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Mites of the family Laelapidae (Acari: Mesostigmata) associated with olive orchards in Guilan Province Iran

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A b s t r a c t : A faunistic study of family Laelapidae (Acari: Mesostigmata) associated with olive orchards in Guilan province, Northern Iran was carried out during 2012-2013. Soil and plant remains samples were taken from olive orchards. The mites were extracted by Berlese funnel and cleared in Nesbitt's fluids; then were mounted in Hoyer's medium on microscopic slides. During this study 18 species belonging to 9 genera were collected and identified. All species are new for olive orchards mite's fauna of Iran.

K e y w o r d s : Fauna, Mesostigmata, Laelapidae, Olive, Iran.

Introduction

Olive, *Olea europaea* L. is one the most important fruit in the world, including Iran. Archaeological findings revealed that olive cultivation in Iran dates back to 2000 years ago (SADEGHI 1992). At present olive cultivars are cultivated mainly in the North of Iran, which is characterized by Mediterranean climatic condition. In the last ten years, olive plantation has grown in Iran and currently, 95.000 hectares of olive orchards produce about 6.500 tons of olive oil annually (SAMAE et al. 2003; HOSSEINI-MAZINANI et al. 2004; NOORMOHAMMADI et al. 2007; OMRANI-SABBAGHI et al. 2007; SHEIDAI et al. 2007). Guilan province has 13118 hectares olive orchards with 28125 tons annual production (MINISTRY of Jihad AGRICULTURE of IRAN 2013). Guilan Province is one of the 31 provinces of Iran. It covers an area of 14.042 km² and located in the North of Iran between the latitude 37°16′38.64″N and the longitude 49°35′20.4″E. It lies along the Caspian Sea and has a humid subtropical climate with a large margin the heaviest rainfall in Iran: reaching as high as 1,900 millimeters (75 in).

The mite family Laelapidae is ecologically diverse, including obligate and facultative parasites of vertebrates, insect paraphages, and free-living predators that inhabit soil-litter habitats and the nests of vertebrates and arthropods (EVANS & TILL 1966; STRONG & HALLIDAY 1994; LINDQUIST et al. 2009). Members of the subfamily Hypoaspidinae (Hypoaspididae of KARG 1993) often are collected in litter or soil substrates (the genera *Pseudoparasitus*, *Ololaelaps* and those often included under *Hypoaspis*, such as *Gaeolaelaps*, *Cosmolaelaps*, and *Stratiolaelaps*, are examples), while species of these and other genera are routinely or occasionally encountered in the nests of mammals or arthropods or directly associated with insects (EVANS & TILL 1966, 1979; KARG 1978,

1993). Some species are ectoparasites of adult bees or their brood, like *Tropilaelaps*, and some of them are also known to feed facultatively on nesting host animals by chewing or punching a hole in the skin (RADOVSKY 1967; LINDQUIST et al. 2009). Some species have established close phoretic relationships with other arthropods and less commonly, with vertebrates (KRANTZ 1998; LINDQUIST et al. 2009). Those are common predators in different kinds of habitats such as: freshwater and marine habitats, the littoral-intertidal-estuarine milieu, organic matter (COSTA 1962, 1968, 1974; LINDQUIST et al. 2009).

The fauna of mites associated with olive groves in Iran is very poorly known. Due to the predatory importance of laelapid mites and their important role in natural control of injurious edaphic pests such as arthropods and nematodes, a faunistic study was carried out for identification of laelapid mites associated with olive orchards in Guilan Province Iran. The present paper is part of a master thesis project of first author on mesostigmatic mites associated with olive orchards in Guilan Province Iran.

Materials and methods

A faunal study on family Laelapidae associated with olive orchards was carried out in Guilan Province, Northern Iran during 2012-2013. Soil and Plant remains samples were collected from olive orchards of Guilan Province. Mites were extracted from collected samples by placing them on Berlese funnel. Specimens preserved in 75% ethanol, cleared in Nesbitt's fluids and mounted on microscopic slides using Hoyer's medium. The slides were placed in at 45°C for two weeks. Specimens were identified by the relevant taxonomic keys and papers. The setations pattern is widely used as a taxonomic criterion in the Mesostigmata, and the system followed in the present work is that of LINDQUIST & EVANS (1965) and LINDQUIST (1994) for dorsal and ventral setations respectively. The voucher material which comprises slide mounted specimens is deposited in the Department of Plant Protection at University of Guilan, Rasht, Iran.

Results

In the current study 18 species belonging to 8 genera from family Laelapidae were collected and identified, in association with olive orchards in Guilan province Iran. All species are new for olive orchards mite fauna in Iran. The list of identified species is as follow.

L a e l a p i d a e BERLESE, 1892

***Haemolaelaps* BERLESE, 1910**

***Haemolaelaps shealsi* (COSTA, 1968)**

M a t e r i a l e x a m i n e d : Adult, Iran, Guilan province, collected from olive soil: Manjil, 366m, 36°44´31.80´´N, 49°24´57.14´´E, October 2012; Roodbar, 237m, 36°49´26.86´´N, 49°25´25.42´´E, July 2013; Nesfi, 455m, 36°50´44.85´´N, 49°30´o4.60´´E, August 2013. Collected by M. Mahjoori.

D i s t r i b u t i o n : Iran, Israel (COSTA 1968; HADDAD IRANI-NEJAD et al. 2003).

Gaeolaelaps EVANS & TILL, 1966

Gaeolaelaps aculeifer (CANESTRINI, 1884)

Material examined: Adult, Iran, Guilan province, collected from olive soil: Rostamabad, 170m, 36°53´54.00´´N, 49°29´26.00´´E, July 2013; Roodbar, 237m, 36°49´26.86´´N, 49°25´25.42´´E, July 2013; August 2013; October 2013. Collected by M. Mahjoori.

Distribution: Canada, England Germany, Iran, Italy, Netherlands, North American and Sweden, (HUGHES 1976; BALOOCH SHAHRYARI et al. 2012).

Gaeolaelaps kargi COSTA, 1968

Material examined: Adult, Iran, Guilan province, collected from olive soil: Rostamabad, 170m, 36°53´54.00´´N, 49°29´26.00´´E, October 2012; Roodbar, 237m, 36°49´26.86´´N, 49°25´25.42´´E, July 2013. Collected by M. Mahjoori.

Distribution: America, Bashkiria (in the floodlands of the Belaya river), Dagestan, Europe, Georgia, Iran, Israel, Lithuania, Moldavia, Ukraine and USSR (COSTA 1968; GILYAROV et al. 1977; KARG 1982; BALOOCH SHAHRYARI et al. 2012).

Gaeolaelaps nolli KARG, 1962

Material examined: Adult, Iran, Guilan province, collected from olive soil: Roodbar, 237m, 36°49´26.86´´N, 49°25´25.42´´E, October 2012. Collected by M. Mahjoori.

Distribution: Asia, Europe and Iran (KARG 1962; 1982; BALOOCH SHAHRYARI et al. 2012).

Gaeolaelaps queenslandica (WOMERSLEY, 1956)

Material examined: Adult, Iran, Guilan province, collected from olive soil: Roodbar, 237m, 36°49´26.86´´N, 49°25´25.42´´E, October 2012 & July 2013 & August 2013. Collected by M. Mahjoori.

Distribution: America, Australia, Iran (WORMERSLEY 1954; TENORIO 1982; BALOOCH SHAHRYARI et al. 2012).

Gaeolaelaps praesternalis (WILLMANN, 1949)

Material examined: Adult, Iran, Guilan province, collected from olive soil: Roodbar, 237m, 36°49´26.86´´N, 49°25´25.42´´E, October 2012. Collected by M. Mahjoori.

Distribution: Africa, Europe, Iran and Russia (EVANS & TILL 1966; VAN ASWEGEN & LOOTS 1970; GILYAROV et al. 1977; SOLEIMANI et al. 2011).

Laelaspisella MARAIS & LOOTS, 1969

Laelaspisella canestrinii (BERLESE, 1903)

Material examined: Adult, Iran, Guilan province, collected from olive soil: Rostamabad, 170m, 36°53´54.00´´N, 49°29´26.00´´E, July 2013; Manjil, 366m, 36°44´31.80´´N, 49°24´57.14´´E, July 2013. Collected by M. Mahjoori.

Distribution: Iran, Israel, Italy, Stavropol Territory and USSR (GILYAROV et al. 1977; CHERAGHALI et al. 2012).

***Gymnolaelaps* BERLESE 1916**

***Gymnolaelaps myrmecophila* (BERLESE, 1892)**

M a t e r i a l e x a m i n e d : Adult, Iran, Guilan province, collected from olive soil: Ganjeh, 227m, 36°51′23.26′′N, 49°28′10.14′′E, September 2012; Manjil, 366m, 36°44′31.80′′N, 49°24′57.14′′E, July 2013. Collected by M. Mahjoori.

D i s t r i b u t i o n : Western Europe, Finland and Iran (GILYAROV et al. 1977; HUHTA & KARG 2010; JOHARCHI & HALLIDAY 2013).

***Cosmolaelaps* BERLESE, 1903**

***Cosmolaelaps claviger* (BERLESE, 1882)**

M a t e r i a l e x a m i n e d : Adult, Iran, Guilan province, collected from olive soil: Roodbar, 237m, 36°49′26.86′′N, 49°25′25.42′′E, September 2012; Manjil, 366m, 36°44′31.80′′N, 49°24′57.14′′E, July 2013. Collected by M. Mahjoori

D i s t r i b u t i o n : Croatia, Europe, Iran, Latvia, Ukraine and USSR (EVANS & TIILL 1966; GILYAROV et al. 1977; SALMANE 2000; KACZMAREK et al. 2009; BAROOZEH et al. 2013).

***Cosmolaelaps lutegiensis* SHCHERBEK, 1971**

M a t e r i a l e x a m i n e d : Adult, Iran, Guilan province, collected from olive soil: Rostamabad, 170m, 36°53′54.00′′N, 49°29′26.00′′E, September 2012; Roodbar, 237m, 36°49′26.86′′N, 49°25′25.42′′E, September 2012; July 2013; Manjil, 366m, 36°44′31.80′′N, 49°24′57.14′′E, July 2013; Nesfi, 455m, 36°50′44.85′′N, 49°30′o4.60′′E, August 2013. Collected by M. Mahjoori.

D i s t r i b u t i o n : Iran and Ukraine (SHCHERBAK 1971; HAJIZADEH et al. 2010).

***Cosmolaelaps vacua* (MICHAEL, 1981)**

M a t e r i a l e x a m i n e d : Adult, Iran, Guilan province, collected from olive soil: Rostamabad, 170m, 36°53′54.00′′N, 49°29′26.00′′E, October 2012; June 2013; Manjil, 366m, 36°44′31.80′′N, 49°24′57.14′′E, June 2013. Collected by M. Mahjoori.

D i s t r i b u t i o n : America, Asia, Europe, Cis-Carpathia and Trans- Carpathia, Crimea, Iran, Lithuania, Ukraine, Uzbekistan and USSR (EVANS & TILL 1966; GILYAROV et al.1977; KARG 2000; GWIAZDOWIEZ 2004; HAJIZADEH et al. 2010).

***Euanderolaelaps* BREGETOVA, 1977**

***Euanderolaelaps karawaiewi* (BERLESE, 1903)**

M a t e r i a l e x a m i n e d : Adult, Iran, Guilan province, collected from olive soil and plant remains: Roodbar, 237m, 36°49′26.86′′N, 49°25′25.42′′E, June 2013; Manjil, 366m, 36°44′31.80′′N, 49°24′57.14′′E, June 2013; Nesfi, 455m, 36°50′44.85′′N, 49°30′o4.60′′E, July 2013. Collected by M. Mahjoori.

D i s t r i b u t i o n : Asia, Europe, Iran, Israel, Ryazan oblast, Tataria, Trans-Carpathia, Trans- Caucasus, Ukraine, USSR, Western Kazakhstan and Western Siberia, (COSTA 1968; GILYAROV et al. 1977; KARG 1982; HAJIZADEH et al. 2010).

***Euanderolaelaps sardoa* (BERLESE, 1911)**

Material examined: Adult, Iran, Guilan province, collected from olive soil: Ganjeh, 227m, 36°51′23.26′′N, 49°28′10.14′′E, October 2012; Manjil, 366m, 36°44′31.80′′N, 49°24′57.14′′E, October 2012; Roodbar, 237m, 36°49′26.86′′N, 49°25′25.42′′E, June 2013 & October 2013. Collected by M. Mahjoori.

Distribution: Europe, Iran, and USSR (EVANS & TILL 1966; GILYAROV et al. 1977; DEHGHAN et al. 2011).

***Laelaspis* BERLESE, 1903**

***Laelaspis astronomica* (KOCH, 1839)**

Material examined: Adult, Iran, Guilan province, collected from olive soil: Manjil, 366m, 36°44′31.80′′N, 49°24′57.14′′E, September 2012. Collected by M. Mahjoori.

Distribution: Armenia, Britain, Georgia, Hungary, Iran, Ukraine, USSR, Western Europe, (EVANS & TILL 1966; GILYAROV et al. 1977; KONTSCHÁN 2007; BALOOCH SHAHRYARI et al. 2012).

***Laelaspis dariusi* (JOHARCHI & JALAEIAN, 2012)**

Material examined: Adult, Iran, Guilan province, collected from olive soil and plant remains: Manjil, 366m, 36°44′31.80′′N, 49°24′57.14′′E, September 2012; Roodbar, 237m, 36°49′26.86′′N, 49°25′25.42′′E, June 2013. Collected by M. Mahjoori.

Distribution: Iran (JOHARCHI et al. 2012a).

***Laelaspis pennatus* (JOHARCHI & HALLIDAY, 2012)**

Material examined: Adult, Iran, Guilan province, collected from olive soil: Rostamabad, 170m, 36°53′54.00′′N, 49°29′26.00′′E, October 2012, Taklim, 535m, 36°50′50.28′′N, 49°24′01.12′′E, August 2013. Collected by M. Mahjoori.

Distribution: Iran (JOHARCHI et al. 2012b).

***Ololaelaps* BRELESE, 1903**

***Ololaelaps ussuriensis* BREGETOVA & KOROLEVA, 1964**

Material examined: Adult, Iran, Guilan province, collected from olive soil: Roodbar, 237m, 36°49′26.86′′N, 49°25′25.42′′E, September 2012; Manjil, 366m, 36°44′31.80′′N, 49°24′57.14′′E, July 2013. Collected by M. Mahjoori.

Distribution: Iran, Primorye Territory, USSR (GILYAROV et al. 1977; RAMROODI et al. 2013).

***Pseudoparasitus* OUDEMANS, 1902**

***Pseudoparasitus dentatus* (HALBERT, 1920)**

Material examined: Adult, Iran, Guilan province, collected from olive soil: Rostamabad, 170m, 36°53′54.00′′N, 49°29′26.00′′E, October 2013; Manjil, 366m, 36°44′31.80′′N, 49°24′57.14′′E, September 2013. Collected by M. Mahjoori.

Distribution: England; France, Iran, Italy, Northern and Central Europe; and USA (HUNTER 1966; GILYAROV et al. 1977; JOHARCHI et al. 2011).

Zusammenfassung

Im Zeitraum 2012 bis 2013 wurde in der Provinz Guilan im Norden des Iran eine faunistische Untersuchung der Familie Laelapidae (Acari: Mesostigmata) an Olivenplantagen durchgeführt. Nach Entnahme von Laub- und Bodenproben wurden die Milben in einem Berlese-Trichter extrahiert und auf Objektträgern montiert. Vorliegende Studie ergab Milben in 18 Arten und 9 Gattungen die allesamt Neunachweise für die Olivengärten Irans sind.

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