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Research Article

Status of ladybirds (Coleoptera:Coccinellidae) in Khatam County (Yazd Province) and the first report of *Hyperaspis reppensis* (Herbst, 1783) for Iranian fauna

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ABSTRACT: An extensive survey of predatory coccinellid beetles (Coleoptera: Coccinellidae) was conducted in the Khatam County, Iran, over a period of six months (April–September, 2013). In this study, a total of 13 species belonging to nine genera of ladybirds were collected and identified, among them, *Hyperaspis reppensis* (Herbst, 1783) is a new record from Iran. Samples were collected and identified using a valid key by characteristics of their appearance and their genitalia.

KEY WORDS: First record, *Hyperaspis reppensis*, Iran, Coccinellidae

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INTRODUCTION

The family Coccinellidae, commonly known as ladybirds and ladybugs, are the best known beneficial insects (William, 2002). The Coccinellidae belong to the superfamily Cucujoidea and the Coleoptera suborder Polyphaga (Kovár˘, 1996; Hunt *et al*., 2007). They are present in diverse habitats and range widely from stenotopic to eurytopic species. Most ladybirds possess a dotted pattern, although the number, shape, and size of the spots, as well as their colour, vary considerably. Ladybirds have varied diet: they are mainly predators but there is also a group of phytophagous that causes damage to economically important crops (Shaefer, 1983). Potential role of coccinellids in managing the pest have been reported by several authors (Smirnoff, 1956; Iperti, 1971; Quilici, 1981; Obrycki and King, 1998; Magro and Hemptinne, 1999; Michaud, 2004). Coccinellidae consists approximately 4,200 species; of which 90% are considered beneficial predators (Iperti, 1999) and this number is actually much that is roughly over 6000 (Canepari, 2009). The first success of biological control was related to the use of the ladybird vedalia, *Rodolia cardinalis* (Mulsant) against fluted scale, *Icerya purchasi* Maskell (Hemiptera: Margarodidae) in the orange farms of California, in 1880 (Caltagirone and Doutt, 1989). Falling in this line are other successful control, involving coccidophagous ladybirds (Dixon and Kindlmann, 1998). First use of Coccinellidae for pest control in Iran, in 1310 was related to the use of *R. cardinalis* against *I. purchasi* Maskell. Iranian ladybirds were listed by by Duverger, (1983). Naeem in 1971 published a list of the ladybirds of Iran (Sadeghi, 1991). Ladybird fauna from different regions of Iran have been subsequently documented (Fatemi, 1983; Sadeghi, 1991; Montazeri and Mosadegh, 1995; Haji zade *et al.*, 2001; Yaghmaei and Kharazi Pakdel, 1995; Farahi and Sadeghi Namghi, 2009; Ansaripor and Shakarami, 2011, Zare Khormizi *et al.*, 2013). An inventory of natural enemies is necessary to chalkout an integrated pest management program, and this work serves to improve IPM on pests in crops and orchards in Iran. We present here the results of our surveys for lady beetles in Khatam County, Iran.

MATERIAL AND METHODS

Samples collected

Khatam County is in Yazd Province in Iran with Herat as its capital. The county is subdivided into two districts: the Central and Marvast District. The county has two cities: Herat and Marvast. majority of the County is under forest cover. Pistachio forests " Baghe shadi ," and jungle peanuts " Chenarnaz " are the vegetation of this region.

Sampling for ladybird beetles were done from April to September of 2013, from farms, agricultural land, gardens and jungle within and around the city of Khatam at weekly

intervals. Geographical coordinates of the study area was fixed using a GPS device**.** Information on the names of the tree and shrub varieties from which the samples were taken. Samples were collected from within cultivated fields, with insect nets or by hand directly from the plant or from the surface of the farm land. Samples were also collected from gardens, trees and shrubs on a glazed tray by hitting several branches and an aspirator was used to collect the fallen specimens of ladybirds.

MAINTENANCE AND IDENTIFICATION OF SAMPLES

Adult insects collected from various habitats were killed with ethyl acetate and preserved in 70% alcohol. The genitalia were mounted on permanent slides for identification. Each specimen was tagged with the information about host plants, locality, and date. Samples were catalogued using valid keys (Hodek, 1973, 1967; Gordon, 1985) and a team of internal and external experts assisted in the sex determination of the insects and then species were identified and described. Some species were identified and confirmed by Dr. Claudio Canepari in Italy.

RESULTS

Totally, 13 species belonging to 9 genera in four tribes and one subfamily were recorded. Of these, three species are new to Yazd province and one is new to Iran.

Subfamily Coccinellinae Latreille

Tribe Coccinellini Latreille

***Coccinella undecimpunctata* Linnaeus**

Length 4.0–5.0 mm. More elongate and less convex than any other species of *Coccinella*. Head black with 2 well separated pale spots; pronotum with anterior margin black at middle, ventral pale spot large, extending posteriorly nearly as far as dorsal spot; elytron usually with 5 black spots and a small scutellar spot (Gordon, 1985). This species was also collected from Herat city on peach.

***Adalia bipunctata* (Linnaeus 1758)**

Length 3.50–5.20 mm, width 2.80–4.0 mm. Dorsal color pattern highly variable (Gordon, 1985). This species was also collected from Marvast city on almond.

***Adalia decempunctata* (Linnaeus 1758)**

Length 3.5–5 mm, width 2.6 to 3.5 mm. Elytral pattern variable , common form light red with ten black spots. The samples was also collected from Marvast city on almond.

***Hippodamia variegata* (Goeze)**

Length 3.60–5.00 mm, width 2.50–3.40mm.Head yellow; pronotum black, with variable maculae, sometimes with convergent spots, (Iablokoff-Khnzorian, 1982). This species was collected from Herat and Marvast sites on almond.

***Oenopia conglobata* (Linnaeus 1758)**

Length 3.3–4 mm, width 2.43 mm. Dorsal side light pinkish pronotum usually with 7 dark spots elytron with 8 dark spots. The samples were also collected from Marvast city on almond.

***Oenopia oncina* (Olivier)**

Length 3.10–4.20, width 2.70–3.20 mm; form oval, convex. Head black, labrum, antenna, mouthparts yellow; pronotum black, anterior margin and anterolateral angles yellow; elytron yellow with black spots (Khnzorian, 1979) . This species was also collected from Herat city on pistachio.

Tribe Chilocorini Mulsant, 1846

***Chilocorus bipustulatus* (Linnaeus 1758)**

Length 3–3.5 mm, width 2.7–3 mm. Ground colour light to dark brown with narrow, irregular band of 3 partially connected spots. This species was also collected from Marvast city on almond.

***Exochomus nigripennis* (Erichson)**

Length 3.0–4.0mm, width 2.50–3.40 mm. Form oval, convex; dorsal surface shiny and glabrous. Head black; mouthparts, antennae and legs yellow; pronotum yellow; elytron black (Fursch, 1979). This species was also collected from Herat city on pistachio.

Tribe Coccidulini Mulsant, 1846

***Scymnus syriacus* (Marseul 1868)**

Length 1.65–2.30mm, width 1.15–1.60mm. Elytra light to dark brown with one black spot on middle of elytron with yellow surroundings. Dorsal surface with bright pubescence. Postcoxal line on 1st abdominal ventrite complete, recurved, extending to base of first ventrite. The samples were also collected from Marvast city on almond.

***Scymnus (Pullus) subvillosus* (Goeze, 1777)**

Length 2 mm, width 1.4 mm. Elytra dark brown with 4 reddish brown spots, pronotum reddish brown at apex. Dorsal surface with bright pubescence. Postcoxal line on 1st abdominal ventrite complete, recurved, extending to base.

This species has been reported throughout Europe (except North), North Africa, Middle East, Siberia and the Afrotropical Region (Canepari, 2011). This species was also collected from Herat site on peach.

***Stethorus* Weise, 1885**

***Stethorus gilvifrons* (Mulsant 1850)**

Various species of the genus *Stethorus* Weise, commonly known as acarophagous ladybird beetles, are predators of agricultural crop pests and significantly contribute to the control of spider mite pests (Roy *et al*., 2003; Gotoh *et al*., 2004). The species *Stethorus gilvifrons* Mulsant is one of the two recorded Iranian *Stethorus* species (Modares Awal, 2001; Mossadegh & Kocheili, 2003) which is found in sugarcane and castor bean fields as well as date palm and apple orchards (Hajizadeh, 1995; Kajbaf Vala, 1999; Modares Awal, 2001; Afshari, 1998), where it successfully controls various spider mites (Chazeau, 1985; Obrycki and Kring, 1998). This species has been reported in Mediterranean Region, Middle East, Saudi Arabia, Pakistan (Baluchestan, Punjab, Lyallpur), Kashmir, India and Oriental Region. This species, like most members of the genus, is predatory on mites of the family Tetranychidae (Canepari, 2011). This species was collected from Herat city on wild almond and collected from Marvast city on almond.

Tribe Hyperaspini Mulsant, 1846

***Hyperaspis reppensis* (Herbst, 1783)**

Three specimens of this species were collected and identified by Dr Claudio Canepari (Fig. 1). Length 3.1–3.9 mm. This species has been reported from South and Central Europe, North Africa, Syria and Caucasus. *H. reppensis* lives on calcareous and semi-arid grasslands and at sun-exposed edges of forests. This species is a predator of various scale insects. This is the first time this ladybird has been collected and reported in Khatam county. The geographical location of the collection site 29°48.13'N 54°08.38'E at an altitude of 2156 m. This species was also collected from Herat city on wild almond (Fig. 2).

Fig. 1. Dorsal habitus of *Hyperaspis reppensis* (original)

***Hyperaspis quadrimaculata* (Redtenbacher)**

This ladybird has a length of 3.0–3.5 mm and a width of 2.0–2.4 mm. Elytra shiny black, with two red spots on each elytron. The first red marking is at the central and second is toward the eleytron of elytra. This species was also collected from the Herat site on Spiny Atraphaxis.

DISCUSSION

In this study, 13 species of ladybirds were documented from Khatam county. Four of these, namely, *Scymnus* (Pullus) *subvillosus, Hyperaspis reppensis, Hyperaspis quadrimaculata* and *Stethorus gilvifrons* are new to Yazd province and *H. reppensis* is new to the fauna of Iran. The results are similar to those recorded by Zare Khormizi et al (2013).

H. reppensis has a wide distribution range in Palaearctic and Ethiopian regions. This species has been reported in Hungary (Papp, 1938), Poland (Burakowski *et al*., 1986), Georgia (Merkviladze, 1985), Turkey (Kreissl, 1980), Latvia (Seidlitz, 1872), Morocco (Chrif Smaili *et al*., 2010), Russia and West Europe (Yakobson, 1905), Czech Republic, Germany (Canepari *et al*, 1985), Portugal, England, Spain, Italy, and Holland.

Lady beetles of genus *Hyperaspis* Redtenbacher 1844 (10 species) are species-rich in Iran (Jafari *et al*., 2013). Adults and larvae of *Hyperaspis* are predators of scale insects and mealybugs (Homoptera: Coccoidea) (McClanahan 1970; Booth *et al*. 1995; Stäubli Dreyer *et al*., 1997; Vandenberg 2002). Some larvae burrow into the egg sacks of female scales and approach a parasitic mode of existence (Vandenberg 2002).

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