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Oribatid mites (Acari: Oribatida) associated with raspberry shrubs in Iran

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Abstract: During 2009-2010, the fauna of raspberry shrubs [*Rubus* spp (Rosaceae)], mites in central area of Guilan Province, Northern Iran, was studied. Foliage samples were taken from different places. The Mites were extracted by Berlese funnel and cleared in lactophenol; then were mounted in Hoyer's medium on microscopic slides. During this study, 17 species belonging to 14 genera and 14 families of oribatid mites were collected and identified. 3 species and 1 family are new for Guilan Province mites fauna and all of the species, genera and families are new for raspberry shrubs mites fauna. Also, an identification key for oribatid mites of raspberry shrubs in Guilan Province, is provided.

Key words: Fauna, Cryptostigmata, Oribatida, Raspberry, Iran, key.

Introduction

Oribatid mites are present in anywhere, many are arboreal, a few are aquatic and show adaptation to all niches. They are usually dominant arthropodes of these ecosystems (KRANTZ 2009). Also, these mites are one of the numerically dominant arthropod groups in the organic horizons of most soils (NORTON 1990). They feed mostly on plant detritus and fungi, and are important components of food webs involved in the processes of organic matter decomposition and nutrient cycling (OLOVEIRA et al. 2005). Some oribatid mites act as intermediate hosts of tapeworms of the Anoplocephalidae (DENEGRI 1993). Also, their role as bioindicators in ecotoxicological experiments and assessment of air and soil quality is significant (Lebrun & van Stralen 1995; BEHAN-PELLETIER 1999). Guilan Province, Northern Iran, is located between the latitudes 37°1' and 37°27' N and longitudes 48°35' and 49°3' E. This part of Iran because of geographic position (located on central flat, prolific soils and lands) consists high density of edaphic mites specially oribatid mites (MORTAZAVI et al. 2011). The only notable studies of oribatid mites fauna in this region, was carried out by MORTAZAVI et al. 2010 and 2011, on soil oribatid mites. Also there is no comprehensive study on raspberry shrubs (*Rubus* spp.), mites (especially oribatid mites) fauna in Iran. So this study was carried out to investigate the occurrence and species diversity of oribatid mites fauna of raspberry shrubs in Guilan Province and to provide a key to facilitate identification of the known species in this investigation.

Materials and methods

Foliage samples (raspberry leaves) were taken from different places during 2009-2010 in central area of Guilan Province. The Mites were extracted by Berlese funnel or collected by direct examination of leaves under a stereomicroscope. Then preserved in 75 % ethanol and cleared in lactophenol. Cleared mites were mounted in Hoyer's medium on microscopic slides. The slides were placed in an oven at 45 °C for two weeks. Specimens were identified using valid keys (BALOGH & BALOGH 1992a, b; BALOGH & MAHUNKA 1983).

Results

During this study, 17 species belonging to 14 genera and 14 families of oribatid mites were collected and identified, of which 3 species and 1 family are reported as new taxa for Guilan Province mites fauna:

P h t h i r a c a r i d a e PERTY 1841

Phthiracarus furvus NIEDBALA 1983

M a t e r i a l e x a m i n e d : Sumesara, 10.I.2010 & 31.XII.2010, (N: 37°17'; E: 49°14'; 25 m), leg. P. Tajmiri.

D i s t r i b u t i o n : Mediterranean oriental (SUBIAS 2011); Iran (AKRAMI & SABOORI 2004).

S t e g a n a c a r i d a e NIEDBALA 1986

Austrophthiracarus pavidus (BERLESE 1913)

This species is new for Guilan Province oribatid mites fauna.

M a t e r i a l e x a m i n e d : Pasikhan, 13.IX.2009, (N: 37°15'; E: 49°28'; 13 m), leg. P. Tajmiri.

D i s t r i b u t i o n : Palearctica meridional (SUBIAS 2011); Poland (NIEDBALA 2008); Iran (AKRAMI et al. 2006).

E u p h t h i r a c a r i d a e JACOT 1930

Rhysotritia ardua (C.L. KOCH 1841)

M a t e r i a l e x a m i n e d : Sumesara, 26.I.2009, (N: 37°17'; E: 49°14'; 25 m), leg. P. Tajmiri.

D i s t r i b u t i o n : Europe, Asia, North America, North and East Africa, Iran (BAYARTOGTOKH & AKRAMI 2000a; AKRAMI et al. 2006; MORTAZAVI et al. 2010).

L o h m a n n i d a e BERLESE 1916

Lohmannia turemenica BULANOVA-ZACHVATKINA 1960

M a t e r i a l e x a m i n e d : Fuman, 15.X.2009, (N: 37°13'; E: 49°22'; 18 m), leg. P. Tajmiri.

Distribution: Turkmenistan, Spain, Hungary (BALOGH & MAHUNKA 1983); Palearctica meridional, China suboriental, Argentina (SUBIAS 2011); Iran (HADDAD IRANI-NEJAD et al. 2003; MORTAZAVI et al. 2010).

Epilohmanniidae OUDEMANS 1923

***Epilohmannia (Epilohmannia) cylindrica cylindrica* (BERLESE 1904)**

Material examined: Rasht, Guilan University, 06.XII.2009, (N: 37°11'; E: 49°37'; 29 m), leg. P. Tajmiri.

Distribution: Australia, Italy, France (BALOGH & MAHUNKA 1983); Iran (AKRAMI & SABOORI 2004; MORTAZAVI et al. 2010).

***Epilohmannia (Epilohmannia) pallida aegyptica* BAYOUMI et MAHUNKA 1976**

This species is new for Guilan Province oribatid mites fauna.

Material examined: Sumesara, 27.VIII.2009, (N: 37°13'; E: 49°43'; 13 m), leg. P. Tajmiri.

Distribution: East Mediterranean (SUBIAS 2011).

Nothriidae BERLESE 1896

***Nothrus biciliatus* (C.L. KOCH 1841)**

Material examined: Sumesara, 10.I.2010, (N: 37°17'; E: 49°14'; 25 m), leg. P. Tajmiri.

Distribution: Germany, Ireland, Greenland, the Netherland, Denmark, Australia, Hungary, Italy, Japan (BALOGH & MAHUNKA 1983); Iran (AKRAMI & SABOORI 2004; MORTAZAVI et al. 2010).

Camisiidae OUDEMANS 1900

***Heminothrus (Platynothrus) grandjeani* (SITNIKOVA 1975)**

Material examined: Fuman, 15.X.2009, (N: 37°13'; E: 49°22'; 18 m), leg. P. Tajmiri.

Distribution: Hungary, Germany, Europe, Greenland, Canada, Japan, India (GHOSH & BHADURI 1979; BALOGH & MAHUNKA 1983); Iran (MORTAZAVI et al. 2010).

Eremulidae GRANDJEAN 1965

***Eremulus avenifer* BERLESE 1913**

Material examined: Sumesara, 13.IX.2009, (N: 37°21'; E: 49°51'; -19 m), leg. P. Tajmiri.

Distribution: Italy, Japan, Iran, Vietnam, Tahiti (BAYARTOGTOKH & AKRAMI 2000a; MORTAZAVI et al. 2011); India (GHOSH & BHADURI 1979).

Xenillidae WOOLLEY et HIGGINS 1966

***Xenillus (Xenillus) singularis* GOLOSOVA & LJASHCHEV 1984**

Material examined: Sumesara, 31.XII.2010, (N: 37°17'; E: 49°14'; 25 m), leg. P. Tajmiri.

Distribution: Sajalin, Iran (SUBIAS 2011; MORTAZAVI et al. 2011).

Oribatulidae THOR 1929

***Oribatula (Oribatula) pallida* BANKS 1906**

Material examined: Sumesara, 01.XI.2009 & 31.XII.2010, (N: 37°17'; E: 49°14'; 25 m), leg. P. Tajmiri.

Distribution: North America, Mongolia, Iran (BANKS 1906, BAYARTOGTOKH & AOKI 1998, AKRAMI et al. 2008; MORTAZAVI et al. 2011).

***Oribatula (Oribatula) tibialis allifera* SUBIAS 2000**

Material examined: Sumesara, 01.XI.2009 & 31.XII.2010, (N: 37°17'; E: 49°14'; 25 m), leg. P. Tajmiri.

Distribution: South Europe (SUBIAS 2011); Iran (AKRAMI et al. 2008; MORTAZAVI et al. 2011).

***Oribatula (Zygoribatula) undulata* BERLESE 1916**

Material examined: Shaft, 23.X.2009, (N: 37°13'; E: 49°31'; 13 m), leg. P. Tajmiri; Saravan, 27.VIII.2009, (N: 37°05'; E: 49°39'; 79 m), leg. P. Tajmiri.

Distribution: Pantropical and subtropical regions (SUBIAS 2011); South Africa (GROBLER & KOK 1993); Iran (HADDAD IRANI-NEJAD et al. 2003; MORTAZAVI et al. 2011).

Hemileiidae J. BALOGH & P. BALOGH 1984

***Siculobata sicula* (BERLESE 1892)**

This species is new for Guilan Province oribatid mites fauna.

Material examined: Pasikhan, 13.IX.2009,2010, (N: 37°15'; E: 49°28'; 13 m), leg. P. Tajmiri; Sumesara, 31.XII.2010, (N: 37°17'; E: 49°14'; 25 m), leg. P. Tajmiri; Khoshk e bijar, 13.IX.2009, (N: 37°22'; E: 49°45'; -15 m), leg. P. Tajmiri; Sangar, 27.VIII.2009, (N: 37°13'; E: 49°43'; 13 m), leg. P. Tajmiri.

Distribution: Poland, Iran, Argentina (SUBIAS 2011).

Scheloribatidae GRANDJEAN 1953

***Scheloribates praeincisus* (BERLESE 1910)**

Material examined: Khoshk e bijar, 13.IX.2009, (N: 37°22'; E: 49°45'; -15 m), leg. P. Tajmiri; Rasht, Guilan University, 31.XII.2010, (N: 37°11'; E: 49°37'; 29 m), leg. P. Tajmiri.

Distribution: Philippine, Indonesia, Iran, Fiji (BAYARTOGTOKH & AKRAMI 2000b; MORTAZAVI et al. 2011).

Ceratozetidae JACOT 1925***Ceratozetella sellnicki* (RAJSKI 1958)**

Material examined: Lasht nasha, 13.IX.2009, (N: 37°21'; E: 49°51'; -19 m), leg. P. Tajmiri; Shaft, 23.X.2009, (N: 37°13'; E: 49°31'; 13 m), leg. P. Tajmiri; Fuman, 15.X.2009, (N: 37°13'; E: 49°22'; 18 m), leg. P. Tajmiri.

Distribution: Poland (RAJSKI 1958); Iran (MORTAZAVI et al. 2011).

Mycobatidae GRANDJEAN 1954***Punctoribates liber* PAVLITSHENKO 1991**

Material examined: Sumesara, Rasht, Guilan University, 06.XII.2009, (N: 37°11'; E: 49°37'; 29 m), leg. P. Tajmiri; Khomam, 27.VIII.2009, (N: 37°23'; E: 49°39'; -18 m), leg. P. Tajmiri.

Distribution: Ukraine (SUBIAS 2011); Iran (MORTAZAVI et al. 2011).

Key to oribatid mites associated with raspberry shrubs in Guilan Province, Iran

- 1 At list with one of these characteristics: prodorsum can be folded under notogaster; tibia and genu have the same shape and length; genital and anal plates are larg and meet each other Macropylina (Archoribatida)2
- With none of above characteristics Brachypylina (Euoribatida).....9
- 2 Body is ptychoid, prodorsum can be folded under notogaster3
- Body is not ptychoid5
- 3 With a Triangle interlocking between genital and anal plates.....*Rhysotritia ardua*
- Without a Triangle interlocking between genital and anal plates.....4
- 4 Lateral carina reach the sensillus; with 17 pair of notogastral setae*Austrophthiracarus pavidus*
- Lateral carina exceed the sensillus; with 15 pair of notogastral setae ...*Phthiracarus furvus*
- 5 Body is dichoid6
- Body is holoid8
- 6 With preanal plate; 10 pair of genital setae; 16 pair of notogastral setae.....*Lohmannia turcmenica*
- Without preanal plate; 8 pair of genital setae; 14 pair of notogastral setae.....7
- 7 Tarsus of leg IV with two spiniform setae; a double difference in length between lamellar and interlamellar setae; apodemes I not meeting each other not touching corresponding apodemes II posteriorly*Epilohmannia (E.) cylindrica cylindrica*
- Tarsus of leg IV with four spiniform setae; no essential difference in length between lamellar and interlamellar setae; apodemes I not meeting medially, each one coalescent with corresponding apodemes II*Epilohmannia (Epilohmannia) pallida aegyptica*
- 8 Without aggenital setae; notogastral setae thick and palmate*Nothrus biciliatus*
- With aggenital setae; notogastral setae setiform; external side of trochanter of leg III with 3 setae*Heminothrus (Platynothrus) grandjeani*
- 9 Without Pteromorpha; notogaster is Pycnonotic10
- With or Without Pteromorpha; notogaster is Poronotic11
- 10 Epimeral and aggenital setae with 2-3 branches; sensillus S shape.....*Eremulus avenifer*
- Epimeral and aggenital setae without branches; sensillus fusifor*Xenillus (Xenillus) singularis*
- 11 Prodorsum with tutorium; lamella usually with cuspid.....12

- Prodorsum without tutorium; lamella usually without cuspid.....13
- 12 With translamella; pteromorph connected with tectum.....*Punctoribates liber*
- Without translamella; without tectum.....*Ceratozetella sellnicki*
- 13 Notogaster with 4 pairs of areae porosae14
- Notogaster with 4 pairs of sacculi16
- 14 With translamella.....*Oribatula (Zygoribatula) undulate*
- Without translamella.....15
- 15 Interlamella seta shorter than rostral seta.....*Oribatula (Oribatula) pallid*
- Interlamella seta as long as rostral seta; rostrum straight.....
.....*Oribatula (Oribatula) tibialis allifera*
- 16 Notogaster without pteromorph.....*Siculobata sicula*
- Notogaster with pteromorph.....*Schelorbitates praeincisus*

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