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Mites (Arthropoda, Acari) associated with pistachio trees (Anacardiaceae) in Iran (I)

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Absract

Fourteen mite species belonging to eleven families are reported from cultivated and wild pistachio trees of the main pistachio growing areas of Iran. Each species is defined and information on their geographical distribution and biology, where possible, is given. Eleven mite species are recorded from pistachio trees of Iran for the first time.

Key words: Acari, Pistachio, *Pistacia mutica*, *Pistacia vera*, Iran.

Introduction

A survey of mites associated with pistachio trees was conducted in the major pistachio-growing region of Iran (Kerman province) during the period 1991-1994 by the senior author. Only the two dominant pistachio species, *Pistacia vera* (Linnaeaus) and *Pistacia mutica* Fischer and Meyer (Anacardiacae) were sampled. Previously only a few species of mites were known from pistachio trees in Iran. The phytophagous mite, *Tenuipalpus granati* (Sayed) was reported by Khalil-Manesh (1972) and he also listed an eriophyid mite, *Eriophyes* sp.

Mehrnejad and Daneshvar (1991) reported two eriophyid mites, *Aceria pistaciae* (Nalepa) and *Aceria stefanii* (Nalepa) from pistachio trees. During this study up to 45 mite species associated with pistachio trees were collected. However, only the 14 known species are reported here. The rest is either new species or species of which the identity is still unconfirmed.

1. Astigmata Canestrini

Acaridae Ewing & Nesbitt

Tyrophagus putrescentiae (Schrank)

DIAGNOSIS: Small, whitish and slow-moving mites. Prodorsum covered with a shield, with a pair of corneae anterolaterally. Sejugal furrow separates prodorsum from opisthosoma. Most dorsal body setae are very long and serrated. Supracoxal seta with a swollen bases bearing fairly long pectinations. The swollen base is drawn out into a long point. Tarsus I with omega$_1$ parallel-sided, but only slightly expanded distally. Supporting arms of aedeagus pointed outwards and aedeagus curved twice like the spout of a coffeepot (lateral view). Tarsi of all legs terminate into an empodium with a single claw (Hughes 1976).

MATERIAL EXAMINED: 8 specimens, Rafsanjan, *P. vera* (stem bark and collar soil), November 1992 and January 1993, Mehrnejad; Shahrbabak, *P. vera* (stem bark and collar soil), November 1992, Mehrnejad.

REMARKS: *Tyrophagus putrescentiae* is a pest of stored grain, food and even fungi cultures. However, it is also considered an important factor in the control of the southern corn rootworm, *Diabrotica undecimpunctata howardi* Barber; it consumes the eggs of the rootworm (Brust & House 1988). It was also found feeding on adults and eggs of the grape phylloxera, *Daktulosphaira vitifolii* (Fitch) (Gerson & Smiley 1990).

2. Prostigmata Kramer

Anystidae Oudemans

Anystis baccarum (Linnaeaus)

DIAGNOSIS: Large (1-1.5 mm long), broadly oval, reddish and soft-bodied. Prodorsum with an almost kidney-shaped shield bearing 2 pairs of serrated setae and a pair of sensilla. The naso anterior to shield also with a pair of sensilla. Opisthosoma with 8 pairs of long serrated setae. Reticulated peritremes at base of gnathosoma flared distally. Palptibia with 3 spine-like claws (Smith Meyer & Ueckermann 1987).

MATERIAL EXAMINED: 9 specimens, Rafsanjan, *P. vera* (leaves and twigs), May - September 1993 and June 1994, Mehrnejad; Rafsanjan, *P. mutica* (stem bark), May 1994, Mehrnejad.

REMARKS: This mite is predacious on other mites and small insects, but is difficult to rear, as it is cannibalistic. In the pistachio orchards these mites were encountered in psyllid colonies (*Agonoscena pistaciae* Burckhardt & Lauterer, Hemiptera: Psylloidea).

Bdellidae Dugès

Spinibdella cronini (Baker & Balock)

DIAGNOSIS: Pale red mites with darker markings on dorsolateral prodorsum. Striae in center of prodorsum longitudinally or obliquely directed. Hypostome with 2 pairs of setae ventrally. Palps longer than hypostome and tibiotarsus longer and thicker than genu. Chelicerae elongated and bear two conspicuous setae. Tibia II with one blunt sensory seta. Venter with 2-3 unpaired setae anterior to genital opening, anterior setae situated between coxae III. Well-developed genital tracheae present.

MATERIAL EXAMINED: 9 specimens, Rafsanjan, *P. mutica* and *P. vera* (stem bark and collar soil), May - August - November 1992 and May 1994, Mehrnejad; Shahrbabak, *P. vera* (stem bark and collar soil), November 1992, Mehrnejad; Sirjan, *P. vera* (stem bark and collar soil), November 1992, Mehrnejad.

REMARKS: This mite often secures its arthropod prey to the underlying substrate by means of silken threads. Silk spinning can also be used as protection during molting (Krantz 1978). Wallace and Mahon (1972) observed this species feeding on members of the family Tetranychidae and Cunaxidae. According to Atyeo (1963) males of this species are either scarce or non-existent, however, Wallace and Mahon (1972) collected one male specimen in Western Australia.

Camerobiidae Southcott

Neophyllobius pistaciae Bolland & Mehrnejad, 2001

DIAGNOSIS: Dorsum with 9 pairs of lateral setae and 5-6 pairs of middorsal setae. Two double-lensed eyes on each side. One short supracoxal seta located lateral to v_2. Genual setae often whiplike. Tibial setal formula I-IV: 9-8-7-7. Each tibia with a solenidion on the distal end. Solenidion on tarsi I and II situated proximally. Two pairs of genital and three pairs of anal setae.

MATERIAL EXAMINED: 12 specimens, Rafsanjan, *P. mutica* and *P. vera* (stem bark, leaves and twigs), May and October 1993, Mehrnejad; Shahrbabak, *P. vera* (leaves and twigs), November 1993, Mehrnejad; Sirjan, *P. mutica* and *P. vera* (leaves and twigs), April - September - October 1993, Mehrnejad.

REMARKS: These mites were encountered in pistachio scale insect colonies (*Pistaciaspis pistaciae* Archan., Hemiptera: Diaspididae).

Cheyletidae Leach

Cheletogenes ornatus (Can. & Fanz.)

DIAGNOSIS: A relatively small rotund species with papillose integument and shields. Dorsum covered with 2 shields, opisthosomal shield is ill defined. Dorsal setae fan-like. Tarsus I without claws and empodia, bearing 2 long terminal setae. Palptarsus bears 2 comb-like and 2 sickle-like setae (Summers & Price 1970).

MATERIAL EXAMINED: 16 specimens, Jebalbarez region, *P. mutica* (twigs), October 1993, Mehrnejad; Rafsanjan, *P. mutica* and *P. vera* (twigs), May - September 1992 and May 1993, Mehrnejad; Shahrbabak, *P. vera* (twigs), November 1994, Mehrnejad; Sirjan, *P. mutica* (twigs), October 1993, Mehrnejad.

REMARKS: *Cheletogenes ornatus* feeds on armoured scale insect crawlers in many parts of the world. Although it is not deemed an especially promising predator it can be useful as a "second line" predator (Gerson & Smiley 1990). In the pistachio orchards these mites were encountered in scale insect colonies (*Pistaciaspis pistaciae* & *Salisicola davatchii* Bala. & Kauss., Hemiptera: Diaspididae).

Eriophyidae Nalepa

Aceria pistaciae (Nalepa)

DIAGNOSIS: This mite is wormlike and has only 2 pairs of legs. The prodorsal shield ornamentation comprises of a median line on the rear half of the shield, almost complete admedian lines that gradually diverge towards the rear and first submedian lines that run back toward the dorsal tubercles ending in a diagonal line. Laterally the shield bears an additional 2 short submedian lines and granules. The abdominal microtubercles are subcircular and slightly ahead of annulus margins. Leg coxae granulated. Tarsal empodium (featherclaw) 4-rayed. Genital coverflap of female bears 6 rather broad longitudinal lines (Jeppson *et al.* 1975).

MATERIAL EXAMINED: 24 specimens, Jebalbarez region, *P. mutica* (leaves, buds and fruits), June - September 1991, Mehrnejad; Kerman, *P. vera* (leaves, buds and flowering clusters), April - June 1992, Mehrnejad; Rafsanjan, *P. vera* (leaves, buds and fruit clusters), May - June 1992 and 1993, Mehrnejad; Sirjan, *P. vera* (leaves, buds and flowering clusters), April 1992, Mehrnejad.

REMARKS: *Aceria pistaciae* causes leaf deformation and flower stalk brooming. The brooms are reddish and noticeable (Jeppson *et al.* 1975). This mite is assumed as a minor pest in the pistachio orchards of the Kerman province, Iran.

Aceria stefanii (Nalepa)

DIAGNOSIS: This mite is also worm-like and has two pairs of legs. Prodorsal shield pattern consists of the median line on rear two-thirds ending in a dart-shaped mark, admedian lines that are sinuate, complete and gradually diverging and short submedian lines anterolaterally. The lateral margins are granulated. The microtubercles are pointed and just ahead of the annulus margins. Leg coxae are covered lines of granules. Tarsal empodium 4-rayed. Genital coverflap of female bears 10 longitudinal lines (Jeppson *et al.* 1975).

MATERIAL EXAMINED: 18 specimens, Jebalbarez region, *P. mutica* (leaves, buds and fruits), June and September 1991, Mehrnejad; Chatrood, *P. vera* (leaves, buds and fruits, June 1992, Mehrnejad; Sirjan, *P. vera* (leaves, buds and flowering clusters), April 1992, Mehrnejad.

REMARKS: This mite causes tight, leaf margin rolls and transforms especially leaflets into thin, sticklike structures (Jeppson *et al.* 1975).

Raphignathidae Dugés

Raphignathus gracilis (Rack)

DIAGNOSIS: Dorsum covered with 4 rather reduced shields. Dorsal setae are simple. Anterior margin of opisthosomal shield straight or slightly concave. Seta *f1* either situated on the opisthosomal shield, on the striated integument or on the margin of the shield. Palpfemur bears 2 setae. Venter with endopodal shields around bases of coxae III and IV. Femur IV bears 3 setae. Coxae I-IV contiguous (Smith Meyer & Ueckermann 1989).

MATERIAL EXAMINED: 6 specimens, Jebalbarez region, *P. mutica* (collar soil), November 1992, Mehrnejad; Rafsanjan, *P. vera* (stem bark and collar soil), November 1992, Mehrnejad; Shahrbabak, *P. vera* (stem bark and collar soil), November 1992, Mehrnejad.

Tenuipalpidae Berlese

Tenuipalpus granati Sayed

DIAGNOSIS: Opisthosoma narrower than prodorsum, with penultimate pair of dorsolateral setae (h_2) flagellate and only one pair of dorsocentral setae. Setae sc_2 relatively long and lanceolate and rest of dorsal body setae minute and setiform. Dorsal integument is nearly smooth. Venter with one pair of intercoxal setae on posterior margin of proventer and 2 pairs of intercoxal setae on metapodosomal venter (Smith Meyer 1979).

MATERIAL EXAMINED: 28 specimens, Jebalbarez region, *P. mutica* (leaves), June - September 1991, Mehrnejad; Kerman, *P. vera* (leaves and twigs), June - October 1993, Mehrnejad; Rafsanjan, *P. mutica* and *P. vera* (leaves and twigs), May July - November 1992 and 1993, Mehrnejad; Ravar, *P. vera* (leaves), September 1993, Mehrnejad; Sirjan, *P. mutica* and *P. vera* (leaves and twigs), April - August 1992, Mehrnejad; Zarand, *P. vera* (leaves), August 1994, Mehrnejad.

REMARKS: *Tenuipalpus granati* is an occasional pest in vineyards and pomegranates in Egypt. It was also reported from Greece, Georgia, Kazakhstan and Azerbaidzhan (Jeppson *et al.* 1975). This species is an economically important pest in pistachio orchards in Iran. The population usually reaches its peak in late summer.

Cenopalpus irani (Dosse)

DIAGNOSIS: According to Dosse (1971) the dorsolateral setae of the female are long, narrowly expanded and serrated but become progressively shorter posteriorly. Dorsocentral setae on opisthosoma short and serrated. Prodorsum with 2 small pores anterolateral to setae c_1 and opisthosoma with 2 larger pores lateral of setae d_1. Setae c_2 are present.

MATERIAL EXAMINED: 10 specimens, Rafsanjan, *P. mutica* (leaves and twigs), July - October 1993, Mehrnejad; Shahrbabak, *P. vera* (twigs), November 1993, Mehrnejad; Sirjan, *P. mutica* (leaves and twigs), June 1993, Mehrnejad.

REMARKS: *Cenopalpus irani* was collected from apple and ornamental trees in Iran. However, it is not considered an important pest of the latter and pistachio trees, but population eruptions can occur occasionally (Khosrowshahi & Arbabi 1997).

Tetranychidae Donnadieu

Bryobia praetiosa Koch

DIAGNOSIS: Adult females are broadly oval, flattened, dark green to brownish green, with pale red legs, of which the first pair is longer than the body. Outer most prodorsal lobes are triangular. Femur I has 17-22, genu I 8, tibia I 15-16 and genu II 6 setae and tarsi III and IV each has a pair of duplex setae. Empodium of leg I is a short pad bearing one pair of tenent hairs, the empodia of the other legs bear 2 rows of tenent hairs (Smith Meyer 1987).

MATERIAL EXAMINED: 5 specimens, Bam, *P. vera* (stem bark), October 1993, Mehrnejad.

REMARKS: Occasionally these mites invade buildings and can become a nuisance, however, they are harmless to humans. This mite is a pest of clover, lucerne, cereals and occasionally vegetables.

3. MESOSTIGMATA Canestrini

Ascidae Voigts & Oudemans

Arctoseius cetratus (Sellnick)

DIAGNOSIS: Dorsal shield with lateral incisions and 31 pairs of setae. Opisthosoma bears a longitudinal garland of puncta between J and Z setae. Anterior margin of tectum 2-tined. Fixed cheliceral digit with 6-8 teeth. Leg II of male with tarsal seta *al-2* swollen bassally and trichoid distally (Halliday *et al*. 1998).

MATERIAL EXAMINED: 3 specimens, Rafsanjan, *P. vera* (stem bark and collar soil), December 1992 and May 1994, Mehrnejad.

REMARKS: According to Binns (1973) this species reduced the

egg hatch of *Lycoriella auripila* (Winnertz), a pest of mushrooms, by 85 % in small pot experiments.

Antennoseius bacatosimilis Karg

DIAGNOSIS: This is a large mite, 500-600 µm long and 360 µm wide. The dorsum is covered with two reticulated shields. Most dorsal setae are short and pilose, except for seta j_1, which is more prominent and lanceolate-serrate. The prodorsal shield bears 20 pairs of setae and the opisthonotal shield 16 pairs and three unpaired setae. The fixed cheliceral digit of the female bears 7-8 teeth and the movable digit two large and one tiny subapical tooth. Leg I shorter than idiosoma and tarsus devoid of an ambulacrum. The movable digit of the male bears a finger-like spermatodactyl.

MATERIAL EXAMINED: 2 specimens, Rafsanjan, *P. vera* (stem bark and collar soil), February 1994, Mehrnejad.

REMARKS: This species was originally identified as *A. delicatus* Berlese by Bernhard (1963), collected from moss in Germany. Karg (1965) found that these specimens differ form Berlese's *A. delicatus*. Therefore Karg renamed them as *A. bacatosimilis*. Knowledge of this mite's feeding habits is still unknown.

Laelapidae Berlese

Androlaelaps casalis (Berlese)

DIAGNOSIS: Dorsal shield reticulated and with 39 pairs of symmetrically arranged setae, as well as a variable number of unpaired accessory setae between the J setae and about 8 pairs of setae on lateral integument. Ventral shields also reticulated. Sternal shield with 3 pairs of setae and 2 pairs of elongate pores, posterior margin almost straight or slightly concave. Metasternal setae and third pair of pores on integument. Genital shield expanded and broadly rounded posteriorly. Two pairs of metapodal shields. Leg II stouter than others with a stout ventral spurlike seta on femur and genu. Tarsus II with 3 ventral and 3 apical setae thickened but not spine-like. Fixed cheliceral digit with pilus dentilis setiform (Till 1963).

MATERIAL EXAMINED: 6 specimens, Rafsanjan, *P. vera* (stem bark and collar soil), January September - November 1992, Mehrnejad.

REMARKS: This species is normally found in association with a wide variety of birds and mammals (particularly rodents) or in nest materials. This species can be abundant in poultry houses. It can prey upon various other mites and their eggs, young and injured *Tribolium* larva and even feeds on dried blood, egg yolk and chicken feces. It is also found occasionally on moths (Treat 1975). Men (1959) reported that *A. casalis* could penetrate the unbroken skin of birds and young rodents.

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