

Identification of Coccinellid and *Orius* Species in Isfahan Maize Fields

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ABSTRACT

The aim of this investigation was to studies *Orius wolff* (Het. Anthocoridae) and Coccinellidae species present in localities in Isfahan region, Iran. Samples were taken from Corn fields and the material screened in laboratory. External characters plus characters of the male and female genitalia were used in order to giagnose *Orius* and Coccinellidae species. Five *Orius* species were sampled on Corns: *Orius albidipennis*, *O. niger niger*, *O. niger aegyptiacus*, *Orius vicinus*, *Orius horvathi*, *O. horvathi* were reported for the first time in Isfahan, Iran. Coccinellids species were identified on maize and collected as following: *Coccinella septempunctata*, *Coccinella undecimpunctata*, *Hipodamia variegata*, *Oenopia conglobata*, *Propylea quatuordecimpunctata*; *Hyperaspis syriaca*. Identification of insect species with biological control potential has important role in their use for the production of healthy crops.

Keywords: Coccinellid; *Orius*; predators; Corn. Biological control

INTRODUCTION

The genus *Orius* Wolff, belonging to the family Anthocoridae, comprises about 70 species distributed throughout all zoogeographical regions. (Crossley *et al.*, 2021). These species are generalist predators able to suppress pest population and some species have been studied in detail because of their efficiency in controlling Thrips (Thysanoptera) on different crop (Bosco and Tavella, 2008)., in a review of *Orius*, mentioned several species of *Orius* including *Orius albidipennis*, *Orius insidiosus*, *Orius laevigatus*, *Orius majusculus*, *Orius minutus*, *Orius niger* and *Orius tristicolor* were used for biocontrol of *Frankliniella occidentalis* and *Thrips tabaci* Lind, (Riudavets, 1995). Other species such as *Orius limbatus* used on *F. occidentalis* in the Canary Islands (Carnero *et al.* 1993), *Orius sauteri* (Poppius), *Orius strigicolis* (Poppius) and *Orius tantillus* (Motschlsky) used on *Thrips palmi* in Japan (Yano, 1999).

An Anthocoridae of Iran were catalogued by Ghahari *et al.* (2009) including an extensive reference list. The Coccinellidae are generally considered useful insects, because many species feed pests, which are pests in gardens, agricultural fields, orchards, and similar places. Within the colonies of such plant-eating pests, they will lay hundreds of eggs, and when these hatch the larvae will commence feeding immediately (Crossley *et al.*, 2021). Ladybirds are also widely recognized for their role in biological ecosystems (Gordon, 1985). They are environmentally beneficial and have been used in different parts of the world to control pests such as aphids, mealybugs, thrips and mites (Spear *et al.*, 2021). Linnaeus, in the mid-seventeenth century AD, was the first person to classify groups of animals and plants, and it was then that this category of ladybird was first classified (Lundin *et al.*, 2019). Ladybird species were studied in the Himalayas and Nepal, by Canepari, (1997), eastern Russia by Kuznetsov, (1997), Poona and Kashmir regions of Pakistan by Inayatullah *et al.*, (2005), Iran by Sadeghi, 1991; Montazeri and Mosadegh (1995); Hajizade *et al.* (2001), Yaghmaei and Pakdel (1995); Farahi and Namghi (2009); Ansari pour and Shakarami (2011).

This research in to *Orius* and Coccinellidae species of the corn fields of the Isfahan region, aims to identify various species and to pave the way for more extensive future research in the field.

MATERIALS AND METHODS

The specimens were collected in various cultivated corns by sweeping, aspirator, beating tray in North Baraan, South Baraan, Kararag, Rehnan, Gey and ghohab, Garghoye olia, Garghoye sofla, Varzane, Eslam abad and Kohpaye in Isfahan nearly middle of Iran in 2017 summer. Transparent plastic bags were utilized for the collection of the insects, in which plants or parts of plants to be sampled were placed. The predators were stored in flasks containing 70% alcohol for preservation and identification based on patterns of the wings, body and male and female genitalia which, according to some authors, are the most reliable structures for taxonomic determination (Kelton 1963; Herring 1966; Diepenbrock and Finke, 201; Prescott and Andow, 2016)

The *Orius* male abdomen was removed, macerated in 10% KOH, and boiled in a water bath for approximately 20 min. afterwards, transferred to a watch glass with distilled water where the removal of the genitalia was carried out with the use of very fine entomological stylets. The genitalia were placed in clove oil, where remained for 15 min. and they were subsequently mounted on slides with Hoyers solution and sealed with varnish. The female genitalia were prepared following the methodology given by Hadi Ostovan (personal communication), whom recommended the genital pore (abdominal sternit VIII) as a reliable structure for female identification. Abdominal sternit VIII can be mounted on a slide and observed after preparation of the abdomen with a clearing solution. Specialists confirmed the species, in Islamic Azad University, Science and Research Branch of Fars and Agriculture and Natural Resources Research Center of Isfahan Province, Iran. Illustrations of the body and genitalia of both sexes are also given (Honek *et al.*, 2016).

The morphological characters of each Coccinellidae species were carefully studied under stereomicroscope; also, the slides of body parts and male and female genitalia were prepared. The body parts and genitalia were drawn using a drawing tube and under a stereomicroscope. The beetles were identified to the species level with the help of available keys (Chapin, 1965; Leeper, 1976; Gordon, 1985; Pope, 1988; Fürsch, 1981; Majerus and Kearns, 1989).

RESULTS AND DISCUSSION

In this study, a total of 11 species of ladybirds and *Orius* species were collected from the corn fields and identified. They were from different parts of the Isfahan region. Descriptions of some important characteristics of the morphologies of them are identified below:

Orius albedipennis: Length 1.7-2mm. Black. 1st antennal segment black, 2nd yellowish, 3rd and 4th segments embrowned. Hemelytra pale yellow-brown, sometimes embrowned; membrane hyaline immaculate. Legs yellowish. Hind femora and tibiae, sometimes also other femora, often blackish. Calli of pronotum small. Separated from each other by punctate median band, posterior lobe densely and finely punctate. Extending from Africa to Middle Asia. In steppes and semideserts on numerous herbaceous plants. Such as Asteraceae. Also found on Tamarix. Predator of Thysanoptera (*Thrips tabaci*), Erisomatids (*Rhopalosiphum maidis* Fitch), Lepidoptera (cotton pest *Platydera gossypiella* Saund. and *Spodoptera litura* F.) and Acarina.

Orius niger wolf, 1811: Length 1.7- 2.3 mm. Shiny black. Antennae yellowish, 1st segment black. Hemelytra yellow-brown with cuneus and apical margin of corium black; membrane brownish. Femora and middle and hind tibiae black, fore tibiae and apices of fore femora pale yellowish. Antennae in male incrassate, in female gracile. Posterior lobe of pronotum fine punctate. Holopalaearctic. The most common species in Guilan. On herbaceous plants, especially, Asteraceae such as Artemisia and Matricaria in meadows, gardens and fields. Active predator of Aphids, Thysanoptera and Acarina. Also feeding on eggs of Pentatomidae and Lepidoptera (Spear et al., 2021).

Orius (Heterorius) vicinus (Ribaut, 1923): length 2.1- 2.5 mm. Like the preceding species but posterior lobe of pronotum more finely punctate. Apex of the lamellate portion narrower and more strongly curved, flagellum shorter, and tooth arising distinctly below upper margin of the conical process. Holomediterranean, extending to Central Europe, the Middle East and Central Asia. New to Iran. On several deciduous trees and herbaceous plants such as *Chenopodium*, *Heracleum* and *Mentha*. Predator of Aphids (*Eucallipterus tiliae* L.) and Acarina (*Panonychus ulmi* on apple trees and *Eotetranychus tiliarum* on Tilia). Common in Guilan often at light traps.

Orius (Heterorius) horvathi (Reuter, 1884): Length 2.0- 2.5 mm. Like preceding species. Legs pale or embrowned. Euro-Siberian, recorded from Iran and Azerbaijan. Common on Asteraceae and other herbaceous plants in mountain meadows in Guilan and Ardebil.

O. niger aegyptiacus: Length 1.7-2.3 mm. Shiny black. Antennae yellowish 1st segment black. Hemelytra yellow-brown with cuneus and apical margin of corium black; membrane brownish. Femora and middle and hind tibiae black, fore tibiae and apices of fore femora pale

yellowish .Antennae in male incrassate, in female gracile Posterior lobe of pronotum fine punctuate .Paramer have a one –branchs flagellum ,black in the base.

Several species of coccinellids recognized as following:

Coccinella septempunctata Linnaeus, 1758: Length 5.3 to 7.6 mm, width 4 to 5.1 mm. Elytra red with 6 black spots and scutellar spot . Prosternal keels diverging to the front. Male genitalia with club shape siphonal capsule.

Coccinella undecimpunctata Linnaeus, 1758: Length 3.5 to 5 mm, width 3.2 to 4 mm. Elytra red with 10 black spots . Prosternal keels parallel to the front.

Hippodamia variegata (Goeze, 1777): Length 4.4 to 5 mm, width 3 to 3.25 mm. color and pattern of the elytra varied. Male genitalia with flat trabes, fovea at apex; siphon with membranous process at apex. Remarks: In most collected samples of this species, elytra were red with 6 black spots in addition to scutellar spot.

Oenopia conglobata (Linnaeus, 1758): Length 3.3 to 4 mm, width 2.4 to 3 mm. Male genitalia with triangular siphon at apex. Female genitalia with apically divided basal lobe. Remarks: Coloration of elytra in this species was cream in plane areas and pink in mountainous areas with 8 black spots.

Propylea quatuordecimpunctata (Mulsant 1846): length of 3.2–4.5 mm. The elytra are yellow with 14 black spots. Other areas where this ladybird has been reported are cited by (Montazeri and Mossadegh, 1995), in ChaharMahal and Bakhtiari (Bagheri and Mossadegh, 1995), in Mashhad (Yaghmae and KharaziPakdel, 1995), Gilan (Haji Zade et al., 2001), Lorestan province (Jafari and Kamali, 2007, Ansari pour and Shakarami, 2011), Khorasan (Farahi and Sadeghi namghi, 2009) and in Golestan (Afshari, 2010).

Hyperaspis syriaca Weise: Length 2.7 to 3 mm, width 1.9 to 2.1 mm. Dorsal surface glabrous. Elytra black with 2 spots on corners, Pronotum black except yellowish with 2 spot on anterior margin.

In conclusion, various populations of ladybugs and *Orius* species were isolated and identified in Isfahan corn fields, which can be used as potential for biological control of pests in these fields.

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