Entomology, Ornithology & Herpetology:
Current Research

Biranvand and Shakarami, Entomol Ornithol Herpetol 2014, 4:1
DOI: 10.4172/2161-0983.1000142

Research Article Open Access

First Report of 18 Morphs of *Hippodamia variegata* Goeze (Col.: Coccinellidae) In Iran

Amir Biranvand[1]* and Jahanshir Shakarami[2]

[1]*Department of Entomology, College of Agricultural Sciences, Shiraz Branch, Islamic Azad University, Shiraz, Iran*
[2]*Plant Protection Department, Lorestan University, Agricultural faculty, Khorramabad, Iran*

Abstract

Color pattern variation of the elytra and pronotum in *Hippodamia vareigata* Goeze (Col.: Coccinellidae) was studied during 2012-2013 in Chegeni region (Lorestan province, Iran), which resulted in the collection of a total of 500 individuals. Adult specimens were collected by sweeping net and by hand and identified based on their morphological appearance and male genitalia. Different morph of *H. vareigata* was separated based on morphological characteristics such as color, pattern and number and size of spots on elytra and pronotum. Results showed that, *H. vareigata* has different color morphs and show great variation of pattern. A total of 18 different morphs of *H. vareigata* were collected and identified as follows:1- Elytra red, with 11 black spots (three morphs with different patterns), 2- Elytra red, with 13 black spots (three morphs with different patterns), 3- Elytra red and orange, with 7 black spots (three morphs with different patterns), 4- Elytra red and orange, with 9 black spots (five morphs with different patterns), 5- Elytra red, with 5 black spots, 6- Elytra red, with 15 black spots, 7- Elytra red, with 1 black spot, 8- Elytra red, with 9- black spots and 1 black stripe.

Keywords: Lady Bird beetle; Taxonomy; Polymorphism; Lorestan; Iran

Introduction

Among different type of polymorphism, color polymorphism provides one of the best characterized examples of functionally and ecologically important polymorphisms. In many animal groups, color polymorphism differentially affects the adaptations of the individuals in the populations. Warning coloration is considered as an important factor against natural enemies in many animals [1].

Some color morphs in species may be more cryptic than other morphs and therefore becoming harder for predators to locate them visually. Examples of these cryptic morphs to reduce the risk of predators have been reported in vertebrates and invertebrates [2,3].

Polymorphism have been reported in different groups of insect such as dragonflies [4,5], aphids [6,7], Diptera [8-10], Lepidoptera [11], ants [12], bees [13], coccinellids [14-17].

Lady bird beetles are voracious familiar predators of aphids, scale insects, and many other pests in orchards, farmlands and pastures [18,19]. Some of lady bird beetles have brightly colored and these colors are a warning signal to their natural enemies. This signal is addressed to optically orienting predators [20]. The lady beetles have dotted patterns, which these patterns are differently in different individuals. Most common colors used by insects to discourage predators from attacking them are bright red, orange, and yellow [21]. Dolenska [22] suggested that lady bird beetles with a spotted pattern were attacked less frequently than unspotted ones and when they had removed elytra.

Hippodamia variegata Goeze has a wide distribution range in the Palearctic and extends to Nearctic areas [23]. This species is widespread in Iran and usually undergo 2-3 generations per year [24-30]. This predator is associated with diverse herbaceous plants [31]. Under suitable conditions of temperature and food supply this predator is active year around and otherwise overwinters as adult [32]. Hence, *H. variegata* has important role in control of crop pests such as aphids. The purpose of the present study was to investigate the color polymorphism of *H. variegate* in Chegini regions, Lorestan province, Iran.

Materials and Methods

The Collection of specimens was conducted from various regions of Chegini region, Lorestan province, Iran. Different morphs of *H. variegate* were collected from five localities including: Shorab, Sarab Doreh, Kashkan and Viesian (Situated between 31° 32' to 31° 40' N and 48° 02' to 54° 26' E).

Each locality was repeatedly sampled throughout 16 month (from April, 2012 to August, 2013). Specimens were collected from agricultural and non-agricultural landscapes. Adult specimens were collected with a standard sweeping net and by hand. Insects were killed in a cyanide bottle. In order to preserve quality including appearance and color as well as image quality samples were kept inside the closed bottles at sub-zero temperatures. Specimens were identified to species level with the help of available literature and characteristics of male genitalia (Figure 1).

Different morphs were identified based on morphological characteristics including color and spots on dorsal surface of the elytra and pronotum.

Results

Results showed that *H. variegata* was found at all five sampling localities in Chegini region (Lorestan province, Iran). A total of 500 specimens were collected from five sites and 18 morphs of *H. variegata* were identified. Results showed that in all 18 collected morphs a black spot is located in the middle of scutellum.

***Corresponding author:** Amir Biranvand, Department of Entomology, College of Agricultural Sciences, Shiraz Branch, Islamic Azad University, Shiraz, Iran, Tel: +982147911; E-mail: amir.beiran@gmail.com

Received September 08, 2014; **Accepted** December 29, 2014; **Published** December 31, 2014

Citation: Biranvand A, Shakarami J (2014) First Report of 18 Morphs of *Hippodamia variegata* Goeze (Col.: Coccinellidae) In Iran. Entomol Ornithol Herpetol 4: 142. doi:10.4172/2161-0983.1000142

Figure 1: Distinctive characters of *Hippodamia vareigata* Goeze: 1. maxillary palpus securiform, 2. Antenna long (11-segmented), 3. mandible bifid at apex, 4. Tarsus cryptotetramerous and each tarsal claw cleft near apica, 5. Tegmen in ventral view 6. Sipho, 7. Ist abdominal sternum.

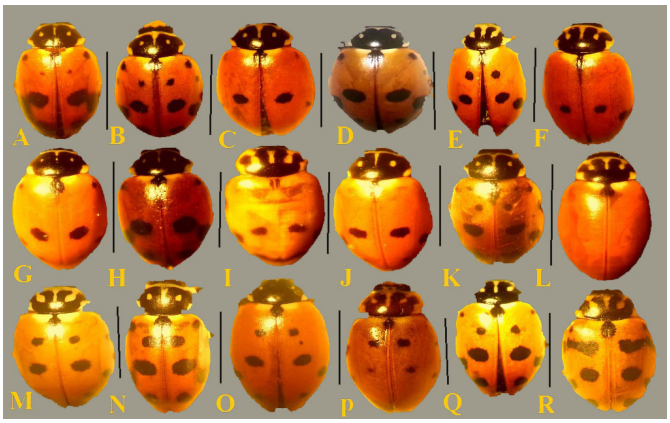

Figure 2: Different morphs of *H. variegata* in Chegeni region, Lorestan province, Iran.

Different morphs of *H.* variegata are as follows:

Elytra red, with 11 black spots (Figure 2A); Elytra red, with 13 black spots (Figure 2A and 2B); Elytra red with 7 black spots (Figure 2A and 2C); Elytra red, with 11 black spots (Figure 2D); Elytra are red with 9 black spots (Figure 2E); Elytra are red with 5 black spots (Figure 2F); Elytra are orange with 9 black spots (Figure 2G); Elytra are red with 9 black spots (Figure 2H); Elytra orange, 7 black spots (Figure 2I); Elytra are red with 7 black spots (Figure 2J); Elytra are red with 15 black spots (Figure 2K); Elytra are red with one black spot (Figure 2L); Elytra are red with 11 black spots (Figure 2M); Elytra are red with 13 black spots (Figure 2N); Elytra red to orange, 9 black spots (Figure 2O); Elytra are red with 9 Black-spotted (Figure 2P); Elytra are red with 13 black spots (Figure 2Q); 3.18. Elytra are red with 9 black spots and 1 black stripe (Figure 2R).

Discussion

The color pattern of the elytra and of the pronotum is very widely variable in many species of lady bird beetles. Morphs of lady bird beetles have different appearance such as number, size, color and pattern of spots on elytra and pronotum. In most cases the occurrence of morphs appears to be associated with climatic factors, industrial pollution and, possibly, visual predation [33]. Polymorphism of several coccinellids, such as *Adalia bipunctata* (L.) and *A. decempunctata* (L.) has been studied [34,35]. Zare [17] reported that 17 different morphs of *A. bipunctata* in Mehriz region of Yazd province, Iran.

The variegated lady birde beetle, *H. variegata* has been reported as an important natural enemy to at least 12 different aphid species. This species is widespread in the world and can be used as an important biological agent for control of pests. The present study is an attempt to identify different morphs of *H. variegata* in Lorestan province, Iran. Although genetic studies can provide important information for identify different morphs of one species.

References

1. Komárek S (2003) Mimicry, aposematism and related phenomena: mimetism in nature and the history of its study. München: Lincom.
2. Hoekstra HE, Nachman MW (2003) Different genes underlie adaptive melanism in different populations of rock pocket mice. Molecular Ecology 12: 1185-1194.
3. Petranka JA, Rushlow W, Hopey ME (1998) Predation by tadpoles of Rana sylvatica on embryos of Ambystoma maculatum: implications of ecological role reversals by Rana (predator) and Ambystoma (prey). Herpetologica 54: 1-13.
4. Cordero A (1990) The inheritance of female polymorphism in the damselfly Ischnura elegans (Zygoptera: Coenagrionidae). Heredity 64: 341-346.
5. Andres JA, Cordero A (1999) The inheritance of female color morphs in the damselfly Ceriagrion tenellum (Odonata, Coenagrionidae). Heredity 82: 328-335.
6. Weber G (1985) On the ecological genetics of Sitobion avenae (F.) (Hemiptera, Aphididae). Zeitschrift fur Angewandte Entomologie 100: 100-110.
7. Tomiuk J, Wohrmann K, Bohm I, Stamp J (1990) Variability of quantitative characters and enzyme loci in rose aphid populations. Entomologist 109: 84-92.
8. Matena J (1995) Polymorphism of Chironomus plumosus (Diptera: Chironomidae) males from a temperature fish-pond population. European journal of entomology 92: 699-703.
9. Rohacek J, Barber KN (2005) Revison of the new world species of Stiphrosoma czerny (Diptera: Anthomyzidae). Beiträge zur Entomologie 55: 1-107.
10. Schonrogge K, Gardner MG, Elmes GW, Napper EKV, Simcox DJ, et al. (2006) Host propagation permits extreme local adaptation in a social parasite of ants. Ecology Letters 9:1032-1040.
11. Zhang DX (2004) Lepidopteran microsatellite DNA: redundant but promising. Trends in Ecology and Evolution 19: 507-509.
12. Higashi S, Peeters CP (1990) Worker polymorphism and nest structure in Myrmecia brevznoda Forel (Hymenoptera: Formicidae). Australian Journal of Entomology 29: 327-331.
13. Sumer Ercan F, Oztemiz S, Ozcan S, Tuncbilek AS (2012) Detection of genetic polymorphism by RAPD-PCR in two Trichogramma (Hymenoptera: Trichogrammatidae) species in Turkey. Turkiye Entomoloji Dergisi-Turkish 36: 177-182.
14. Jiggins FM, Tinsley MC (2005) An Ancient Mitochondrial Polymorphism in Adalia bipunctata Linked to a Sex-Ratio-Distorting Bacterium. Genetics Society of America 171: 1115-1124.
15. Blehman AV (2007) Variability of pronotum patterns in ladybird beetle Harmonia axyridis Pallas (Coleoptera: Coccinellidae). Ekol Genet 5: 25-36.
16. Michie LJ, Mallard F, Majerus MEN, Jiggins FM (2010) Melanic through nature or nurture: genetic polymorphism and phenotypic plasticity in Harmonia axyridis. Journal of evolutionary biology 23: 1699-1707.
17. Zare M, Jafari R, Dehghan Dehnavi L, Javan S (2012) Polymorphism of Adalia bipunctata Mulsant (Col.: Coccinellidae) in center of Iran. Global Advanced Research Journal of Microbiology 1: 27-32.
18. Hodek I (1973) Biology of Coccinellidae. Czechoslovak Academy of Sciences. Prague pp. 260.

19. Gordon R (1985) The coccinellidae (coleoptera) of America North of Mexico. Journal of the Entomological Research Society 93: 1-912.

20. Edmunds M (1974) Defence in animals. A survey in antipredator defences. Harlow: Longman.

21. Cott HB (1940) Adaptive coloration in animals. Methuen, London.

22. Dolenská M, Nedvěd O, Veselý P, Tesařová M, Fuchs R (2009) What constitutes optical warning signals of ladybirds (Coleoptera: Coccinellidae) towards bird predators: colour, pattern or general look? Biological Journal of the Linnean Society 98: 234-242.

23. Obrycki JJ, Orr CJ (1990) Suitability of three prey species for Nearctic populations of Coccinella septempunctata, Hippodamia variegata and Propylea quatrodecimpunctata (Coleoptera: Coccinellidae). Journal of Economic Entomology 83: 1292-1297.

24. Sadeghi I (1991) An investigation on the Coccinellidae fauna of alfalfa fields and determination of dominant species at Karaj. M.Sc. thesis. dissertation, Tarbiat modares university, Tehran, pp. 284.

25. Koohpayezadeh N, Mossadegh MS (1991) Some of the ladybirds (Coccinellidae) fauna of Kerman province. In: Proceeding of the 10th plant protection congress of Iran. Kerman, Iran, pp. 64.

26. Yaghmaee F, Kharazi Pakdel A (1995) A faunestic survey of Coccinellids in mashhad region. In: Proceeding of the 12th plant protection congress of Iran Karaj, Iran, pp. 307.

27. Bagheri MR, Mossadegh MS (1995) The faunistic studies of Coccinellidae in Charmahal Bakhtiari province. In: Proceeding of the 12th plant protection congress of Iran, Karaj, Iran, pp. 308 (2-7).

28. Ansari pour A, Shakarami J (2011) Study of ladybirds (Col: Coccinellidae) in Khorramabad district and the first report of Hyperaspis quadrimaculata (Redtenbacher 1844) for Iranian fauna. Life Science Journal 8(3): 488-495.

29. Zare Khormizi M, Biranvand A, Shakarami J (2013) The Faunistic survey of Lady beetles (Coleoptera, Coccinellidae) in The Mehriz Region (Yazad Province), Iran. Bulletin of the Iraq Natural History Museum 12 (4): 43-51.

30. Biranvand A, Jafari R, Zare Khormizi M (2014) Diversity and distribution of Coccinellidae (Coleoptera) in Lorestan Province, Iran. Biodiversity Journal 5 (1): 3-8.

31. Nedved O (1999) Host complexes of predaceous ladybeetles (Col., Coccinellidae). Journal of applied entomology 123: 73-76.

32. Loch A (2004) New ladybird beetle in Australian vineyards. National WinGrape Industry Centre., Charles Sturt University, Locked bag 588, W-agga NSW 2678.

33. Brakfeild PM, Willmer PG (1985) The basis of thermal melanism in the ladybird Adalia bipunctata: Differences in reflectance and thermal properties between the morphs. Heredity 54: 9-14.

34. Hodek I, Honek A (1996) Ecology of Coccinellidae. Kluwer Academic Publishers, Dordrecht pp. 464.

35. Majerus MEN, Zakharov IA (2000) Does thermal melanism maintain melanic polymorphism in the two-spot ladybird Adalia bipunctata (Coleoptera: Coccinellidae). Zhurnal Obshchei Biologii 61: 381-392.