Lady beetles (Coleoptera: Coccinellidae) of Iranian cotton fields and surrounding grasslands

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ABSTRACT: Lady beetles (Coleoptera: Coccinellidae) are one of the powerful and dominant predators in cotton fields and also other agroecosystems. The fauna of these beneficial insects was studied in cotton fields and surrounding grasslands of Iran through 2000-2006. Totally, 40 species from 17 genera (including Adalia, Anisosticta, Brumus, Chilocorus, Clitostethus, Coccinella, Cryptolaemus, Delphastus, Exochomus, Hippodamia, Nephaspis, Nephus, Oenopia, Propylea, Rodolia, Scymnus and Stethorus) were collected from different regions of Iran.

KEY WORDS: Coccinellidae, cotton fields, fauna, Iran

INTRODUCTION

Cotton fields are one of the agroecosystems with interesting biodiversity (Alabama Cooperative Extension Service, 1999). Several insect pests, especially in orders Hemiptera, Coleoptera and Lepidoptera damage different parts of cotton plant all through the crop season and cause crop loss (Williams et al., 2000). There are diverse natural enemies (predators and parasitoids) in cotton fields which decrease the pests' population density and crop loss (Ghahari et al., 2008). One of these groups of beneficial insects which have efficient role in pest control in cotton fields all over the world, are lady beetles (Coleoptera: Coccinellidae) (Obrycki and Kring, 1998; Ghahari and Ostovan, 2006). Lady beetle fauna of cotton fields is very diverse in different regions of the world (Ellis and Bradley, 1992; Ellsworth et al., 1994).

Predaceous coccinellids are linked to biological control more often than any other taxa of predatory organisms. The beneficial status of these organisms has a rich history that is recognized by the general public and biological control practitioners alike (Hussey and Scopes, 1985; Dixon, 2000). The lady beetles are important natural enemies of pest species, especially whiteflies, aphids, mealybugs, scales and mites (Obrycki and Kring, 1998). The role of naturally occurring Coccinellidae in suppressing pest populations is significant but poorly documented in many pest management programs that purport to conserve natural enemies (Hodek and Honek, 1996). The causes for the relatively low rates of establishment of coccinellids in importation biological control have not been examined for most species (Cooper and Crenshaw, 1999). Augmentative releases of several coccinellid species are well documented and effective; however, ineffective species continue to be used due to ease of collection. For most agricultural systems, conservation techniques for Coccinellidae are lacking, even though they are abundant in these habitats. Evaluation techniques are available but quantitative assessment of the efficacy of coccinellids has not been done for most species in most agricultural crops. Greater emphasis is needed on evaluation of community–level interactions to maximize the use of coccinellids in biological control (Nechols et al., 1996; Obrycki and Kring, 1998).

Although many studies have been conducted on Iranian Coccinellidae (Modarres Awal, 1997), the fauna of these beneficial and important insects in biological control and IPM programs studied in recent years. The lone work on the coccinellid fauna of Iranian cotton fields was conducted by Ghahari and Ostovan (2006) in Mazandaran and Golestan Provinces. In the present paper, the fauna of Coccinellidae from most Iranian cotton fields is discussed.
MATERIALS AND METHODS

Faunistic surveys on Coccinellidae of Iranian cotton fields were carried out in major cotton growing regions in Iran. Totally 8 provinces including Golestan, Mazandaran, Tehran, Semnan, Fars, Khorasan, East Azarbayjan and Ardabil, and 21 localities including, Kordkoy, Nokandeh, Salikandeh, Gorgan, Gonbad, Ali-Abad, Azadshahr, Ramian, Aghghala, Minoodasht, Bandar-Torkman of Golestan province, Ghaemshahr, Sari, Neka, Behshahr, Galogah of Mazandaran province, Varamin of Tehran province, Garmsar of Semnan province, Darab of Fars province, Kashmar of Khorasan province, Arasbaran of East Azarbayjan province, and Dashte-Mogh an of Ardabil province were sampled. The materials were collected mainly by a sweepnet and aspirator. The lady birds were collected from the cotton fields and surrounding grasslands for seven crop seasons (2000–2006). In addition to the collected specimens by the authors, several other collected specimens by many researchers and amateur students were and insect collections of some universities including, Ardabil, Damghan, Ghaemshahr, Shahre Rey and Varamin Islamic Azad Universities, Tehran and Fars Science & Research Branches were used for this research. The information concerning specific name, authority, locality and date of collection, and number of species (in brackets) is given for the species studied.. In this paper, classification and nomenclature suggested by Majerus & Kerans (1989) and Majerus (1994) have been followed.

RESULTS AND DISCUSSION

In all, 40 lady beetle species from 17 genera were collected from Iranian cotton fields and surrounding grasslands. The list of species is given below.

Adalia bipunctata (L.)

Adalia decempunctata (L.)

Anisostica bitriangularis Say

Brumus octostignatus Gebler

Brumus undecempunctata L.

Chilocorus bipustulatus (L.)

Chilocorus stigma Say

Clitostethus arcuatus (Rossi)

Coccinella hieroglyphica (L.)

Coccinella monticola Mulsant

Coccinella septempunctata L.

Coccinella trifasciata subversa Le Conte
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*Coccinella undecimpunctata* L.

*Cryptolaemus montrouzieri* Mulsant

*Delphastus pusillus* (LeConte)

*Exochomus flavipes* (Thunb.)

*Exochomus nigromaculatus* (Goeze)

*Exochomus nigripennis* (Erichson)

*Exochomus pubescens* Kuster

*Exochomus quadripustulatus* (L.)


*Hippodamia convergens* Guérin-Méneville

*Hippodamia variegata* (Goeze)

*Nephasis oculatus* (Blatchley)

*Nephus biguttatus* Mulsant

*Nephus bipunctatus* (Kugelann)

*Oenopia conglobata* (L.)

*Oenopia conglobata contaminata* Menetries

*Propylea quatuordecimpunctata* (L.)

*Rodolia fausti* Weise

*Scymnus apetzi* Mulsant

*Scymnus ararticus* Khnizorian
**Scymnus flavicollis** (Redtenbacher)

**Scymnus frontalis** (Fabricius)

**Scymnus levaillanti** Mulsant

**Scymnus pallipes** (Mulsant)

**Scymnus subvillosus** (Goeze)

**Scymnus syriacus** (Marseul)

**Stethorus gilvifrons** (Mulsant)

**Stethorus nigripens** Kapur

**Stethorus punctillum** Weise

The results of this research indicate that there is a diverse fauna of Coccinellidae in the cotton fields of Iran. Of the collected species, 5 species including *Adalia bipunctata*, *Chilocorus bipustulatus*, *Coccinella septempunctata*, *Exochomus flavipes*, and *Exochomus pubescens* are the most common and abundant species in nearly all the Iranian cotton fields. The three genera *Scymnus*, *Exochomus* and *Coccinella* with 8, 6, and 5 species, respectively, are more diverse than others in Iranian cotton fields.

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