



Taxonomic notes on some newly recorded species of orb-weaving spiders of Bangladesh

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Abstract

Taxonomic studies on some orb-weaving spiders of the genus *Singa* C.L. Koch, 1836 was made in the coastal areas of district Khulna, Bangladesh. Two species were newly recorded from this study, namely - *S. chota* Tikader and *S. haddoensis* Tikader. Generic diagnosis, illustrated description, distribution and key to the species were included herewith.

Keywords: Taxonomy, Orb-weaving spider, Araneae, Araneidae, Araneinae, Bangladesh

Introduction

Orb-weaving spiders (family Araneidae) are one of the important predatory members in the crop-fields and gardens of Bangladesh. These are very attractive due to their beautiful colour and ornamented body appearances. They play a great role in the insect pest management systems in the crop-fields and gardens by making typical webs within plan leaves and stay there for the preys.

Members of the family Araneidae are small to medium in size. At present, the the family contains a total of 3,129 species belonging to 191 genera in the world fauna (World Spider Catalog, 2024). Species of genus *Singa* C.L. Koch are small and colourful spiders. The genus also called striped orb-weavers, first erected by C. L. Koch in 1836 with the type-species *S. hamata* (Clerck, 1757). At present the genus contains a total of 28 species world wide (World Spider Catalog, 2024) of which there is no previous record in the fauna of Bangladesh (Chowdhury & Nagari 1981 ; Chowdhuri & Pal 1984 ; Okuma *et al.* 1993 ; Begum & Biswas 1997 ; Biswas *et al.* 1995). But there are satisfactory records available in different countries of the world like – India (Tikader 1970 , '77 ; Tikader & Biswas 1981), China (Song & Zhu 1992 ; Yin *et al.* 1997), The Philippines (Barrion & Lisinger 1995), Korea (Kim & Lee 2012), Israel (Levy 1984), USA (Levi 1972, '2002), USSR (Marusik 2009) and so on.

The present paper contains illustrated description of 2 (two) newly recorded species namely – *S. chota* Tikader

and *S. haddoensis* Tikader with their distribution and key to the species.

Materials and methods

Collection and preservation: Specimens of the genus *Singa* C.L. Koch were collected from the crop-fields and gardens of different areas of districts Jashore, Khulna, Bagerhat, Barisal and Faridpur of Bangladesh. Collections were made by hand with vials from the webs and by jarking the branches of plants on an inverted umbrella placed underneath the plants (Tikader 1987). Collected specimens were then placed to a large glass vial containing chloroform with cotton for paralyzing the specimens. These were then transferred to a petri-dish filled with 70% ethyl alcohol for sorting the specimens. After sorting, the specimens were separated each other and preserved separately in glass vials with 70% alcohol for identification and future study.

Identification and study: The preserved specimens were identified following various famous books and journals of home and abroad. These are – Tikader (1982, '87), Barrion and Litsinger (1995), Biswas (1995), Yin *et al.* (1997), Song *et al.* (1999), Dondale *et al.* (2003), Levy 1984), Kim and Lee (2012) and Jhao (1993).

After identification, the specimens were preserved permanently (separate specimen in separate vial) in Audmans' Preservatives (90 parts 70% alcohol + 5 parts glycerene + 5 parts glacial acetic acid) following Lincoln and Sheals (1985).

In the taxonomic study, necessary important body-parts of the identified specimens were dissected out under the Stereozoom Binocular Microscope on a petridish filled with 70% alcohol and few sand grains. Male palps after dissection were boiled in 10% KOH for 3-5 minutes and female epigynum after dissection stay in clove oil for 12-18 hours (Levi 1965 ; Tikader 1987). After study, both male palp and female epigynum were placed in separate microvial and put it in a large vial (containing Audmans' Preservatives) along with parent spider.

Illustration and photographs : Adult body and different body-parts of identified spiders were illustrated by Camera lucida fitted with Stereozoom Binocular microscope. Legs were measured in the following sequences : femur, patella, tibia, metatarsus, tarsus and total length, under the same condition and all measurements were taken in millimeters (mm). Photographs were taken in the laboratory by Camera-fitted microscope , model SV8, Zeiss.

Type-deposition : After study and illustrations, the preserved specimens are placed with the collection of the Department of Zoology, Khulna Government Womens' College, Khulna and will be deposited to the Museum of the Department of Zoology, University of Dhaka, in due course of time.

Results and discussion

Systematics

Family : ARANEIDAE

Subfamily : Araneinae

Genus : *Singa* C.L. Koch, 1836

Type-species : *Aranea hamatus* Clerck, 1757

1836. *Singa* : Koch, *Die Arachniden*, III : 42.
 1940. *Singa* : Comstock, *The Spider Book* : 475.
 1970. *Singa* : Tikader, *Rec. zool. Surv. India*, **64**(1-4) : 35.
 1977. *Singa* : Tikader, *Rec. zool. Surv. India*, **72** (1-4) : 183.
 1981. *Singa* : Tikader & Biswas, *Rec. zool. Surv. India*, **30** : 43.
 2015. *Singa* : Platnick, *World Spider Catalog*, Version 15.5, <http://www.research.amnh.org/iz/spider/catalog/intro.html>
 2024. *Singa* : *World Spider Catalog*, Version 24.5, Nat. Hist. Mus. Bern, <http://www.wsc.nmbe.ch> (accessed on 07th Nov., 2024)

Diagnosis : Spiders of the genus *Singa* C. L. Koch are small to medium in size. Cephalothorax broad, sparsely

covered with short hairs. Eyes usually in 2 rows, posteromedian eyes closer than the anterolaterals. Legs relatively short, without ventral femoral spines. Males have protuberances on coxae I and II. The male palpal organs are rather similar.

Abdomen oval or nearly so, covered with sparsely distributed short hairs, medially broad and little depressed.

Biological note : Species of the genus *Singa* are usually called striped orb-weaving spiders. They make typical orb-webs in the crop-fields and gardens in the afternoon during sunset and stay near the middle of the webs for the prey. They are predatory in habit and consume small pest insects by their webs. Thus, they help in the biological control of crop pests and so that they are considered as one of the important biological control agent in the crop-fields and gardens.

Distribution : ASIA ; AMERICA ; AFRICA.

Key to the species of genus *Singa* C. L. Koch

1. Abdomen elongately oval, faintly constricted anteriorly ; sternum medially broad and posteriorly produced ; cheliceral tooth absent ; maxillae oval and labium urchin-like anteriorly truncate, epigyne as in fig. 2e
 *haddoensis*
- Abdomen typically oval, without any such constriction; sternum typically heart-shaped ; chelicerae toothed; maxillae flat, elongate, anteriorly broad and labium anteriorly bluntly pointed ; epigyne as in fig. 1e
 *chota*

Description of the species

1. *Singa chota* Tikader, 1970 (Figures 1a – 1e ; Plate - 1a)

1970. *Singa chota* Tikader, *Rec. zool. Surv. India*, **64**(1-4) : 35.
 1981. *Singa chota* : Tikader & Biswas, *Rec. zool. Surv. India*, **30** : 43.
 2015. *Singa chota* : Platnick, *World Spider Catalog*, version 15.0, <http://www.research.amnh.org/iz/spider/catalog/intro.html>
 2024. *Singa chota* : *World Spider Catalog*, version 24.5, Nat. Hist. Mus. Bern, <http://www.wsc.nmbe.ch> (accessed on 7th Nov. 2024)

Materia examined : 1 female, ADI Faridpur, 09. VI. 1995, Coll. V. Biswas ; 2 female, Jashore, 12 . II. 1998, Coll. V. Biswas ; 1 female, Dumuria, Khulna, 08. VII. 2001 , Coll. V. Biswas ; 2 females, Bagerhat, 24. VII 2002 , Coll. V. Biswas.

General : Body small, longer than wide, light yellow in colour. Cephalothorax and legs brown ; abdomen brown with white scally reticulations. Total body length 4.10 mm. Carapace 1.50 mm long, 1.25 mm wide ; abdomen 2.60 mm long and 1.45 mm wide.

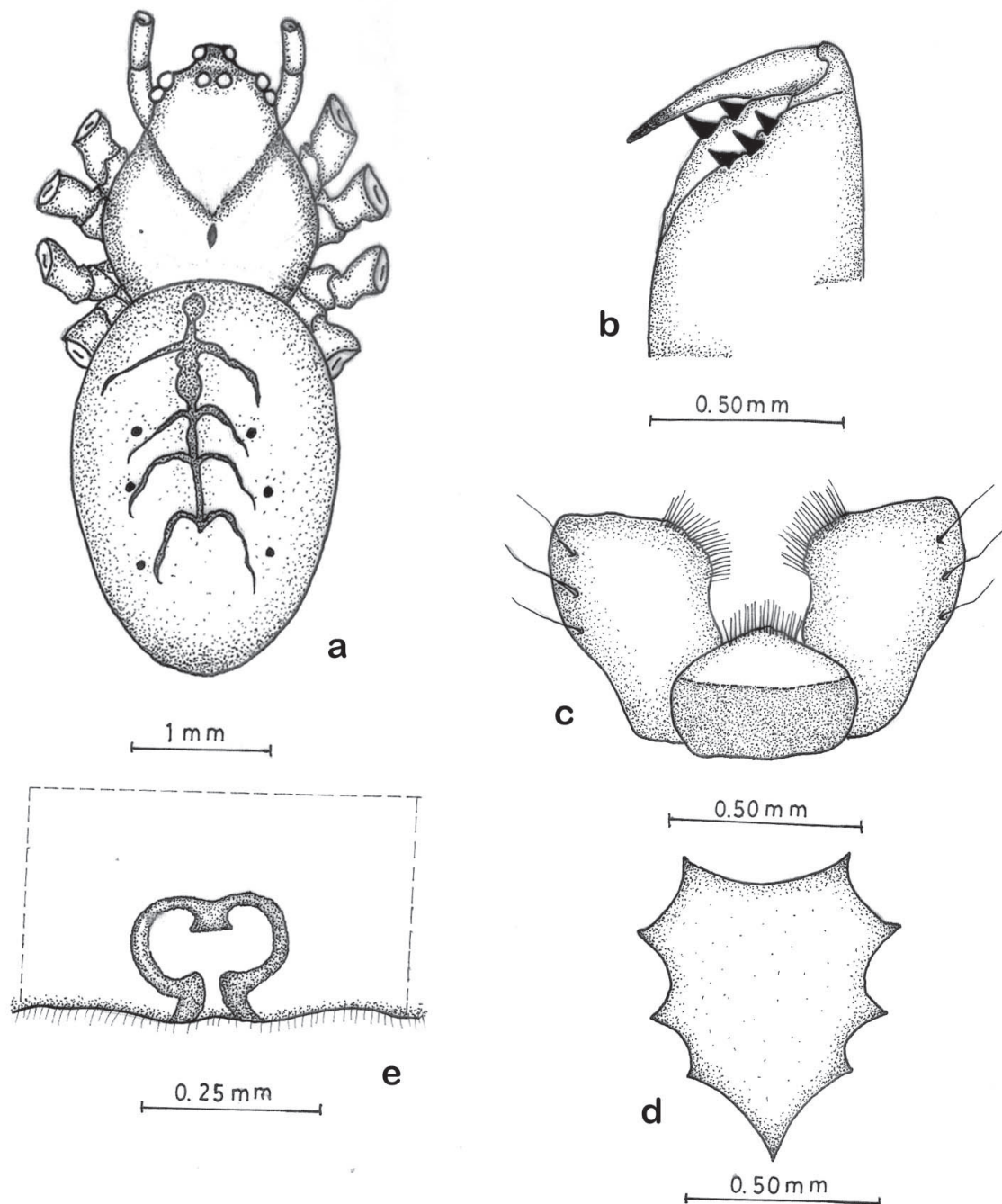


Figure 1 (a-e). *Singa chota* Tikader a. Whole body (dorsal view); b. Chelicerae; c. Maxillae and Labium; d. Sternum; e. Female epigynum.

Cephalothorax : Longer than wide, posteriorly broad, anteriorly narrowed, clothed with fine hairs ; cephalic region dark brown, raised, narrowing anteriorly, weakly constricted, with distinct cervical furrows ; thoracic region with central longitudinal fovea; radii distinct. Eyes pearly white, with black basal band, anterior row strongly recurved and posterior row faintly so ; lateral eyes close, placed marginally, anteromedians larger, situated on the lateral concavity of protuberance ; ocular quad wider than long, anteriorly broad, posteriorly narrowed. Chelicerae

brown, strong, each of inner and outer margins with 3 and 2 teeth, fang broad basally (Fig. 1b). Maxillae brown, longer than wide, anteriorly broad and scopulate (Fig. 1c). Labium brown, broad medially and scopulate anteriorly (Fig.1c). Sternum yellow brown, heart-shaped, narrowing posteriorly (Fig. 1d). Legs long and strong, clothed with few spines and hairs ; leg formula 1243 and the measurements (in mm) of leg segments are shown in Table -1.

Table 1. Measurements (mm) of leg segments of *S. chota* Tikader

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	2.00/2.00	0.90/0.90	2.00/2.00	2.00/2.00	0.80/0.80	7.70/7.70
II	2.00/2.00	0.50/0.50	1.50/1.50	1.20/1.20	0.60/0.60	5.80/5.80
III	1.50/1.50	0.30/0.30	1.00/1.00	0.70/0.70	0.40/0.40	3.90/3.90
IV	1.50/1.50	0.50/0.50	1.50/1.50	1.10/1.10	0.50/0.50	5.10/5.10

Abdomen : Oval, longer than wide, narrowing posteriorly, dorsum whitish, reticulate, provided with longitudinal and transverse brown stripes and 3 pairs of sigillae, clothed with fine hairs ; epigyne as in fig. 1e.

Male unknown and will be described when available.

Distribution : BANGLADESH : Faridpur, Jashore, Khulna, Bagerhat ; INDIA (Tikader, 1970; Tikader & Biswas, 1981).

2. *Singa haddoensis* Tikader, 1977 (Figures 2a - 2f ; Plate – Ib)

1977. *Singa haddoensis* Tikader, *Rec. zool. Surv. India*, **72**(1-4) : 183.

2015. *Singa haddoensis* : Platnick, *World Spider Catalog*, version 15.0, <http://www.research.amnh.org/iz/spider/catalog/intro.html>

2024. *Singa haddoensis* : *World Spider Catalog*, version 24.5, Nat. Hist. Mus. Bern., [http:// www.wsc.nmbe.ch](http://www.wsc.nmbe.ch) (accessed on 7th Nov. 2024).

Material examined : 1 female, Barisal, 08.II.1995, Coll. V. Biswas ; 2 female, Comilla, 18. V. 1995, Coll. V. Biswas ; 1 female, Bhawal park, Gazipur, 12. IV. 1996, Coll. V. Biswas ; 1 female, S. Park, Dhaka, 14.III. 1997, Coll. V. Biswas ; 2 females, Terosree, Manikganj, 08. VII. 1998, Coll. V. Biswas.

General : Body small, yellowish brown in colour. Cephalothorax and legs red brown ; abdomen chalk-white, with brown streaks. Total body length 4.50 mm. Carapace 2.00 mm long, 1.65 mm wide ; abdomen 2.60 mm long and 1.00 mm wide.

Cephalothorax : Longer than wide, posteromedially broad, narrowing anteriorly, with a weak constriction, clothed with hairs ; cephalic region faintly raised ; thoracic

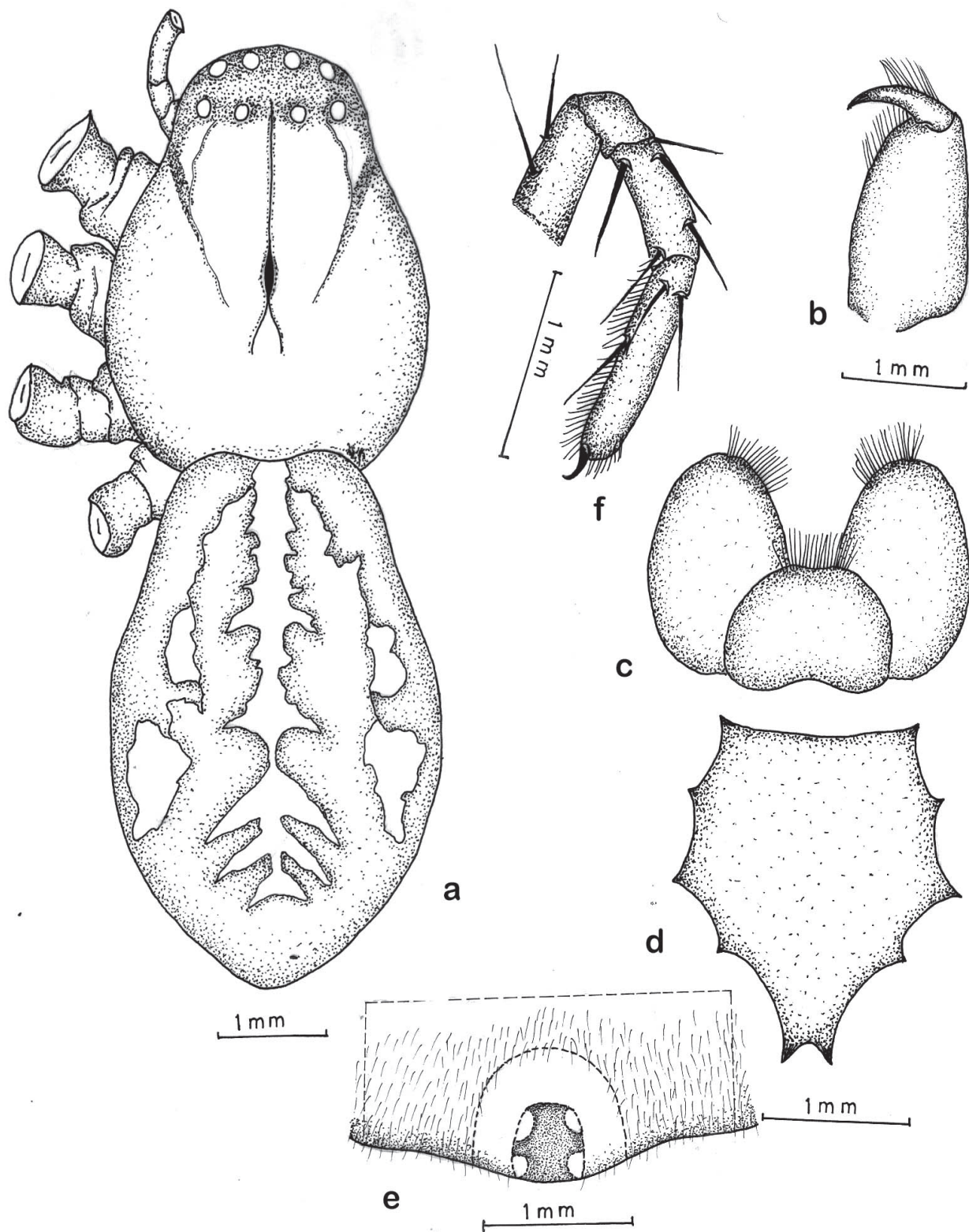


Figure 2 (a-f). *Singa haddoensis* Tikader a. Whole body (dorsal view); b. Chelicerae; c. Maxillae and Labium; d. Sternum; e. Female epigynum; f. Tarsal segment of leg-I.

region with a deep longitudinal fovea. Eyes pearly white, with black basal patch ; anterior row recurved and posterior row faintly procurved ; anteromedians largest ; ocular quad longer than wide, anteriorly narrowed. Chelicerae brown, strong, longer than wide, without any tooth (Fig. 2b). Maxillae pale brown, nearly oval, scopulate anteriorly (Fig. 2c). Labium brown, typically urchin-

like, anteriorly scopulate (Fig. 2c). Sternum yellow, broad medially, posteriorly narrowed and produced, with long fine hairs (Fig. 2d). Legs long and slender, clothed with hairs ; metatarsi and tarsi of leg I and II with brown, strong spines (Fig. 2f) ; leg formula 2143 and the measurements (in mm) of leg segments are shown in Table – 2.

Table-2. Measurements (mm) of leg segments of *S. haddoensis* Tikader

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	5.00/5.00	2.00/2.00	4.50/4.50	4.50/4.50	1.50/1.50	17.50/17.50
II	6.00/6.00	2.00/2.00	6.00/6.00	6.00/6.00	2.00/2.00	22.00/22.00
III	4.00/4.00	3.00/3.00	3.00/3.00	3.00/3.00	1.50/1.50	13.50/13.50
IV	5.00/5.00	1.30/1.30	3.50/3.50	4.00/4.00	1.20/1.20	15.00/15.00

Abdomen : Elongately oval, posteromedially wide, posteriorly narrowed ; dorsum decorated with white bands, clothed with hairs and dense pubescences ; ventrally pale with deep brown longitudinal bnds, clothed with dense pubescence and hairs ; epigyne as in fig. 2e.



Plate-1a. *Singa chota* Tikader.



Plate-1b. *Singa haddoensis* Tikader.

Figure 3. Orb-weaving spiders.

Conclusion

Members of the genus *Singa* C.L. Koch are one of the important predatory spiders in the crop-fields and gardens. But the taxonomic history of these spiders in Bangladesh reveals that there is no previous record of study took place in this country. In the present study, it was observed that there are some variations observed with the previously described Indian fauna in different characters like - colour, shape, size etc.

In behaviour, both the species are natural predators of insect pests in the crop-fields and gardens. They consume a good number of preys regularly by their webs and thus, play a vital role in the biological pest management system as predator of insect pests. Therefore, a detailed taxonomic and ecological study on these spiders may be undertaken and thus, in future, may be observed their actual ecological position in crop pest management system in agriculture.

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