

Research article

New distributional records of the big-eyed bug, *Geocoris tricolor* Fabricius, 1798 (Hemiptera: Lygaeidae) as an important bio-control agent of economic insect pests from Rawalpindi, Islamabad and Murree

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HIGHLIGHTS

- Record of *Geocoris tricolor* Fabricius, 1798
- New distribution of *Geocoris tricolor* Fabricius, 1798
- Morphology and distribution of *Geocoris tricolor* Fabricius, 1798

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Key words

Geocoris tricolor,
Heteroptera,
Predatory bug,
Sucking insect feeder

ABSTRACT

The big-eyed bug, *Geocoris tricolor* Fabricius, 1798 (Hemiptera: Lygaeidae) is recorded for the first time from Rawalpindi, Islamabad and Murree. It was collected in sweep net collection during October and November, 2016. Main taxonomic identification characters, their measurements along with micrographs have been illustrated. It is suggested as an important candidate of biological control for sucking and chewing insect pests for economic crops in Pakistan.

1. Introduction

Main unmistakable characters of wide head with big eyes centres the subfamily Geocorinae (or family

Geocoridaesensu Henry, 1997), a well-defined group of Lygaeoidea which included the genus *Geocoris* Fallen, 1814 as the largest among its 14 genera (Torres *et al.*, 2004). The members are predators of

many economically important insect pests like Hadda beetle (CABI, 2010), Colorado potato beetle, psyllids (Erler, 2004), mealybugs, aphids and thrips (Kumar and Ananthkrishnan, 1985). Described species from Pakistan (1 species, Sarwar and Sattar, 2016), India (23 species, Mukhopadhyay, 1988), Iran (18 species, Linnavuori, 2011), Mexico (15 species, Brailovsky, 2016) and other surrounding countries shows a large number of species in the *Geocoris* genus with nearly 240 known species worldwide (Joseph, 2006).

This genus can be identified with the combination of following characters: labial segment 2 shorter than 3, ocular sulcus short, male gonoporal process with 6 to 20 coils; hemelytron either macropterous or coleopteroid; abdominal terga 3 and 4 impunctate (Malipatil, 1994).

Their importance as important predators of different insect species focused the need to identify the available fauna of big-eyed bugs of this region, for which this study was performed.

2. Materials and Methods

Specimens were collected from different parks and road side weeds with the help of insect net during October and November, 2016 from Rawalpindi, Islamabad and Murree. Aspirator was used to collect them and get killed in cyanide killing bottle. Some specimens were preserved in 70% alcohol in glass vials. Identification was made with by using Nikon microscope (SMS-1500 with 30X 1-11.25x magnification) following the keys of Distant (1904). Main identification characters illustrations and measurements were taken with ocular and stage micro-meters on same microscope with stage magnification of 4X and ocular of 10X, a sum total of 40X. Specimens were deposited in the Laboratory of Bio-Systematics, Department of Entomology, PMAS-Arid Agriculture University Rawalpindi.

3. Results and Discussion

Geocoris tricolor Fabricius, 1798 Fig. A (1-5)

Subfamily: Geocorinae

Tribe: Geocorini

Geocoris tricolor Fabricius, 1798

Geocoris tricolor F. (Coreidae) Mani, 1989

3.1 Main identification characters:

Luteous head; 3.11 times wide than its length. Eyes castaneous; 1.86 times longer than wider (Fig.A2). Antennae black with first and apical joint ochraceous, last antennal segment is 1.32 times longer than the second last segment (Fig.A3). Pronotum black with lateral margins ochraceous; pronotum 1.47 times wider than its length (Fig.A2). Scutellum black; 1.32 times wider than its length. Corium ochraceous, the last sometimes greyish-ochraceous; membrane semi hyaline reflecting dark abdomen and body beneath black; 1.71 times longer than its width, membranous segment of forewing a bit wider than its length with maximum hemelytron width in its membranous segment, corium 0.65 times longer than membranous segment of hemelytron (Fig.A5). Head beneath, coxae, legs and extreme lateral margins of sternum and abdomen ochraceous. Rostrum ochraceous with first joint a little longer than the second (Fig.A4); above coarsely punctate, head and disk of corium impunctate.

3.2 Material examined:

Islamabad (Kachnar Park), 22-ix-16, 2♀ and 1♂; Rawalpindi (Nawaz sharif Park), 15-x-16, 2♀ and 2♂; Murree (Osia), 20-ix -16, 3♀.

3.3 Measurements:

Body length 4.3mm, antennal length 1.70mm with first (0.24mm); second (0.48mm); third (0.38); fourth segment (0.50), lateral compound eye length 0.67mm and width 0.36mm, interocular space 0.55mm, eye-ocular space 0.24mm, head length 0.60mm and width across eyes 1.87mm, pronotum length 1.30mm and width 1.92mm, scutellum length 0.96mm and width 1.27mm, hemelytron length 3.19mm and width 1.32mm; corium length 2.06mm and width 1.20mm; membranous wing length 1.27mm and 1.32mm width.

3.4 Material examined previously by other researchers:

Jabalpur, Medical college, 13.ix.1966, (3 exs.), Coll. H. P. Agarawal; Jabalpur, Sehora, Hiran river, 5. viii. 1966 (1ex.), Coll.V.V.Rao.

India: Madhya Pradesh (Jabalpur), Andhra Pradesh, Maharashtra, Karnataka and West Bengal (Chandra, 2008). *Elsewhere*: Myanmar and Sri Lanka.

3.5 Distribution:



Fig. A. External morphology of *Geocoris tricolor* Fabricius, 1798; 1. adult female; 2 dorsal view of head and pronotum; 3. lateral view of head showing head and antenna; 4. fronto-lateral view of head showing rostrum; 5. Forwing showing with corium and membranous part.

4. Remarks

Collected specimens were compared with published description of Distant (1904) and found to be similar. Barber (1926) described a new *Geocoris* from Illinois. Barber (1935) reported a new *Geocoris* from the United States, with key to species. Saha et al. (2016) reported one species of this genus from Chhattisgarh, India. Brailovsky (2016) recorded 4 new species of *Geocoris* from Mexico.

Cultivation of alfalfa strips for harbouring predators including *G. tricolor* to help manage insect pests in cotton crop is previously suggested (Khuhro *et al.*, 2002). Abundance of whitefly and thrips populations with *Geocoris* and other predators showed positive response with rise in temperature (Khazada *et al.*, 2016) suggesting their potential in pest control. Genetically engineered cotton with Cry1Ac toxin exhibited transfer of toxin into non-target beneficial like *G.* but it was not in harmful level suggesting their use as bio-control in integration of such crops

(Torres and Ruberson, 2008). So this bio-control agent explored during our studies, if mass reared may be used against various sucking insect pests in Pakistan.

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