriental, eastern Ethiopian, and Mediterranean areas, but it also involves Palearctic and even Holarctic species as well as circum-subtropical ones (zur Strassen, personal communication, 2001). Little is known about the Thysanoptera fauna of Iran, apart from the checklist by Bhatti *et al.*, (2003), and a further dozen species are still not identified. For instance, it was only recently that three genera including three species of spore feeding Thysanoptera, Idolothripinae were recorded in Iran (Minaei & Alich, 2002), although about 700 species in about 80 genera of this group are known in the world (Mound & Palmer, 1983; Mound, 1997). Moreover and most importantly, there is little information on the biology of most species, particularly the host-plants on which they breed. One example is indicated above, where a species considered to breed only on grasses has been reported as a pest of poplar trees

(Dordaie *et.al.* 2000), but with no supporting data such as the presence of larvae. Another example from Iran is a recent record of one adult of *Liothrips austriacus* (Karny) from the leaves of *Pistachio atlantica*, with this plant then being recorded as a "new host" for this thrips species (Hasani & Fallahzadeh, 2005). Adult thrips disperse readily and land on many plants that may not be their true hosts, and a host-plant record based on a single winged adult must be treated with caution. Thus it is not possible to assume that rice is a host-plant of *S. vittipennis*, based on the single specimen that we have seen from this plant. However, the natural host-plants of this thrips appear to be species of Cyperaceae and Poaceae in damp places (Priesner, 1965; zur Strassen, 2003), and this suggests that a breeding association with rice is quite possible.

Acknowledgments

Eng. Ali Kasaei from Plant Protection Department, University of Tehran is highly appreciated for his help during the field work in this study. Kazushige Minoura, quarantine entomologist in Okinawa, kindly provided specimens referred to here. The first author received funding from the Ministry of Science Research and Technology, Iran, also University of Tehran, in support of a study visit to Canberra, where research facilities were provided by CSIRO Entomology.

References

- Alavi, J.** (2000) Faunistic study of Thysanoptera on wheat and barley in Golestan province. *Proceedings of the 14th Iranian Plant Protection Congress, Vol. I, Pests*, p. 227.
- Bagheri, S., Alavi, J. & Kajbaf-Vala, Gh.** (2002) Introduction of ten species of Thysanoptera from forest trees and rangelands in Khuzestan province. *Proceeding of 2nd National Plant Protection, Conference Forests & Rangelands, Karaj*, pp. 15-16.
- Bagnall, S.** (1927) Contributions towards a knowledge of the European Thysanoptera. II. *Annals and Magazine of Natural History* 19, 564-575.
- Bhatti, J. S. & Mound, L. A.** (1981) The genera of grass and cereal-feeding Thysanoptera related to the genus *Thrips* (Thysanoptera: Thripidae). *Bulletin of Entomology* 21, 1-22.
- Bhatti, J. S., zur Strassen, R. & Telmadarraiy, Z.** (2003) Thysanoptera of Iran. pp. 668-669 in Subrahmanyam, B. & Ramamurthy, V. V. (Eds) *Proceedings of the National Symposium on Frontier Areas of Entomological Research*. New Delhi.

- Bournier, A. & Couilloud, R.** (1969) Cotton thrips in Iran. *Coton et Fibres Tropicales* 24, 211-218.
- Cheraghian, A. & Hojat, S. H.** (1998) A faunistic study of Thysanoptera in Ahwaz region. *Proceedings of the 13th Iranian Plant Protection Congress, Vol. I, Pests*, p. 211.
- Dordaie, A. A., Sadaghian, B. & Nikdel, M.** (2000) Survey of the most important pests of poplar trees in East-Azərbaydjan. *Proceedings of the 14th Iranian Plant Protection Congress, Vol. I, Pests*, p. 287.
- Ghotbi, T., Gilasian, E. & Shahraeen, N.** (2003) Detection of tospoviruses in individual thrips by ELISA from ornamental plants in Tehran and Markazi provinces. *Applied Entomology and Phytopathology* 70, 33-34.
- Ghotbi, T., Shahraeen, N. & Winter, S.** (2005) Occurrence of tospoviruses in ornamental and weed species in Markazi and Tehran provinces in Iran. *Plant Disease* 89, 425-429.
- Gilasian, E., Moharramipour, S. & Alavi, J.** (2000) One genera and five species of Thysanoptera as new records for Iran fauna. *Proceedings of the 14th Iranian Plant Protection Congress, Vol. I, Pests*, p. 341.
- Greber, R. S., Klose, M. J. & Teakle, D. S.** (1991) High incidence of tobacco streak virus in tobacco and its transmission by *Microcephalothrips abdominalis* and pollen from *Ageratum houstonianum*. *Plant Disease* 75, 450-452.
- Hasani, M. R. & Fallahzadeh, M.** (2005) Report of *Liothrips austriacus* (Thysan.: Phlaeothripidae), from Iran. *Journal of Entomological Society of Iran* 24, 151-152.
- Hassanzadeh-Salmasi, M.** (1997) Collecting and identification of insect fauna of onion field in eastern Azarbaijan. *Agricultural Science* 6, 21-40. [in Persian]
- Jalili Moghadam, M. & Azmayesh Fard, P.** (2004) Thrips of ornamental plants in Tehran and Mahallat. *Proceeding of the 16th Iranian Plant Protection Congress, Vol. I, Pests*, p. 160.
- Minaei, K. & Alich, M.** (2002) The first record of subfamily Idolothripinae (Thysanoptera: Phlaeothripidae) for Iran. *Proceeding of the 15th Iranian Plant Protection Congress, Vol. I, Pests*, p. 181.
- Moritz, G., Morris, D. C. & Mound, L. A.** (2001) *ThripsID – Pest thrips of the world. An interactive identification and information system*. CD-ROM published by ACIAR, Australia.
- Mound, L. A.** (1997) Biological diversity. pp. 197-215 in Lewis, T. (Ed.) *Thrips as Crop Pests*. 740 pp. CAB International, Wallingford.

- Mound, L. A.** (2002a) So many thrips - so few tospoviruses? pp. 15-18 in Marullo, R. & Mound, L. A. (Eds) *Thrips and Tospoviruses: Proceedings of the 7th International Symposium on Thysanoptera*. Australian National Insect Collection, Canberra.
- Mound, L. A.** (2002b) The *Thrips* and *Frankliniella* genus groups: the phylogenetic significance of ctenidia. pp. 379-386 in Marullo, R. & Mound, L. A. (Eds) *Thrips and Tospoviruses: Proceedings of the 7th International Symposium on Thysanoptera*. Australian National Insect Collection, Canberra.
- Mound, L. A.** (2005) Thysanoptera (Thrips) of the World – a checklist. Available on: <http://www.ento.csiro.au/thysanoptera/worldthrips.html> (accessed 27 April 2006).
- Mound, L. A. & Kibby, G.** (1998) *Thysanoptera: An Identification Guide*. 70 pp. CAB International Institute of Entomology and British Museum (Natural History), London.
- Mound, L. A. & Masumoto, M.** (2005) The genus *Thrips* (Thysanoptera, Thripidae) in Australia, New Caledonia and New Zealand. *Zootaxa* 1020, 1-64.
- Mound, L. A & Palmer, J. M.** (1981) Phylogenetic relationships between some genera of Thripidae (Thysanoptera). *Entomologica Scandinavica* 15, 153-17.
- Mound, L. A & Palmer, J. M.** (1983) The generic and tribal classification of spore-feeding Thysanoptera. *Bulletin of the British Museum (Natural History), (Entomology)* 46, 1-174.
- Priesner, H.** (1928) Beiträge zur Kenntnis der euräischen Thysanopteren. *Konowia* 7, 322-325.
- Priesner, H.** (1965) A monograph of the Thysanoptera of the Egyptian deserts. *Publications de l'Institut du Desert d'Egypt* 13, 1-549.
- Rasoulpour, R. & Izadpanah, K.** (2003) Transmission of cineraria isolate of tomato spotted wilt virus by onion thrips in Shiraz. *Iranian Journal of Plant Pathology* 39, 28.
- zur Strassen, R.** (2003) Die terebranten Thysanopteren Europas und des Mittelmeer-Gebietes. *Die Tierwelt Deutschlands* 74, 1-277.

Received: 21 June 2006

Accepted: 6 February 2007