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TENUIPALPID MITES FROM NORTHERN IRAN AND DESCRIPTION OF THE MALE OF CENOPALPUS RUBUSI KHANJANI 2012

Mohammad RAISI ARDALI1, Alireza HADIZADEH1, Mahmoud MOHAMMADI SHARIF1 and Mohammad KHANJANI2

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1 Department of Plant Protection, College of Agronomy Sciences, University of Agricultural Sciences and Natural Resources of Sari, Sari, Iran. arhadizadeh@gmail.com, msharif53@yahoo.com
2 Department of Plant Protection, College of Agriculture, University of Bu-Ali Sina, Hamadan, Iran. mkhanjani@gmail.com

ABSTRACT — The Tenuipalpidae are small, slow-moving, flat, red or green phytophagous mites that, despite the economic importance of some species, has been studied much less than the Tetranychidae. They have a great number of host plants including cultivated plants, ornamentals, fruit crops and forest trees. The aim of this study was to determine the species composition of tenuipalpid mites in the northern part of Iran, Mazandaran province. More than 150 plant species belonging to 41 families were inspected for possible infestation with tenuipalpid mites, among which 28 plant species were infested. Most of the infested plants are new records for the respective mite species. A total of 14 species of tenuipalpid mites belonging to five genera were collected and identified. Though citrus is the major fruit crop grown in Mazandaran province, flat spider mites were not yet reported from it in this area. In addition to this faunistic study, a male of Cenopalpus rubusi, which was collected on Rubus persicus Boiss., is described for the first time.

KEYWORDS — False spider mite; host plant; faunistic; male

INTRODUCTION

Mites of the family Tenuipalpidae (Order: Trombidiformes), commonly known as flat mites, are worldwide in distribution. Some of them are plant feeders of considerable economic importance especially a few species are injurious to citrus, tea, grapes and ornamentals (Jeppson et al., 1975). About 1,100 species of tenuipalpids belonging to 38 genera have been described in this family (Mesa et al., 2009; Beard et al., 2013). These mites transmitted serious plant viruses in citrus, coffee, orchids and several woody ornamental plants (Chagas et al., 2003; Childers et al., 2003). Despite the economic importance of the family Tenuipalpidae, these mites have been studied much less than the Tetranychidae and Phytoseiidae in Iran (Rahmani et al., 2008).

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MATERIALS AND METHODS

Infested leaves from several plant species in the Mazandaran Province were collected and those of each plant separately bagged in plastic bags and transferred to the laboratory on the same day. The leaves were carefully examined under a stereomicroscope to collect false spider mites. The mites were removed from the infested plant leaves with a fine camel hair brush, preserved in 75% ethanol, cleared in Nesbitt’s fluid and mounted in Hoyer’s medium. The slides were then dried in an oven at about 45-50 °C for two weeks and then sealed with nail polish prior to examination. Mites were examined and drawn with a Nikon E600 research microscope equipped with a camera Lucida. Keys of Meyer (1979) and Khanjani et al. (2008; 2012a, b; 2013b) were used for the identification of species. Some specimens were sent to Drs. M. Khanjani (co-author) and E.A. Ueckermann of the ARC-Plant Protection Research Institute, Pretoria, South Africa for identification or species confirmation. Voucher specimens are deposited in the Acarological Collection at Sari Agricultural Sciences and Natural Resources University, Sari, Iran.

Setal notations used in the description of the male of Cenopalpus rubusi follows Lindquist (1985) and Mesa et al. (2009) as applied to the Tenuipalpidae in Khanjani et al. (2012b). Setae are measured from their insertion to their tips and the distances between setae represent the distances between their insertions. All measurements are given in micrometers (µm). Microsoft office 2007 was used to clean the figures.

RESULTS AND DISCUSSION

Genus Aegyptobia Sayed, 1950

Aegyptobia beglarovi
Livschiz and Mitrofanov, 1967

Aegyptobia meyerae Khosrowsahi and Arbabi, 1997: 32. Aegyptobia kharazii Mesa et al., 2009: 15.

Distribution — worldwide especially: Egypt, Greece, Iran, Iraq, Mexico, United Arab Emirates and USA.

Specimens examined and associations — Sari (Sari Agricultural Sciences and Natural Resources University Campus): 36°39’N, 53°04’E, -10 m a.s.l. (Meters above sea level), 20 Feb. 2011 – 19 ♀♀ on Thuja orientalis L. (Cupressaceae).

Previous records from Iran — Tehran, Tehran province (Khosrowsahi and Arbabi, 1997); Mazandaran and Khuzestan Provinces (Kamali et al., 2001); Mashhad, Razavi Khorasan province (Sadeghi Namaghi, 2010); Khabr, Kerman Province (Khanjani et al., 2013a); Sanandaj, Kurdistan Province (Khanjani et al., 2012a).

Comments — This species was described as Aegyptobia meyerae Khosrowsahi and Arbabi, 1997 which had been preoccupied by the species described by Hatzinikolis and Panou, 1996. Therefore it was changed into A. kharazii (Mesa et al., 2009) and recently A. kharazii was considered as a junior synonym of A. beglarovi (Khanjani et al., 2012a). The host plant T. orientalis is a new record (Mesa et al., 2009).

Genus Brevipalpus Donnadieu, 1875

Brevipalpus californicus
Banks, 1904

Brevipalpus browningi Baker, 1949: 382. Brevipalpus confusus Baker, 1949: 380. Brevipalpus voglumi McGregor, 1949: 19. Tenuipalpus vitis Womersley, 1940: 241. Tenuipalpus australis Tucker, 1926: 3. Tenuipalpus californicus Banks, 1904: 55.

Distribution — Algeria, Angola, Australia, Brazil, Congo, Cyprus, Egypt, European Union, French Guiana, Greece, India, Israel, Italy, Japan, Libya, Malaysia, Mauritania, Mexico, Mozambique, Nepal, Papua New Guinea, Portugal, Senegal, Sri Lanka, South Africa, Thailand, United States and Zimbabwe.

Specimens examined and associations — Sari (Darab kola forest): 36°32’N, 53°16’E, 216 m a.s.l., 9 Oct. 2010 – 2 ♀♀ on Alnus subcordata C. A. Mey. (Betulaceae); Savadkuh county (Shirghah): 36°19’N, 52°50’E, 236 m a.s.l., 8 Sept. 2011 – 4 ♀♀ and 1 ♂ on Rubus persicus Boiss. (Rosaceae); 4 ♀♀ and 3 Deutonymphs on Chrysanthemum coronarium L. (Asteraceae); 4 ♀♀ on Salix alba L. (Salicaceae).
Previous records from Iran — This is the first record of this species from Iran.

Comments — The host plants: *A. subcordata, R. persicus, C. coronarium* and *S. alba* are new records for *B. californicus* (Childers *et al.*, 2003; Beard *et al.*, 2013).

*Brevipalpus lewisi*

McGregor 1949

Specimens examined and associations — Sari (Darab kola forest): 36°32’N, 53°16’E, 216 m a.s.l., 9 Oct. 2010 – 1 ♀ on *Alnus subcordata* C. A. Mey. (Betulaceae); Juybar county (Juybar): 36°38’N, 52°54’E, -8 m a.s.l., 1 Sept. 2011 – 4 ♂♂ and 2 Deutonymphs on *Campsis grandiflora* (Thunb) (Bignoniaceae); Savadkuh county (Shirghah): 36°19’N, 52°50’E, 236 m a.s.l., 8 Sept. 2011 – 4 ♂♂ and 1 Deutonymph on *Actinidia deliciosa* (Chev.) C.F.Liang et Ferguson (Actinidiaceae); 1 ♀ and 1 Deutonymph on *Salix alba* (Salicaceae).

Previous records from Iran — Khorramabad, Lorestan Province (Khosrowshahi and Arbabi 1997); Tehran, Guilan, Mazandaran and Azarbaijan Provinces (Kamali *et al.*, 2001); Kerman, Kerman Province; Jiroft (Dalfard and Karimabad), Kerman Province (Khanjani *et al.*, 2013a).

Comments — The host plants: *A. subcordata, C. grandiflora* and *S. alba* are new records for *B. lewisi* (Beard *et al.*, 2013).

*Brevipalpus obovatus*

Donnadieu, 1875

*Brevipalpus pereger* Donnadieu, 1875: 117. *Brevipalpus amicus* Chaudhri, 1972: 65. *Brevipalpus assamensis* Sadana and Gupta, 1983: 1. *Brevipalpus origanum* Baker, Tuttle and Abattiello, 1975: 18. *Tenuipalpus bioculatus* McGregor, 1914: 354. *Tenuipalpus inornatus* Banks, 1912: 97. *Tenuipalpus pseudocuneatus* Blanchard, 1940: 11.

Distribution — Argentina, Australia, Brazil, Canada, Chile, China, Colombia, Costa Rica, Democratic Republic of Congo, Ecuador, France, Germany, Hungary, India, Iran, Israel, Italy, Jamaica, Japan, Korea, Mauritius, Mexico, Pakistan, Papua New Guinea, Thailand, The Philippines, South Africa, Taiwan, USA, Venezuela.

Specimens examined and associations — Babol: 36°32’N, 54°41’E, -2 m a.s.l., 17 Oct. 2010 – 5 ♀♀ and 1 Deutonymph on *Prunus cerasus* L. (Rosaceae); Sari (Darabkola forest): 36°32’N, 53°16’E, 216 m a.s.l., 9 Oct. 2010 – 10 ♀♀ on *Alnus subcordata* Mey (Betulaceae); Ramsar: 36°47’N, 50°32’E, 20 m a.s.l., 27 May 2011 – 1 ♀ on *Pyrus communis* L. (Rosaceae); Chalus: 36°38’N, 50°25’E, 33 m a.s.l., 28 July 2011 – 6 ♀♀ on *Erythrina crista-galli* L. (Papilionaceae); Noor: 36°34’N, 52°00’E, -19 m a.s.l., 28 July 2011 – 8 ♀♀ on *Campsis grandiflora* (Thumb.) Loisel (Bignoniaceae); Noor (Anar jar village): 36°30’N, 51°58’E, 53 m a.s.l., 4 Aug. 2011 – 3 ♀♀ on *Smilax excels* L. (Liliaceae); Juybar: 36°38’N, 52°54’E, -8 m a.s.l., 1 Sept. 2011 – 5 ♀♀, 2 ♂♂ and 2 Deutonymphs on *Campsis grandiflora*; Savadkuh county (Shirghah): 36°19’N, 52°50’E, 236 m a.s.l., 8 Sept. 2011 – 8 ♀♀, 1 ♀ and 1 Deutonymph on *Campsis grandiflora*, 2 ♀♀ and 1 Deutonymph on *Chrysanthemum coronarium* L. (Asteraceae), 2 ♀♀ on *Rubus persicus* Boiss.; Sari (Sari University of Agricultural Sciences and Natural Resources Campus): 36°39’N, 53°04’E, -10 m a.s.l., 16 Dec. 2011 – 2 ♀♀ on *Borago officinalis* L. (Boraginaceae).

Previous records from Iran — Guilan, Mazandaran and Tehran Provinces (Kamali *et al.*, 2001); Hamedan (Abhendo village), Hamedan Province (Khanjani *et al.*, 2013a).

Comments — The host plants: *P. cerasus, A. subcordata, E. crista-galli, C. grandiflora* S. excels, *R. persicus, B. officinalis* are new records for *B. obovatus* (Childers *et al.*, 2003; Beard *et al.*, 2013).

**Genus Cenopalpus** Pritchard and Baker, 1958

*Cenopalpus bakeri*

Düzgünes, 1967

*Cenopalpus bakeri* Düzgünes, 1967: 91. *Brevipalpus bakeri* Meyer 1979: 84. *Brevipalpus bakeriana* Ghai and Shenhar, 1984: 127. *Cenopalpus bakeri* Hatzinikolis and Emmanouel, 1987: 18.

Distribution — Iran, Turkey.

Specimens examined and associations — Sari (Goharbaran): 36°49’N, 53°32’E, -22 m a.s.l., 19 Oct. 2010 – 4 ♀♀ on *Juglans regia* L. (Juglandaceae); Sari (Mahforooz Mahalle village): 36°40’N, 53°05’E, -5
m a.s.l., 19 Nov. 2010 – 22 ♀♀ and 1 Deutonymph on Eriobotrya japonica; Sari (Badeleh); 36°34′N, 52°11′E, 27 m a.s.l., 7 Dec. 2010 – 30 ♀♀ on Crataegus microphylla C. Koch (Rosaceae); Ghaemshahr: 36°28′N, 52°51′E, 49 m a.s.l., 26 October 2010 – 12 ♀♀ on Eriobotrya japonica Lindl. (Rosaceae); – 4 ♀♀ on Diospyros kaki L. (Ebenaceae); Savadkuh county (Shirgah): 36°19′N, 52°50′E, 236 m a.s.l., 9 Sept. 2011 – 12 ♀♀ on Eriobotrya japonica Lindl. (Rosaceae), – 1 ♀♀ on Diospyros kaki L. (Ebenaceae); Behshahr county (Galugah): 36°42′N, 53°45′E, 62 m a.s.l., 30 June 2011 – 5 ♀♀ and 1 Deutonymph on Cydonia oblonga Mill. (Rosaceae); Chalus county (Kushksara village): 36°37′N, 50°27′E, 66 m a.s.l., 28 July 2011 – 4 ♀♀ and 4 Deutonymphs on Crataegus microphylla. Ramsar: 36°32′N, 50°30′E, 20 m a.s.l., 27 May 2011 – 2 ♀♀ and 2 Deutonymph on Pyrus communis L.

Previous records from Iran — Shahriyar, Tehran Province (Khalil manesh 1351; Sepasgozariyan 1356), Tabriz, East Azarbaijan Province; Heyran, Ardabil Province; Hamedan, Hamedan Province (Khanjani et al. 2012b) Mazandaran and Tehran Provinces (Kamali et al. 2001).

Comments — The host plants: J. regia, E. japonica, Diospyros kaki, P. communis are new records for C. bakeri (Khanjani et al., 2013a).

Cenopalpus lanceolatisetae
Attiah, 1956

Brevipalpus lanceolatisetae Attiah, 1956: 436. Cenopalpus lanceolatisetae Pritchard and Baker, 1958: 192. Brevipalpus lanceolatisetae Meyer, 1979: 92. Cenopalpus lanceolatisetae Zaher, 1984: 59.

Distribution — Cyprus, Egypt, England, Greece, Iran, Jordan, Lebanon, Libya, Portugal.

Specimens examined and associations — Chalus county (Kushksara village): 36°39′N, 51°24′E, 20 m a.s.l., 28 July 2011 – 8 ♀♀, 2 ♂♂ and 3 Deutonymphs on Alnus subcordata Mey. (Betulaceae).

Previous records from Iran — Banmazaran and Shalan villages, Kermanshah Province; Baba Pir-Ahmad, Chahar Mahal va Bakhtiari Province (Khanjani et al. 2012b); Isfahan, Fars, Guilan, Khuzestan and Tehran Provinces (Kamali et al. 2001).

Comments — This is the first report of C. lanceolatisetae from Mazandaran province and the host plant A. subcordata is a new record for it (Khanjani et al., 2013a).

Cenopalpus irani
Dosse, 1971

Cenopalpus irani Dosse, 1971: 579; Brevipalpus irani Meyer, 1979: 84. Cenopalpus irani Khosrowshahi and Arbabi 1997: 13; Khanjani et al. 2012b: 28.

Distribution — Iran.

Specimens examined and associations — Sari (Badeleh, Faculty of Natural Resources Campus), 36°34′N, 53°11′E, 29 m a.s.l., 7 Dec. 2010 – 20 ♀♀, 1 ♂♂ and 4 Deutonymphs on Carpinus betulus L. (Betulaceae).

Previous records from Iran — Tehran Province (Tehran), Fars Provinces (Shiraz) (Khosrowshahi and Arbabi, 1997); Kerman Province. Kerman (Mehrnejad and Ueckermann 2001), Hamedan, Kermanshah and Kurdistan Provinces (Khanjani et al., 2013a).

Comments — This species is widely distributed in Iran (Kamali et al., 2001). This is the first report of C. irani from Mazandaran province and the host plant, C. betulus is a new record for this species (Beyzavi et al., 2013).

Cenopalpus crataegi
Dosse, 1971

Cenopalpus crataegi Dosse, 1971: 580. Brevipalpus crataegi Meyer, 1979: 84; Cenopalpus crataegi Khosrowshahi and Arbabi 1997: 16; Khanjani et al. 2012b: 49.

Distribution — Iran.

Specimens examined and associations — Savadkuh county (Shirgah): 36°19′N, 52°50′E, 236 m a.s.l., 9 Sept. 2011 – 4 ♀♀ and 1 Deutonymph on Eriobotrya japonica Lindl. (Rosaceae).

Previous records from Iran — Karaj, Alborz Province (Khosrowshahi and Arbabi, 1997); Hamedan, Hamedan Province (Khanjani et al. 2012b).
Comments — This is the first report of C. crataegi for Mazandaran province and the host plant E. japonica is a new record for it.

**Cenopalpus abaii**  
Khosrowshahi and Arbabi, 1997

**Cenopalpus abaii** Khosrowshahi and Arbabi, 1997: 7.  
**Cenopalpus abaii** Khanjani et al., 2012b: 39.

**Distribution** — Iran.

Specimens examined and associations — Sari (Shahid zare forest park): 36°33’N, 53°08’E, 70 m a.s.l., 4 June 2011 – 3 ♀♀, on Quercus castaneifolia May. (Fagaceae).

Previous records from Iran — Kazeron, Fars Province (Khosrowshahi and Arbabi, 1997; Kamali et al., 2001).

Comments — This is a new report of C. abaii in Mazandaran province and the second record for Iranian tenuipalpid fauna.

**Cenopalpus meyerae**  
Khosrowshahi, 1991

**Cenopalpus meyerae** Khosrowshahi and Arbabi, 1997: 15.

**Distribution** — Iran.

Specimens examined and associations — Sari (Shahid zare forest park): 36°33’N, 53°08’E, 70 m a.s.l., 4 June 2011 – 3 ♀♀, on Quercus castaneifolia C. A. May (Fagaceae); Sari(Goharbaran): 36°49’N, 53°04’E, 12 m a.s.l., 18 Nov. 2010 and 19 May 2011 – 20 ♀♂, 1♂ and 6 Deutonymphs on Rubus persicus; Neka county (Hezar jerib), 36°35’N, 53°19’E, 234 m a.s.l., 22 October 2010 – 11 ♀♀ and 5 Deutonymphs on Rubus persicus.

**Distribution** — Iran.

Previous records from Iran — Angozhan village, Sanandaj, Kurdistan Province (Khanjani et al., 2012b).

Comments — This is the first report of C. rubusi in Mazandaran province and the second report for the Iranian tenuipalpid mite fauna. The male of C. rubusi is described for the first time as follows:

**Male** — (n = 1) (Figures 1-2). Color in life is red. Length of body (excluding gnathosoma) 202; (including gnathosoma) 245; width (sc2–sc2) 102; length of leg I 133; leg II 105; leg III 116; leg IV 118.

**Dorsum** (Figure 1a) — The rostral shield with 2 medial lobes. Propodosoma with irregular small reticulations medially and irregular areolae sculpturing laterally. Sejugal furrow distinct; opisthosoma divided into 2 parts by transverse striae; metapodosoma ornamented with irregular small reticulations medially, opisthosoma with small areolae medially and irregular areolae laterally; pores absent. All dorsal setae lanceolate laterally barbed (Fig. 1a). Lengths of dorsal setae as follows: v2 28, sc1 35, sc2 25, c1 19, c2 25, c3 20, d1 16, d3 28, e1 9, e3 25, f2 16, f3 20, h1 15, h2 6; distances between dorsal setae: v2–v2 29, v2–sc1 22, sc1–sc1 67, sc2–sc2 102, sc1–sc2 25, c1–c1 38, c1–c2 28, c2–c3 7, c2–c2 93, c3–c3 107, c1–d1 26, c3–d3 31, d1–d1 42, d1–d3 32, d3–d3 106, d1–e1 27, e1–e1 27, e1–e3 35, e3–e3 92, e3–f2 27, f2–f2 73, f2–f3 17, f3–f3 51, f3–h2 21, h1–h1 4, h1–h2 8, h2–h2 26, e1–h1 73, d3–e3 35.

**Venter** (Figure 1b) — Venter of propodosoma and area between 3a and 4a smooth, metapodoso-
**Figure 1:** *Cenopalpus rubusi* Khanjani (male): a – Dorsum; b – Venter; c – Subcapitulum; d – Chelicerae; e – Palp.
Figure 2: Cenopalpus rubusi Khanjani (male): a – Leg I; b – Leg II; c – Leg III; d – Leg IV.
mal area between 4a and 4g reticulate anteriorly and with broad transverse striae posteriorly. Venter of opisthosoma reticulate medially and areolate laterally (Figure 1b); lengths of setae la 46, 1b 20, 1c 12, 2b 14, 2c 23, 3a 9, 3b 7, 4a 67, and 4b 12. Setae 1a and 4a long. Aggenital setae (ag) 14, longer than genital setae (g1–2); setae g1 1, g2 5, ps1 5, ps2 20. Distances between genital area setae: ag–ag 21, g1–g1 31, g2–g2 26, ps1–ps1 19, ps2–ps2 12.

Gnathosoma (Figure 1c) — Similar to adult female. Subcapitulum with seta m10, distance m–m 10. Chelicerae as in Figure 1d.

Legs (Figures 2) — Legs similar to adult female and shorter than idiosoma. Setal formulae of leg segments as follows: coxae 2-2-1-1; trochanters 1-1-2-1; femora 4-4-2-1; genua 3-3-1-0; tibiae 5-5-3-3; tarsi 9 (1ω) – 9 (1ω) – 5-5. Dorsal seta distinctly serrated (figs. 2). Tarsi I and II with solenidia Lω 31 and IIω 28 (Figures 2a-b).

Genus Pentamerismus McGregor, 1949

Pentamerismus oregonensis
McGregor, 1949

Oligomerismus oregonensis Gutierrez, Kreiter, Bolland and Cotton, 1989: 53-54.

Distribution — USA, Iran.

Specimens examined and associations — Sari (Badeleh, Faculty of Natural Resources Campus): 36°34’N, 53°11’E, 29 m a.s.l., 7 Dec. 2010 – 10 ♀♀ on Juniperus communis L. (Cupressaceae); Sari (Sari University of Agricultural Sciences and Natural Resources Campus): 36°39’N, 53°04’E, -10 m a.s.l., 23 Feb. 2011 – 6 ♀♀ on Juniperus horizontalis Moench; Sari (Baharestan Orchards): 36°35’N, 53°05’E, 28 m a.s.l., 2 June 2011 – 12 ♀♀ on Thuja orientalis L. (Cupressaceae); Tonekabon: 36°48’N, 50°52’E, -18 m a.s.l., 21 July 2011 – 5 ♀♀ on Juniperus communis L., Savadkuh county (Shirgah): 36°19’N, 52°50’E, 236 m a.s.l., 9 Sept. 2011 – 14 ♀♀ on Thuja orientalis L. and 1 ♀ on Chrysanthemeum coronarium; Fereydunkenar: 36°41’N, 52°31’E, -26 m a.s.l., 18 Aug. 2011 – 6 ♀♀ on Thuja orientalis L.

Previous records from Iran — Mazandaran Province (Kamali et al., 2001).
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