

Scale insects of the central Zagros region in Iran (Hemiptera: Coccoidea)

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Abstract

A total of 48 scale insect species (Hemiptera: Coccoidea) are recorded in the central Zagros region (Ilam, Lorestan, Kermanshah and Hamadan provinces). The species belong to 33 genera and 10 families Asterolecaniidae, Cerococcidae, Coccidae, Diaspididae, Eriococcidae, Margarodidae, Kermesidae, Ortheziidae, Phoenicococcidae and Pseudococcidae. Three species *Duplacionaspis noaeae* (Hall) (Diaspididae), *Rhizopulvinaria turkestanica* (Archangelskaya) (Coccidae) and *Gueriniella serratulae* (Fabricius) (Margarodidae) are first recorded for the Iranian fauna. 39 species occur on the forest trees and pastures and 14 species attack on the orchards and crops. The distribution of the identified species is shown that 13 species are restricted to Irano-Turanian region, of which 10 species are found only in the Zagros region. No purely Mediterranean species are so far recorded, but 11 species belonging to a Mediterranean/ Irano-Turanian regions; and 4 scale insect species are restricted in Saharo-Sindian region.

Key words: scale insects, Coccoidea, fauna, central Zagros, Iran.

چکیده

در این مطالعه ۴۸ گونه شپشک گیاهی (Hemiptera: Coccoidea) از منطقه زاگرس مرکزی (استان‌های ایلام، لرستان، کرمانشاه و همدان) گزارش می‌گردد. گونه‌های تشخیص داده شده

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متعلق به ۳۳ جنس و ۱۰ خانواده Diaspididae, Coccidae, Cerococcidae, Asterolecaniidae, Pseudococcidae و Phoenicococcidae, Ortheziidae, Kermesidae, Margarodidae, Eriococcidae می‌باشند. سه گونه (Diaspididae) *Rhizopulvinaria Duplachionaspis noaeae* (Hall) و *Gueriniella serratulae* (Fabricius) و *turkestanica* (Archangelskaya) (Coccidae) (Margarodidae) برای اولین بار از ایران گزارش می‌شوند. از این تعداد ۳۹ گونه روی درختان جنگلی و گیاهان مرتعی و ۱۴ گونه روی درختان میوه و محصولات کشاورزی فعالیت دارند. پراکنش گونه‌های تشخیص داده شده مشخص می‌نماید که ۱۳ گونه به طور اختصاصی در منطقه Irano-Turanian فعالیت دارند که از این میان ۱۰ گونه شپشک گیاهی منحصراً در منطقه زاگرس جمع‌آوری شده است. از میان گونه‌های شناسایی شده گونه‌ی اختصاصی منطقه Mediterranean وجود ندارد، ولی ۱۱ گونه به طور مشترک متعلق به دو منطقه Mediterranean و Irano-Turanian می‌باشند و ۴ گونه منحصراً در منطقه Saharo-Sindian فعالیت دارند*.

واژه‌های کلیدی: شپشک‌های گیاهی، Coccoidea, فون، زاگرس مرکزی، ایران.

Introduction

Iran is one of the largest Middle Eastern countries and has a unique zoogeographical position, linking the Irano-Turanian, the Euro-Siberian, and the Saharo-Arabian regions (Zohary, 1963). Tregubov and Mobayen (1970) recognized the following four floristic regions: the Hyrcanian region along the Caspian coast; the Irano-Turanian region covering whole centre towards the east and west; the Zagros region, and the Khalidjo - Ommanian region. Parsa (1978) defined the following 9 biotic provinces: Caspian, Elburzian, Azerbaidzhanin, Zagrobian, Suzian, Farsian, Bazmanian, Lotian and Kavirian. Anderson (1968) delineated thirteen faunal areas in Iran, based on physical geography, climate, and distribution of lizards. The Zagros mountains rang forms a barrier between the plateau and the Mesopotamian lowlands and the western foothills of the Zagros which contains species from both the Zagros region and the Mesopotamian lowlands.

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The Zagros Mountains, stretch from the River Aras towards the southeast to the Persian Gulf coast. The central Zagros is restricted to Ilam, Lorestan, Kermanshah and Hamadan provinces. The Zagrosian Forest displays an orchard - like appearance and belongs to Irano - Turanian complex, with a few Mediterranean ingredients. It comprises mainly different species of *Quercus* accompanied by elm, maple, celtis, walnut, Syrian pear, pistachio (*Pistacia khinjuk* and *P. atlantica*), a few almond trees and a great many bushes (Abivardi, 2001).

The scale insect fauna of the west of Iran, particularly Zagros region is poorly known. Bodenheimer (1944) was one of the first who recorded coccoids from Iran and listed 62 species, of which nine species, *Asterodiaspis mina* (Russell), *Pulvinaria pistaciae* (Bodenheimer), *Eriopeltis festucae* (Boyer de Fonscolombe), *Bodenheimera rachelae* Bodenheimer, *Puto pilosellae* (Šulc), *Nidularia balachowskii* Bodenheimer, *Diaspidiotus ostraeformis* Curtis, *Diaspis syriaca* Lindinger and *Salicicola pistaciae* (Lindinger) are mentioned for Zagros. Kaussari (1955) recorded three armored scale species *Melonaspis louristanus* Balachowsky & Kaussari, *Leucaspis riccae* Targioni Tozzetti and *Duplachionapis graminilla* Borchsenius from Kermanshah province. Kaussari (1957) introduced *Dynaspidiotus spartii* Kaussari and *Puto pilosella* (Šulc) from Hamadan and Ardabil. Farahbakhsh (1961) listed 18 scale insects species from the Zagros region. Balachowsky & Kaussari (1953) described two new species *Melonaspis louristanus* and *Diaspidiotus baiati*, and Borchsenius (1952) described *Dynaspidiotus amygdalicola* from the west of Iran. Kazemi (1363) also recorded *Didesmococcus unifasciatus* (Archangelskaya) for the first time for Iran. Rajabi (1989) has a complete discussion about pest insects including scale insects in Iran. Moghaddam (2004) listed five armored scale species from this region.

Materials and Methods

Dry specimens of the scale insects were sampled at different locations in Ilam, Lorestan, Kermanshah and Hamadan provinces during 2006-2008. For each sample, the altitude, latitude and longitude measurements are provided. The specimens were wrapped in paper or put in ethyl alcohol 75% in the field and later were mounted on microscope slides using the method given by McKenzie (1967).

The specimens were identified using keys in Hodgson (1994), Balachowsky (1948, 1950, 1953& 1954), Borchsenius (1949), Ter-Grigorian (1973) and Danzig (1980) and compared with the specimens at the collection of scale insects in Iranian Research Institute of

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Plant Protection. The scale insect specimens are deposited at the collection of the Insect Taxonomy Research Department, Tehran, Iran.

The distribution data for the scale insect species in Iran are primarily based on Moghaddam (2004), Moghaddam (2009), Farahbakhsh (1961) and Kozár (1998) and the world distribution by using of Ben-Dov (1993, 1994), Ben-Dov & German (2003) and Ben-Dov *et al.*(2009).

The following abbreviations in the text are used for provinces:

Hamadan P., Hamadan Province

Ilam P., Ilam Province

Kermanshah P., Kermanshah Province

Lorestan P., Lorestan Province

Abbreviations for collectors' names are as follows:

M.M., M. Moghaddam

M.T., M. Tavakoli

M.J., M. Javadzadeh

A.G., A. Gharib

G.F., G. Farahbakhsh

Result

Base on our study, the determined scale insect species of the centre Zagros region belong to 10 families, of which the diaspidid diversity is high (30 species) and then coccids (7 species), the diversity of the other families including Pseudococcidae, Asterolecaniidae, Cerococcidae, Eriococcidae, Margarodidae, Kermesidae, Ortheziidae and Phoenicococcidae are low.

Family ASTEROLECANIIDAE

Asterodiaspis quercicola (Bouché, 1851)

= *Asterolecanium quercicola* (Bouché)

ILAM P.: Ilam, Darreh-shahr, on *Quercus persica*, 2.x.2005, 987m., N33 23 17.7 E46 52 32.2, (M.M.). KERMANSHAH P.: Eslam-abad, Sarmast, on *Quercus* sp., 31.v.2006, 1920m., N33 57 57.1 E46 20 57.3, (M.M.). LORESTAN P.: Khorram-abad, Bisheh, on *Quercus* sp., 6.vi.2007, 1237m., N33 20 00.2 E48 53 20.3, (M.M.); Khorram-abad, on *Q. infectoria*, 6.vi.2007, N33 25 37.9 E48 17 21.0, (M.T.); Firouz-abad, Galaei, on *Q. infectoria*, 21.ix.2007, N33 56 41.7 E48 04 27.7, (M.T.); Sepid-dasht, Shool-abad, on

Quercus sp., 8.vi.2007, 2122m., N33 12 20.6 E49 08 13.0, (M.M.); Khorram-abad, Kakasharaf, on *Q. infectoria*, 15.ix.2007, N33 22 12.9 E48 23 05.0, (M.T.).

Remarks: *A. quercicola* is restricted to oak trees. In addition to this species, *A. mina* (Russell) is also recorded on *Quercus* spp. (Bodenheimer, 1944). This species is distributed in the north and west of Iran (Farahbakhsh, 1961).

Family CEROCOCCIDAE

Cerococcus longipilosus Archangelskaya, 1931

LORESTAN P.: Borujerd, on *Lactuca orientalis*, 6.vii.2006, N33 53 33.8 E48 45 22.9, (M.T.).

Remarks: This species was first recorded by Kaussari (1957) from the northern part of Iran. It is also recorded from Tajikistan, Turkmenistan (Ben-Dov *et al.* 2009).

Family COCCIDAE

Acanthopulvinaria orientalis (Nasonov, 1908)

HAMADAN P.: Hamadan, Tarik-darreh, on *Noea mucronata*, 9.vi.2006, 2318m., N34 45 09.8 E48 28 21.5, (M.M.).

Remarks: This species has been collected from Golestan, Kerman, Sistan & Baluchestan and Tehran provinces and occurs in Irano-Turanian subregion (Ben-Dov *et al.* 2009).

Bodenheimera rachelae (Bodenheimer, 1924)

ILAM P.: Ilam, Karam-zadeh, on *Vitex* cf. *Pseudonegundo*, 2.x.2005, 950m., N33 25 30.8 E46 50 33.8, (M.M.), KERMANS SHAH P.: Nodousheh, Sivand River, 12.x.2006, 731m., N35 08 14.4 E46 17 10.3, (M.M.); Ghasr-e Shirin, 31.v.2006, 604m., N34 16 09.9 E45 48 17.9, (M.M.), LORESTAN P.: Khorram-abad, Vesian, 4.vi.2007, 1070m., N33 32 15.5 E47 59 59.8, (M.M.).

Remarks: This species was first recorded by Bodenheimer (1944) from Iran. The species is restricted to *Vitex* cf. *Pseudonegundo*.

Ceroplastes rusci (Linnaeus, 1758)

LORESTAN P.: Khorram-abad, Pol-dokhtar, on *Ficus carica*, 2.iv.2002, N33 08 06.3 E47 44 19.3, (M.J.).

Remarks: This species is also recorded from Sistan & Baluchestan and Hormozgan provinces.

Didesmococcus unifasciatus (Archangelskaya, 1923)

KERMANS SHAH P.: Biseton, on *Persica vulgaris*, 29.v.2006, 1319m., N34 26 59.1

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E47 34 34.1, (M.M.).

Remarks: This species was recorded for the first time by Kazemi (1985) and also recorded by Rajabi (1989) from Tehran, Damavand.

Eulecanium tiliae (Linnaeus, 1758)

= *Eulecanium coryli* Cockerell, 1901

KERMANSHAH P.: Kermanshah, on *Malus domestica*, 1.vi.2006, 1329m., N34 30 19.2 E46 59 26.6, (M.M.).

Remarks: This species is first recorded by Archangelskaya (1937) from Iran; he mentioned this species as *Lecanium coryli* L. from Rasht and Shiraz on twigs of unknown tree (coll. Afcahir). It is also recorded from Tehran, Damghan, Kerman, Azarbaijan, Esfahan and Khorasan (Farahbakhsh, 1961). Rajabi (1989) recorded this species from Tehran, Esfahan and Markazi provinces

Exaeretopus tritici Williams, 1977

LORESTAN P.: Khorram-abad, on *Hordeum* sp., 14.v.2003, N33 43 37.0 E48 29 06.4, (Jamshidi).

Remarks: This species was recorded for the first time by Moghaddam & Azad-Bakhat (2005), and *Hordeum* sp. is newly record for this species.

Rhizopulvinaria turkestanica (Archangelskaya, 1931)

ILAM P.: Ilam, Sivand Mountain, on *Noea mucronata*, 25.vii.2006, 2222m., N33 34 31.8 E46 36 16.7, (M.M.); KERMANSHAH: Sar-pol-zohab, on *Carthamus oxyacantha*, 30.v.2006, 525m., N34 29 08.6 E45 46 11.7, (M.M.). LORESTAN P. Dorood, Gahar, on *N. mucronata*, 6.vii.2007, 2410m., N33 22 21.7 E49 11 27.8, (M.M.).

Remarks: This species is recorded for the first time for Iran. It also occurs in Irano-Turanian subregion. The host plant *N. mucronata* is recorded for the first time.

Family DIASPIDIDAE

Acanthomytilus kurdicus (Bodenheimer, 1943)

ILAM P.: Ilam, Meymeh Road, on *Acer cinerascens*, 27.vii.2006, 1505m., N33 18 33.5 E46 50 17.0, (M.M.).

Remarks: This species was recorded by Bodenheimer (1944) in Iran. It also occurs in Fars, Hormozgan and Sistan & Baluchestan provinces. This species is also recorded from Iraq.

Chionaspis etrusca Leonardi, 1908

KERMANSHAH P.: Biseton, Ahangan, on *Tamarix* sp., 29.v.2006, 1319m., N34 26

9.1 E47 34 34.1, (M.M.).

Remarks: This species is also recorded from East Azarbaijan and Gilan provinces.

Chionaspis lepineyi Balachowsky, 1928

KERMANSHAH P.: on *Quercus persica*. LORESTAN P.: Khorram-abad, Kakareza, on *Q. brantii*, 9.vi.2007, N33 43 56.8 E48 13 47.1, (M.T.); Firouz-abad, Galaei, on *Q. brantii*, 21.xi.2007, N33 56 41.7 E48 04 27.7, (M.T.).

Remarks: This species occurs on *Quercus* spp., and is also recorded from Fars province.

Chionaspis salicis (Linnaeus, 1758)

ILAM P.: Ilam, Kolm, on *Fraxinus excelsior*, 2.x.2005, 946m., N33 20 29.3 E46 56 50.4, (M.M.).

This species is widespread in Iran.

Chlidaspis asiatica (Archangelskaya, 1937)

= *Tecaspis prunorum* Balachowsky, 1954

Tecaspis asiatica Balachowsky, 1954

Voraspis adlei Balachowsky & Kaussari, 1955

HAMADAN P.: Hamadan, Moradbeyk Valley, on *Armeniaca vulgaris*, 5.vi.2006, 2274m., N34 43 48.8 E48 29 33.3, (M.M.); Malayer, on *Armeniaca vulgaris*, 10.vi.2006, 1608m. N34 37 57.7 E48 10 10.3, (M.M.); ILAM P.: Eyvan, on *Persica vulgaris*, 29.ix.2005, 1529m., N33 41 45.5 E46 23 32.2, (M.M.); KERMANSHAH P.: Kermanshah, on *Prunus armeniaca*, 22.v.1951, N34 19 22.4 E47 04 07.2, (A.G.); Sarpol-zohab, Rijab, on *Amygdalus* sp., 13.x.2006, 1169m., N34 26 02.4 E46 01 16.0, (M.M.); LORESTAN P.: Zagheh, on *Prunus* sp., 19.ix.2007, N33 29 05.3 E48 41 22.2, (M.T.); Khorram-abad, Nojian Road, on *Amygdalus communis*, 19.vii.2006, 2233m., N33 15 22.6 E48 31 14.9, (M.M.).

Remarks: *C. asiatica* was firstly recorded by Archangelskaya (1937) from Iran; this species is widespread in Iran.

Diaspidiotus baiati (Kaussari, 1958)

= *Quadraspidiotus baiati* Kaussari

ILAM P.: Ilam, Ghalarang, on *Daphne angustifolia*, 26.viii.2006, 2220m., N33 38 04.2 E46 31 14.4, (M.M.); Ilam, Meymeh Road, on *D. Angustifolia*, 27.vii.2006, N33 18 33.5 E46 50 17.0, (M.M.). LORESTAN P.: Aleshtar, Cheshmeh Barghi, on *Astragalus* sp., 20.vii.2006, 1911m., N33 50 27.6 E48 19 49.0, (M.M.).

Remarks: This species occurs in the west of Iran.

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Diaspidiotus ceconii (Leonardi, 1908)

= *Quadraspidiotus ceconii* Balachowsky

HAMADAN P.: Hamadan, Tarik darreh, on *Noea mucronata*, 9.vi.2006, 2318m., N34 45 09.8 E48 26 21.5, (M.M.).

Remarks: This species is recorded from Fars, Kordestan and West Azarbaijan provinces.

Diaspidiotus prunorum (Laing, 1931)

HAMADAN P.: Hamadan, Razan, on *Prunus armeniaca*, 6.viii.2006, 1843m. N35 21 10.0 E49 01 24.4, (M.M.); Malayer, Zangaveh, on *Prunus cerasus*, 10.vi.2006, 1935m. N34 08 46.0 E48 59 14.2, (M.M.). KERMANSHAH P.: Kerend, 30.v.2006, 1690m., N34 19 50.1 E46 07 10.9, (M.M.); Ravansar, on *Echinops ritro*, 2.vi.2006, 1362m., N34 41 53.2 E46 40 36.0, (M.M.); Eslam-abad, Sarmast, on *Amygdalus* sp., 23.vii.2006, 1948m., N33 58 21.2 E46 20 45.4, (M.M.). LORESTAN P.: Dorood, Gahar, on *Amygdalus* sp., 6.vii.2007, 2410m., N33 22 21.7 E49 11 27.8, (M.M.).

Remarks: *D. prunorum* is almost observed on all plants of family Rosaceae and is recorded in many cold areas in Iran (Rajabi, 1989).

Diaspidiotus slavonicus Green, 1934

LORESTAN P.: Khorram-abad, Kohdasht, on *Populus* sp., 9.viii.2007, N34 47 08.8 E46 26 54.7, (M.T.).

Remarks: We have collected it on branches, twigs and leaves of *Populus* sp. This species is distributed in Golestan, Sistan & Baluchestan and North Khorasan provinces.

Diaspidiotus turanicus (Borchsenius, 1935)

LORESTAN P.: Aleshtar, on *Salix* sp., 6.v.2007, 1298m. N33 36 16.1 E48 17 54.9, (M.M.).

Remarks: This species is also recorded from Kerman and Khorasan provinces.

Duplachionaspis graminella (Borchsenius, 1949)

ILAM P.: Meymeh Road, on *Phragmites* sp., 27.vii.2006, 1461m., N33 22 23.0 E46 44 21.5; 27.vii.2006, 1434m., N33 23 16.0, E46 41 22.2, (M.M.).

Remarks: This species is also recorded from Fars province.

Duplachionaspis noeae (Hall, 1925)

LORESTAN P.: Dorood, Gahar, on *Noea mucronata*, 22.vii.2006, 2272m., N33 22 31.3 E49 11 35.2, (M.M.).

Remarks: This species is a new record for Iran and occurs on the leaves of the host plant.

Dynaspidiotus amygdalicola (Borchsenius, 1952)

ILAM P.: Ilam, Kolm, on *Amygdalus lycioides*, 2.x.2005, 946m., N33 20 29.3 E46 56 50.4, (M.M.). LORESTAN P.: Aleshtar, Gerin Mountain, on *Amygdalus* sp., 5.vi.2007, 1802m., N33 56 43.8 E48 17 08.5, (M.M.).

Remarks: This species is observed in Fars, Kohgiluyeh & Boyerahmad and Kerman provinces. It is introduced as a new species by Borchsenius (1952) for Iran.

Koroneaspis aegilopos (Koroneos, 1934)

KERMANS SHAH P.: Dalaho, on *Quercus* sp., 13.x.2006, 1770m., N34 37 19.6 E46 05 32.5, (M.M.).

Remarks: This is also recorded from Fars province.

Lepidosaphes malicola Borchsenius, 1947

HAMADAN P.: Hamadan, on *Populus nigra*, 21.vii.1966, N34 48 52.2 E48 32 13.2, Babaii; on *Fraxinus excelsior*, 5.vi.2006, 1882m., N34 47 13.3 E48 29 26.6, (M.M.); Malayer, on *Malus domestica*, 10.vi.2006, 1807m., N34 12 56.1 E48 52 20.2, (M.M.); Asad-abad, Tormianak, on *M. domestica*, 7.vi.2006, 1604m., N34 37 57.7 E48 10 10.3, (M.M.). KERMANS SHAH P.: Nodousheh, Oraman, on *Astragalus* sp., 12.x.2006, 2300m., N35 13 58.1 E46 12 28.8, (M.M.); Nodousheh, on *Astragalus* sp., 12.x.2006, 1953m., N35 11 21.1 E46 13 53.3, (M.M.). LORESTAN P.: Borujerd, on *Salix* sp., N33 53 34.3 E48 45 29.6; Dorood, Gahar, on *Daphne angustifolia*, 22.vii.2006, 2272m., N33 22 31.3 E49 11 35.2, (M.M.); Khorram-abad, Nojian, on *Cotoneaster vulgaris*, 19.vii.2006, 2233m., N33 31 52.2 E48 31 14.9, (M.M.); Khorram-abad, Gerit, on *Cerasus* sp., 21.vii.2006, 1773m., N33 18 13.9 E48 42 55.1, (M.M.); Zagheh, on *Prunus* sp., 11.vi.2007, N33 29 05.3 E48 39 10.7, (M.T.); 19.ix.2007, on *Armeniaca vulgaris*, N33 29 05.3 E48 41 22.2, (M.T.).

Remarks: This species is one of the major pests on the apple trees in Iran (Rajabi, 1989).

Lepidosaphes pistaciae Archangelskaya, 1937

ILAM P.: Meymeh, on *Pistacia khinjuk*, 27.vii.2006, 1324m., N33 16 19.8 E46 52 16.1; 3.x.2005, 1237m., N33 26 53.1 E46 31 12.7, (M.M.). KERMANS SHAH P.: Paveh, Bayangan, on *P. khinjuk*, 3.vi.2006, 1350m., N34 57 52.9 E46 18 08.8, (M.M.). LORESTAN P.: Azna, Oshtoran Mountain, on *P. khinjuk*, 15.x.2007, N33 19 55.0 E49 16 17.5, (M.T.); Aleshtar, Gerin Mountain, 5.vi.2007, 1802m., E33 56 43.8 E48 17 08.5, (M.M.).

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Remarks: This species was recorded by Archangelskaya (1937) for Iranian fauna. It has wide distribution in Iran and occurs only on *Pistacia* spp.

Lepidosaphes ulmi (Linnaeus, 1758)

LORESTAN P.: Aleshtar, Kakareza, on *Rosa* sp., 2.iii.2006, N33 43 56.8 E48 13 47.1, (M.T.).

Remarks: This cosmopolitan species is recorded in many areas in Iran.

Leucaspis riccae Targioni Tozzetti, 1881

KERMANSHAH P.: Ghasr-e Shirin, on *Nerium oleander*, 28.iv.1951, N34 30 53.1 E45 35 10.2, (G.F.).

Remarks: This species was recorded from Kermanshah province (Kaussari, 1955).

Melanaspis inopinata (Leonardi, 1913)

LORESTAN P.: Khorram-abad, Bisheh, on *Astragalus* sp., 6.vi.2007, 2096m., N33 22 53.2 E48 43 59.6, (M.M.); Aleshtar, Gerin Mountain, on *Pistacia khinjuk*, 5.vi.2007, 2060m., N33 56 45.8 E48 21 13.4, (M.M.); Dorood, Gahar, on *Astragalus* sp., 22.vii.2006, 2273m., N33 22 31.3 E49 11 35.2, (M.M.); Azna, Kamandan, on *Astragalus* sp., 23.vii.2006, 2184m., N33 17 41.9 E49 25 15.2, (M.M.); Aleshtar, Cheshmeh Barghi, on *Astragalus* sp., 20.vii.2006, 2121m., N33 47 12.2 E48 24 28.6, (M.M.). KERMANSHAH P.: Dalaho, on *Acer cinerascens*, 13.x.2006, 1770m., N34 37 19.6, E46 05 32.5, (M.M.); Paveh, Bayangan, on *Pistacia khinjuk*, 3.vi.2006, 1350m., N34 57 52.9 E46 18 08.8, (M.M.).

Remarks: This species is distributed in the west and central provinces.

Melanaspis louristanus Balachowsky & Kaussari, 1953

ILAM P.: Meymeh, on *Quercus* sp., 27.vii.2006, 1324m., N33 16 19.8 E46 52 16.1, (M.M.); Eyvan, Tang-e Dalab, on *Quercus* sp., 26.vii.2006, 1484m., N33 41 51.3 E46 23 21.8, (M.M.); Meymeh, Cheshmeh-pahn, on *Q. persica*, 3.x.2005, 1391m., N33 23 14.0 E46 41 34.2, (M.M.); Ilam, Tang-e Arghavan, on *Quercus* sp., 26.vii.2006, 1738m., N33 37 40.3 E46 28 51.2, (M.M.); Mehran, on *Quercus* sp., 1.x.2005, 1110m., N33 34 33.3 E46 15 08.8, (M.M.); Ilam, on *Q. persica*, 15.iii.1952m., N33 38 28.0 E46 25 33.0, (G.F.). LORESTAN P.: Sefid-koh, on *Quercus* sp., 11.vii.2007, N33 47 57.3 E47 54 05.1, (M.T.); Paveh, Gargor, on *Quercus* sp., 3.vi.2006, 1717m., N34 52 19.4 E46 12 5.9, (M.M.); Eslam-abad, Sarmast, on *Quercus* sp., 28.vii.2006, 1948m., N33 58 21.2 E46 20 45.4, (M.M.); Sepid-dasht, Shool-abad, on *Quercus* sp., 6.vii.2007, 2122m., N33 12 20.6 E49 08 13.0, (M.M.); Khorram-abad, Razan, on *Quercus* sp., 22.vii.2006, 1814m., N33 33 08.3 E48 32 6.9, (M.M.); Khorram-abad, Cheshmeh- Sorkkeh, on *Quercus* sp., 19.vii.2006, 1560m., N33 19 26.0 E48 25 45.0,

(M.M.); Aleshtar, Gerin Mountain, on *Quercus* sp., 5.vi.2007, 2060m., N33 56 45.8 E48 21 13.4, (M.M.); Dorood, Tang-e Holivan, on *Quercus* sp., 17.vi.2002, N33 26 13.7 E48 55 05.7, (M.M.); Khorram-abad, Cham-divan, on *Quercus* sp., 4.vi.2007, N33 27 30.1 E48 00 16.2, (M.M.). KERMANSHAH P.: Eslam-abad, Darbadam, on *Quercus* sp., 8.x.2006, 1648m., N34 01 09.5 E46 24 37.7, (M.M.); Nodousheh, on *Quercus* sp., 12.x.2006, 1268m., N35 05 05.1, E46 19 04.3, (M.M.); Eslam-abad, Sarmast, on *Quercus* sp., 31.v.2006, 1920m., N33 57 57.1 E46 20 57.3, (M.M.).

Remarks: This species occurs in the western provinces of Iran, and attacks only to *Quercus* spp. There is not any evidence of damage on oaks trees in Iran.

Mercetaspis halli (Green, 1923)

HAMADAN P.: Hamadan, Morad-beyk Valley, on *Armeniaca vulgaris*, 5.vi.2006, 2274m., N34 43 48.8 E48 29 33.3, (M.M.). KERMANSHAH P.: Gilan-gharb, on *Amygdalus reuteri*, 31.v.2006, 861m., N34 07 21.9, E45 58 05.2, (M.M.); Eslam-abad, Darbadam, on *A. lycioides*, 8.x.2006, 1748m., N34 01 09.5, E46 24 37.7, (M.M.). LORESTAN P.: Khorram-abad, Gerit, 21.vii.2006, 1630m., N33 16 38.5 E48 43 06.8, (M.M.).

Remarks: *M. halli* is recorded in Fars, Khorasan, West Azarbaijan, Chahar Mahal Bakhtiari and Sistan & Baluchestan provinces.

Parlagena mckenziei Balachowsky, 1950

ILAM P.: Mehran, on *Tamarix* sp., 1.x.2005, 423m., N33 20 09.0 E46 16 08.6; 181m., N33 09 20.6 E46 11 44.7, (M.M.).

Remarks: This species is only known from Iran and occurs in the southern provinces. It is occurs on *Tamarix* sp.

Parlagena remaudierei Kaussari, 1955

KERMANSHAH P.: Ghasr-e Shirin, N34 30 53.0 E45 35 20.0

Remarks: This species is only known from Iran and occurs in the southern provinces of Iran.

Parlatoreopsis longispina (Newstead, 1911)

KERMANSHAH P.: Ghasr-e Shirin, on *Prunus spinosa*, 26.iv.1951, N34 30 53.0 E45 35 20.0, (G.F.).

Remarks: This species is also recorded from Kerman and Hormozgan provinces.

Parlatoria blanchardi Targioni Tozzetti, 1868

ILAM P.: Mehran, on *Phoenix dactylifera*, 1.x.2005, 181m., N33 09 20.6 E46 11 44.7,

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(M.M.).

Remarks: This species is recorded in all the southern provinces of Iran.

Parlatoria oleae Colvee, 1880

LORESTAN P.: Khorram-abad, on *Rosa* sp., 18.xii.2007, N33 29 56.1 E48 20 59.1,

(M.T.).

Remarks: This species has a wide distribution in Iran, except for southern provinces.

Prodiaspis tamaricicola (Malenotti, 1916)

= *Adiscodiaspis tamaricicola* Malenotti, 1916

KERMANSHAH P.: Kangavar, on *Tamarix* sp., 4.vi.2006, N34 27 59.3 E47 55 49.8,

(M.M.).

Remarks: This species is commonly distributed in Iran and occurs on tamarix trees.

Salicicola archangelskyae Lindinger, 1930

KERMANSHAH P.: Eslam-abad, Ghalajeh, on *Acer cinerascens*, 8.x.2006, 1836m., N33 58 27.0 E46 20 02.7, (M.M.). LORESTAN P.: Khorram-abad, Gerit, on *Acer cinerascens*, *Celtis australis*, 21.vii.2006, 1773m., N33 18 13.9 E48 42 55.1, (M.M.).

Remarks: This species is also recorded from Gilan, Fars, Kerman, Bushehr, Esfahan, Tehran, Kohgiluyeh & Boyerahmad and East Azarbaijan provinces.

Salicicola davatchii Balachowsky & Kaussari, 1951

ILAM P.: Ilam, Karimzadeh, on *Pistacia khinjuk*, 2.x.2005, 950m., N33 25 30.8 E46 50 33.8, (M.M.); Meymeh, on *P. khinjuk*, 3.x.2005, 1456m., N33 22 37.2, E46 44 03.5, (M.M.). KERMANSHAH P.: Eslam-abad, Sarmast, on *P. khinjuk*, 28.vii.2006, 1948m., N33 58 21.2 E46 20 45.4, (M.M.); Javanrood, Taze-abad, on *P. khinjuk*, 13.x.2006, 1217m., N34 45 39.0 E46 13 12.1, (M.M.); Nodousheh, Sivand River, on *P. khinjuk*, 12.x.2006, 731m., N35 08 14.4 E46 17 10.3, (M.M.). LORESTAN P.: Khorram-abad, Bisheh, on *P. khinjuk*, 6.vi.2007, 1237m., N33 20 00.2 E48 53 20.9, (M.M.); Aleshtar, Gerin Mountain, *P. khinjuk*, 5.vi.2007, 2060m., N33 56 45.8 E48 20 13.4, (M.M.).

Remarks: This species is known from Iran, Afghanistan and Turkey and recorded from Kerman, Hormozgan, Sistan & Baluchestan and Fars provinces.

Salicicola kermanensis (Lindinger, 1905)

HAMADAN P.: Asad-abad, Tormianak, on *Salix* sp., 7.vi.2006, 1604m., N34 47 34.1 E48 06 36.5, (M.M.). KERMANSHAH P.: Kermanshah, Ghaleh, on *Salix* sp., 1.vi.2006, 1425m., N34 40 33.6 E47 01 33.5, (M.M.). LORESTAN P.: Khorram-abad, Sepid-dasht, on *Populus euphratica*, 21.viii.2006, 1212m., N33 12 52.4 E48 50 12.6, (M.M.).

Remarks: This species is recorded mainly from the west of Iran except Sistan & Baluchestan province in the southeast.

Targionia haloxyloni Hall, 1926

LORESTAN P.: Khorram-abad, Nojian, on *Daphne angustifolia*, 19.vii.2006, 2024m., N33 15 59.6 E48 31 11.0, (M.M.); Dorood, Gahar, on *Astragalus* sp., 22.vii.2006, 2272m., N33 22 32.6 E49 11 33.5, (M.M.).

Remarks: This species is recorded from Iran (Kozár *et al.* 1996) but the specimen's location remains unknown. The host plants *D. angustifolia* and *Astragalus* sp. are new for this species.

Family ERIOCOCCIDAE

Eriococcus spurius (Modeer, 1778)

HAMADAN P.: Hamadan, on *Ulmus carpinifolia*, 5.vi.2006, 1882m., N34 48 07.0 E48 31 07.1, (M.M.).

Remarks: *E. spurius* is very common on *Ulmus* sp. and is recorded from the west, north and central provinces of Iran.

Family MARGARODIDAE

Porphyrophora tritici (Bodenheimer, 1941)

HAMADAN P.: Toyserkan, Mobarak-abad, on *Triticum aestivum*, N34 28 12.9 E48 33 05.2.

Remarks: This species was recorded from East Azarbaijan and Kordestan provinces and occurs on the root of wheat (Farahbakhsh, 1961).

Gueriniella serratulae (Fabricius, 1775)

KERMANSHAH P.: Songhor, 29.v.2006, N34 33 36.8 E47 25 01.8, (M.M.); LORESTAN P.: Sepid-dasht, Shool-abad, on *Gundelia tournefortii*, 8.vi.2007, 2122m., N33 12 20.6 E49 08 13.0, (M.M.).

Remarks: This species is recorded in Euro-Siberian and Mediterranean regions, and Turkey. It is recorded for the first time from Iran.

Family KERMESIDAE

Kermes quercus (Linnaeus, 1758)

KERMANSHAH P.: Javanrood, on *Quercus* sp., 1.x.2007, N34 47 08.8 E46 26 54.8, (M.T.); Kerend, *Quercus* sp., N34 16 37.9 E46 14 58.5.

Remarks: This species is found in the west provinces and occurs on oak trees.

Family ORTHEZIIDAE

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Orthezia urticae (Linnaeus, 1758)

HAMADAN P.: Hamadan, Morad-beyk Valley, on *Astragalus* sp., 5.vi.2006, 2322m., N34 43 31.9 E48 29 29.1, (M.M.). ILAM P.: Ilam, Sivand Mountain, on *Daphne angustifolia*, 25.vii.2006, 2222m., N33 34 31.8 E46 36 16.7, (M.M.). KERMANSHAH P.: Eslam-abad, Sarmast, on *Astragalus* sp., 31.v.2006, 1920m., N33 57 57.1 E46 20 57.3, (M.M.). LORESTAN P.: Dorood, Gahar, on *Astragalus* sp., 22.vii.2006, 2272m., N33 22 31.3 E49 11 35.2, (M.M.); Khorram-abad, Taft, on *Astragalus* sp., 11.xi.2002, N33 44 09.3 E48 21 60.7, (M.T.).

Remarks: This species is recorded mainly in the western provinces.

Family PHOENICOCOCCIDAE

Phoenicococcus marlatti Cockerell, 1899

KERMANSHAH P.: Ghasr-e Shirin, on *Phoenix dactylifera*, 4.ix.1950, N34 16 09.9 E45 48 17.9.

Remarks: This species occurs in tropical region including the southern provinces of Iran.

Family PSEUDOCOCCIDAE

Phenacoccus aceris (Signoret, 1875)

KERMANSHAH P.: Eslam-abad, Sarmast, on *Crataegus azarollus*, *Echinops ritro*, 31.v.2006, N33 57 57.1 E46 20 57.3, (M.M.).

Remarks: This species is also recorded from Tehran city on *Juglan regia* (Moghaddam, 2009).

Puto pilosellae (Šulc, 1898)

Syn. *Puto euphorbiaefolius* (Bodenheimer, 1943)

HAMADAN P.: Toyserkan to Hamadan road, on *Euphorbia* sp., 6.vii.2006, 1841m., N34 28 12.9 E48 33 05.2, (M.M.); Toyserkan, on *Euphorbia* sp., 6.vii.2006, 1841m., N34 28 12.9 E48 33 05.2, (M.M.). KERMANSHAH P.: Gilan-gharb, on *Euphorbia* sp., 31.v.2006, 861m., N34 07 21.9 E45 58 05.2, (M.M.); Kermanshah, Biseton, on *Euphorbia* sp., 29.v.2006, 1310m., N34 23 25.4 E47 26 15.5, (M.M.); Kermanshah, on *Euphorbia* sp., 1.vi.2006, N34 37 53.6 E47 11 45.8, (M.M.); Eslam-abad, Sarmast, on *Echinops ritro*, 31.v.2006, 1920m., N33 57 57.1 E46 20 57.3, (M.M.). ILAM P.: Ilam, Meymeh, Malek-shahi, on *Euphorbia* sp., 3.x.2005, 1460m., N33 25 01.1 E46 35 03.7, (M.M.); Eyvan, on *Euphorbia* sp., 4.x.2005, 1272m., N33 46 42.2, E46 19 30.9, (M.M.); Meymeh, on *Euphorbia* sp., 3.x.2005, 1321m., N33 19 15.1 E46 48 52.7, (M.M.); Ilam, Sivand Mountain, on

Euphorbia sp., 25.vii.2006, 2222m., N33 34 31.8 E46 36 16.7, (M.M.).

Remarks: This species is known from Afghanistan, Iraq and occurs in the western provinces along the Zagros Mountains.

Discussion

The paper deals with results of faunistic studies carried out in the central Zagros region (Ilam, Lorestan, Kermanshah and Hamadan provinces) during 2006-2008 and present 48 species of 33 genera and 10 families as follows: 1 Asterolecaniidae, 1 Eriococcidae, 1 Cerococcidae, 7 Coccidae, 31 Diaspididae, 1 Eriococcidae, 2 Margarodidae, 1 Ortheziidae, 1 Phoenicococcidae, and 2 Pseudococcidae, of which three species *Duplachionaspis noaee* (Hall) (Diaspididae), *Gueriniella serratulae* (Fabricius) (Margarodidae) and *Rhizopulvinaria turkestanica* (Archangelskaya) (Coccidae) are new records for the Iranian fauna. These species occur on the pastures.

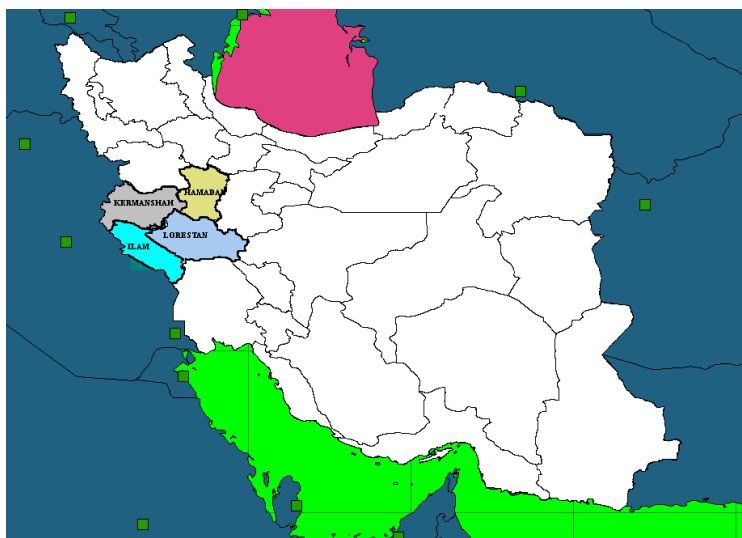


Fig. 1- The position of the central Zagros provinces of Iran

Among 39 scale insect species which occur on the forest trees and in pastures, *Puto pilosellae*, *Melanaspis inopinata*, *M. louristanus*, *Asterodiaspis quercicola* and *Orthezia urticae* have the wide and out of distribution and 14 scale insect species occur in orchards and crops fields, *Lepidosaphes malicola* and *Chlidaspis asiatica* are the most common species.

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Bodenheimer (1944) believed all northern and central parts of Iran belong to the Irano-Turanian region and the extreme south to the Saharo-Sindian region. The study of Coccoidea from the central Zagros region supports Bodenheimer's approach. The following 13 species among 48 species occur only in Irano-Turanian region: *Acanthomytilus kurdicus*, *Chlidaspis asiatica*, *Diaspidiotus baiati*, *D. prunorum*, *Dynaspidotus amygdalicola*, *Lepidosaphes pistaciae*, *Melanaspis louristanus*, *Salicicola davatchii*, *S. kermanensis*, *Exaeretopus tritici*, *Rhizopulvinaria turkestanica*, *Puto pilosellae* and *Porphyrophora tritici* of which only *C. asiatica*, *D. prunorum* and *S. kermanensis* are reported from the other areas of Iran. No purely Mediterranean species are so far recorded, but 10 species exist in both Mediterranean and Irano-Turanian regions: *Chionaspis etrusca*, *Diaspidiotus ceconii*, *Duplachionaspis noaeae*, *Koroneaspis aegilopos*, *Leucaspis riccae*, *Melanaspis inopinata*, *Salicicola archangelskaya*, *Bodenheimera rachelae*, *Cerococcus longipilosus*, *Gueriniella serratulae*. The species *Parlagena mckenziei*, *Parlagena remaudierei*, *Targionia haloxyloii*, and *Phoenicococcus marlatti* are only found on Ilam province (Mehran) and Kermanshah province (Ghasre-e Shirin).

This paper provides the initial study of the scale insects of Zagros provinces of Ilam, Lorestan, Hamadan and Kermanshah fauna. This ongoing study of the superfamily Coccoidea will cover other provinces in this region to improve our knowledge of the scale insects fauna of Zagros Mountains.

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