



E-ISSN: 2320-7078

P-ISSN: 2349-6800

www.entomoljournal.com

JEZS 2022; 10(2): 235-240

© 2022 JEZS

Received: 14-01-2022

Accepted: 05-03-2022

M Mahbubur Rahman

Regional Agricultural Research
Station, Bangladesh Agricultural
Research Institute, Rahmatpur,
Barishal, Bangladesh

MA Rahman

Regional Agricultural Research
Station, Bangladesh Agricultural
Research Institute, Rahmatpur,
Barishal, Bangladesh

MR Islam

Regional Agricultural Research
Station, Bangladesh Agricultural
Research Institute, Rahmatpur,
Barishal, Bangladesh

MM Rahman

Regional Agricultural Research
Station, Bangladesh Agricultural
Research Institute, Rahmatpur,
Barishal, Bangladesh

MA Sarker

Entomology Division,
Bangladesh Agricultural
Research Institute, Gazipur,
Bangladesh

NK Dutta

Entomology Division,
Bangladesh Agricultural
Research Institute, Gazipur,
Bangladesh

Corresponding Author:**M Mahbubur Rahman**

Regional Agricultural Research
Station, Bangladesh Agricultural
Research Institute, Rahmatpur,
Barishal, Bangladesh

Seasonal occurrence of *Riptortus pedestris* (Hemiptera: Alydidae) attacking mungbean in Southern part of Bangladesh

M Mahbubur Rahman, MA Rahman, MR Islam, MM Rahman, MA Sarker and NK Dutta

DOI: <https://doi.org/10.22271/j.ento.2022.v10.i2c.8995>

Abstract

The bean bug, *Riptortus pedestris* (Hemiptera: Alydidae), is a polyphagous species that is an important pest of mungbean, soybean and other leguminous crops in Asian countries. As it is distributed in Asian countries, like Korea, Japan, China, India, and Taiwan and caused damage on leguminous crops, but the status of bean bug are still unknown in Bangladesh even though it is first recorded in mungbean (*Vigna radiata* L) field during 2017 in our preliminary study. Therefore a series of field survey was conducted in southern part of the country during three consecutive seasons of 2018, 2019 and 2020 to know the pest status of bean bug and their intensity of infestation in mungbean. Three years study revealed that a new pest *R. pedestris* is recorded in mungbean field which causes damage on tender stem, leaf and pod. Adult and nymph *R. pedestris* occurrence began at first week of April in mungbean. Peak population densities of both nymphs (4-6 bugs/10 plants) and adults (5-7 bugs/10 plants) are recorded at mid-April. Then the number of bean bug gradually decreased in mungbean field. Seasonal average number of bean bug nymph and adult is 2.13-3.07 and 2.47-4.20 per plant. Nymph population is recorded from 15.33 to 22.67% plants where adults are found in 18.67 to 30.67% plants. The abundance of adult population significantly 64.27% increased in 2020 compare to 2018 cropping season while infestation of mungbean by nymph was also 47.88% increased. This is the first report of the occurrence of *R. pedestris* on mungbean in southern part of Bangladesh. Since pest abundance increasing day by day in southern part of the country, therefore more research should be recommended to assess crop loss by this pest and to develop appropriate management option.

Keywords: Bean bug, mungbean, leguminous, insect, pests

Introduction

Bean bug *Riptortus pedestris* (Hemiptera: Alydidae) previously known as *R. clavatus* (Thunberg) is one of the major agricultural pests^[1] in Asian countries like Korea, Japan, China, Taiwan, Srilanka, Myanmar, and India^[2-9] and feed mainly on leguminous crops^[3, 5]. Its host crops range various field crops such as mungbean, soybean, cowpea (*Vigna unguiculata* L. Walp.), sesame (*Sesamum indicum* L.), rice (*Oryza sativa* L.), and fruit trees like sweet persimmon^[4, 8, 28, 11-12]. Both adults and nymphs of *R. pedestris* cause serious damage to pod and seed by piercing and sucking^[3, 5, 13], considerably reduce yield of legume crops^[6] and transmit yeast-spot disease to soybean^[14]. Usually female bug lay scattered eggs not only on the leaves, stem, and pod of legume crops^[15] but also on the non-host plants or over the other substrates^[16]. First-instar nymphs need only water to develop into the second instar because nutrients were invested from their mother^[16] but from second to fifth instar nymph protein sources for their development. It is reported that both nymph and adult bean bug can cause damage on mature legume pods containing hard shell^[17]. The adults and nymphs of bugs infest the crop by congregating on tender vines and sucking sap resulting in fading of vines and shoots^[18, 19]. Nymphs and adults of the bug were found sucking the tender leaves, tender pods and maturing seeds. Damage to pods and seeds ranged from 60 to 70%^[20]. Bean bug *R. pedestris* occur commonly and found in large numbers in field bean throughout the cropping period cause damage in legume crops in India^[21]. As it is distributed in Asian countries, like Korea, Japan, China, India, and Taiwan and caused damage on leguminous crops. But in Bangladesh the status of bean bugs are still unknown even though it was first observed in mungbean field in our preliminary study at Regional Agricultural Research Station (RARS), Bangladesh Agricultural Research Institute (BARI), Rahmatpur, Barishal during 2017^[22].

Therefore, the present study has been taken to know the pest status of this new pest *R. pedestris* and their intensity of infestation in mungbean in southern part of Bangladesh.

Materials and Methods

The survey was conducted during late rabi season of 2018, 2019 and 2020 at three unsprayed mungbean fields of Regional Agricultural Research Station (RARS), Rahmatpur, Barishal (90°17'29.84" E, 22°78'81.20" N) and 3 farmers field in Barishal district of Bangladesh. In each field 10 plants were visually scanned to count adult and nymph of *R. pedestris* population was from seedling to maturity stage of the crops at weekly interval throughout the season. Nymph and adult of *R. pedestris* were collected by sweep net and reared in laboratory to assess their biological and morphological parameters.

Statistical analysis. Percent infested plant by *R. pedestris* nymph and adults found in mungbean were analyzed by Chi-square test of a contingency table and post-hoc multiple comparison tests analogous to the Tukey's test [22]. The seasonal pooled number of number of *R. pedestris* nymph and adults per plants data were analyzed with ANOVA using PROC GLM in SAS [23]. Before analysis of variance, the seasonal pooled number of number of *R. pedestris* nymph and adults per plants were square-root transformed, and means were separated using Tukey's multiple range tests.

Results and Discussion

First Record: *Riptortus pedestris* was first recorded in mungbean field at Regional Agricultural Research Station (RARS), Bangladesh Agricultural Research Institute (BARI), Rahmatpur, Barishal during April 2017 (Fig. 2 and 3) which was first reported in Annual Research Program of Entomology Division, BARI 2017-18 [24].

Morphological Characteristics: *Riptortus pedestris* is a 16.5 ± 2.0 mm sized elongate bug, overall dorsal color brownish, ventral pale yellow with brownish tinge.

Head: Head triangular, projecting between the antenniferous tubercles, Antennae long, fourth joint longest, first slightly shorter than fourth, second and third sub-equal.

Thorax: Pronotum quadrangular, slightly broad at the base due to humeral spines, gradually narrowed towards head. There are two diffuse brownish pronotal spots on the disc (Fig 1b), rest of the entire disc of pronotum very pale brown which are the stable trait of the classification between closely two species *Riptortus pedestris* and *Riptortus linearis* [25].

Abdomen: Abdomen narrow, second and third segments longer than others segments, a "U" shaped black band made up of diffuse black granules on the disc of third and fourth segment.

Nature of Damage: The nymphs and adults suck sap from the tender stems, leaves, immature pods and maturing seeds. Owing to sap sucking, brown spots appeared on the pod and also shriveling of seed was noticed. Similarly, previous studies also reported that both adults and nymphs of bean bug cause serious damage to pod and seed by piercing and sucking [3,5,13], considerably reduce yield of legume crops [6]. Its appearance was recorded in the field from pod setting to pod maturity stage of crop growth. On the basis abundance it is

considered as a minor pest on mungbean in Bangladesh.

Pest Status: Seasonal average number of bean bug and percentage of infested plant were presented in Table 1. Average number of bean bug nymph was 2.13 to 3.07 per plant and adult 2.47-4.20 were recorded during three consecutive years 2018 to 2020. Nymph population was found 15.33 to 22.67% plant where adult population was found in 18.67 to 30.67% plants. The abundance of adult population significantly 64.27% increased in 2020 compare to 2018 cropping season ($\chi^2 = 6.05$, $df = 2$, $P = 0.048$). Infestation of mungbean by nymph was also 47.88% increased which were statistically non-significant.

Abundance of pest population

A new pest bean bug, *R. pedestris* were recorded in mungbean field which cause damage to pod and seed by piercing and sucking considerably reduce yield of mungbean. It was first appeared at 5th, 4th and 4th April 2018, 2019 and 2020 respectively in mungbean field. Highest nymph (6 bugs/10 plants) and adult (7 bugs/10 plants) of *R. pedestris* population were recorded at second and third week of April respectively (Fig. 4-6). Three years study revealed that the pest abundance were higher when crops are in pod setting or grain filling stage. Previously, it is also reported that the incidence of *R. pedestris* were observed at later stages of crop growth in field bean [26]. This is the first report of the occurrence of *R. pedestris* on mungbean in Bangladesh.



Fig 1a: *Riptortus pedestris* adult

(Source: India Biodiversity Portal, Dr. Hemant V. Ghate, Modern College, Shivaji Nagar Pune 411 091)

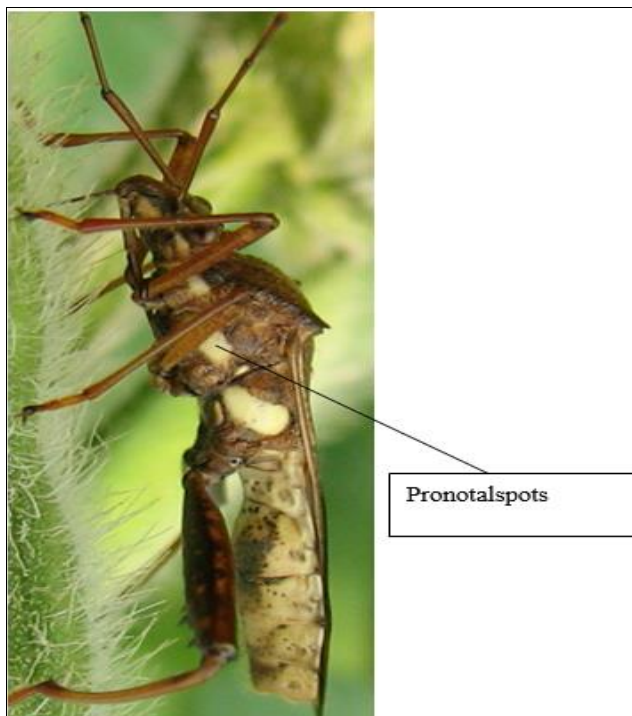


Fig 1b: *Riptortus pedestris* adult
(Recorded from mungbean field in Barishal, Bangladesh 2017)

Fig 1: Comparison of recorded *Riptortus pedestris* with previously identified species.

Fig 3: Different life stages of *Riptortus pedestris* found in mungbean fields.

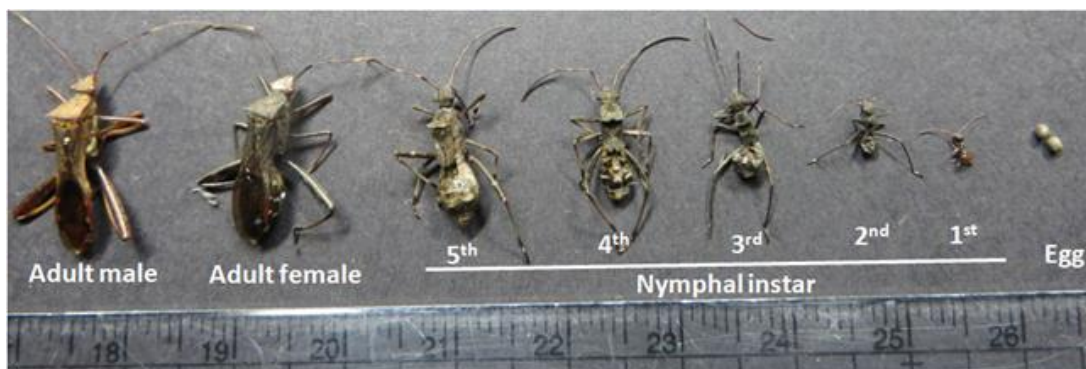


Fig 2: Life stage of laboratory reared *Riptortus pedestris*.



Adult of *Riptortus pedestris*



Egg of *Riptortus pedestris*



Riptortus pedestris in mated condition



Fifth instar Nymph of *Riptortus pedestris*

Fig 3: Different life stages of *Riptortus pedestris* found in mungbean fields.

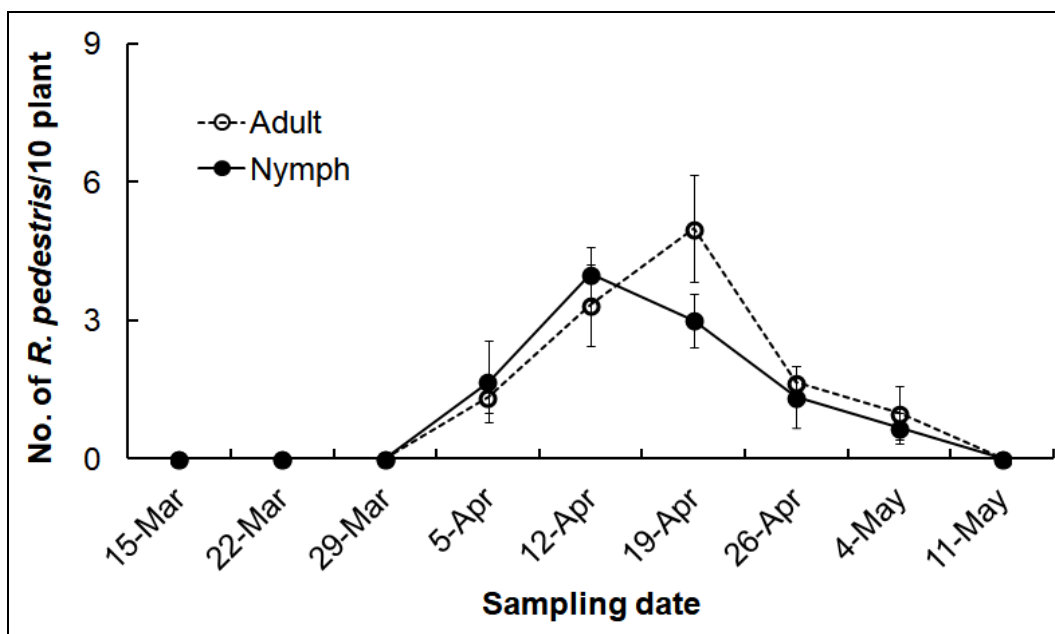


Fig 4: Seasonal density (mean number ± SE) of *Riptortus pedestris* in mungbean fields during late rabi season, 2018 at southern region of Bangladesh.

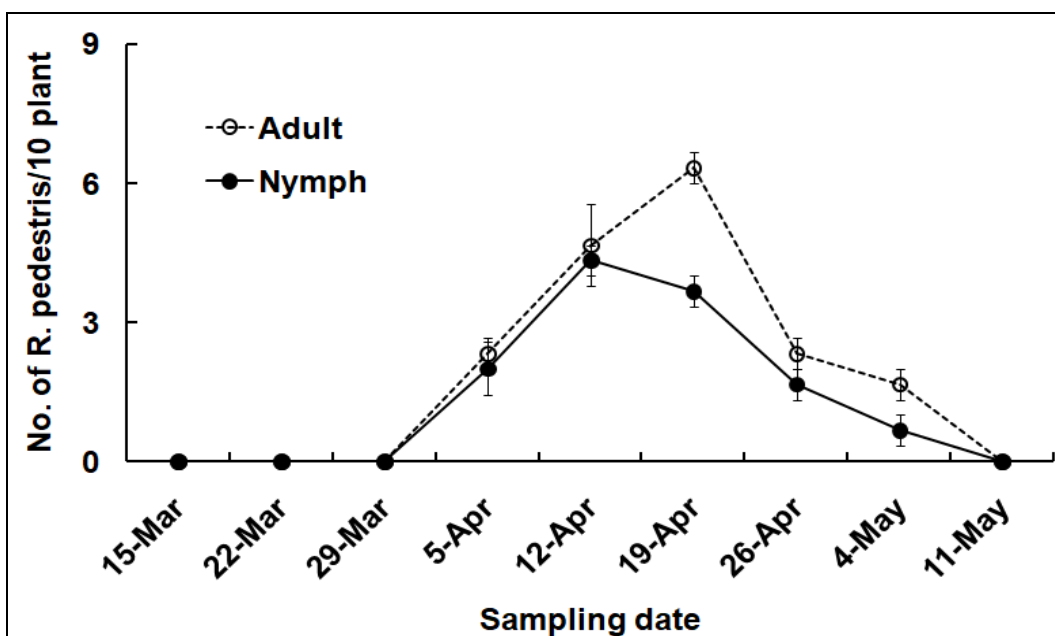


Fig 5: Seasonal density (mean number ± SE) of *Riptortus pedestris* in mungbean fields during late rabi season, 2019 at southern region of Bangladesh.

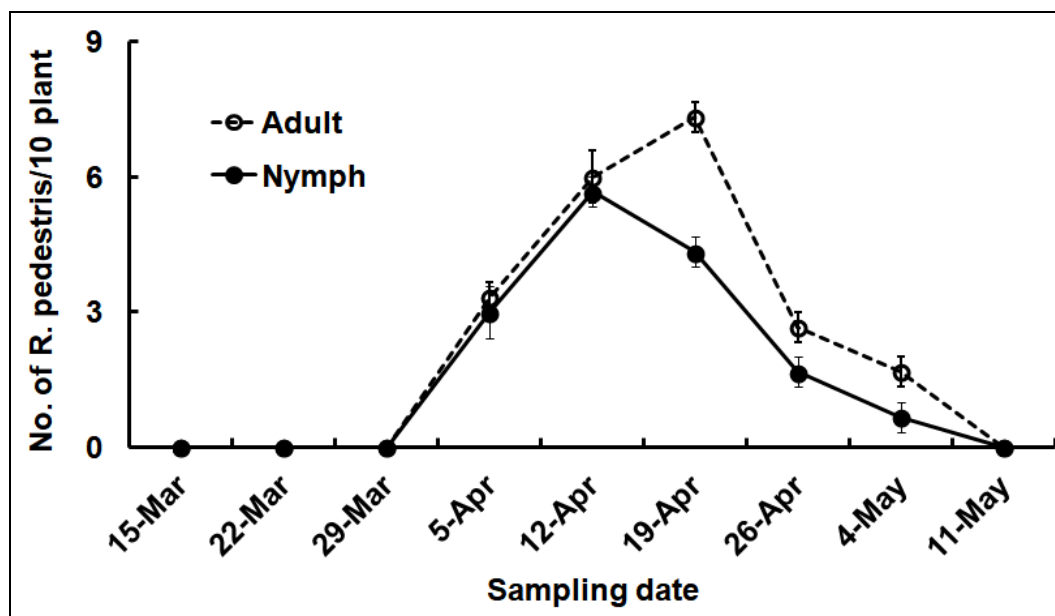


Fig 6: Seasonal density (mean number \pm SE) of *Riptortus pedestris* in mungbean fields during late rabi season, 2020 at southern region of Bangladesh.

Table 1: Pest status of *Riptortus pedestris* infesting mungbean in southern region of Bangladesh during 2018 to 2020

| Cropping Season | Average no. of nymph/plant (\pm SE) | Average no. of adult/plant (\pm SE) | Percent of infested plant by nymph \pm SE | Percent of infested plant by adult \pm SE |
|-----------------|--|--|---|---|
| 2018 | 2.13 \pm 0.44 a | 2.47 \pm 0.35 a | 15.33 \pm 2.40 b | 18.67 \pm 3.53 b |
| 2019 | 2.47 \pm 0.29 a | 3.47 \pm 0.07 a | 18.00 \pm 2.00 b | 27.33 \pm 1.33 b |
| 2020 | 3.07 \pm 0.18 a | 4.20 \pm 0.12 a | 22.67 \pm 1.76 a | 30.67 \pm 2.40 a |

Conclusion

A new pest *R. pedestris* were recorded in mungbean field which cause damage to tender stems, leaves, immature pods and seeds by piercing and sucking considerably reduce yield of mungbean. It is first appeared at first week of April in mungbean field and peak population was recorded on mid April. From the present study it is clear that abundance of this pest increasing day by day in southern part of the country. Therefore more research should be undertaken to assess crop loss by this pests and to develop appropriate management option. This is the first report of the occurrence of *R. pedestris* on mungbean field in southern region of Bangladesh.

Acknowledgements

The experiment had been carried out with the financial assistance under research scheme namely "Documentation of Insect Pests, Development and Dissemination of Integrated Pest Management Technology for Cultivating Important Fruits, Betel Leaf, Betel Nut and Pulse Crops through Safe Food Production in Southern Region of Bangladesh" Ministry of Agriculture, Government of the People's Republic of Bangladesh.

References

- Kikuhara Y. The Japanese species of the genus *Riptortus* (Heteroptera, Alydidae) with description of a new species. Jpn. J Syst Entomol. 2005;11(2):299-311.
- Visalakshi A, Jacob A, Nair MRGK. Biology of *Riptortus pedestris* F. (Coreidae: Hemiptera), a pest of cowpea. Entomon. 1976;1:139-142.
- Kono S. Analysis of soybean seed injuries caused by three species of stink bugs. Jpn. J Appl. Entomol. Zool. 1989;33:128-133.
- Chung BK, Kang SW, Kwon JH. Damages, occurrences and control of Hemipterous insects in non astringent persimmon orchards. J Agric. Sci. 1995;37:376-382.
- Son CK, Park SG, Hwang YH, Choi BS. Field occurrence of stink bug and its damage in soybean. Korean J. Crop Sci. 2000;45:405-410.
- Kang CH, Huh, HS, Park CG. Review on true bugs infesting tree fruits, upland crops, and weeds in Korea. Korean J. Appl. Entomol. 2003;42:269-277.
- Bhuiyan MSH, Islam MS, Roy TS, Karim MA, Munsur MAZA. Mungbean and weed growth as affected by potassium and weed control methods. Int. J Res. Agron. 2020;3(2):01-08.
- Mainali BP, Lim UT. Annual pattern of occurrence of *Riptortus pedestris* (Hemiptera: Alydidae) and its egg parasitoids *Ooencyrtus nezarae* Ishii and *Gryon japonicum* (Ashmead) in Andong, Korea. Crop Prot. 2012;36:37-42.
- Lim UT. Occurrence and control methods of *Riptortus pedestris* (Hemiptera: Alydidae): Korean perspective. Korean J. Appl. Entomol. 2013;52:437-448.
- Talila Garamu. Effect of different source and rates of biochar application on the yield and yield components of mungbean on the acidic soil in western Ethiopia. Int. J Res. Agron. 2020;3(1):01-07.
- Lee SW, Lee DH, Choi KH, Kim DA. A report on current management of major apple pests based on census data from farmers. Korean J Hort. Sci. Technol. 2007;25:196-203.
- Lee HS, Chung BK, Kim TS, Kwon JH, Song WD, Rho CW. Damage of sweet persimmon fruit by the inoculation date and number of stink bugs, *Riptortus clavatus*, *Halyomorpha halys* and *Plautia stali*. Korean J Appl. Entomol. 2009;48:485-491.
- Choi MY, Lee GH, Paik CH, Seo HY, Oh YJ, Kim DH,

- Kim JD. Feeding preference, nymphal development time, body weight increase, and survival rate of the bean bug, *Riptortus clavatus* (Thunberg) (Heteroptera: Alydidae) on soybean varieties. Korean J Appl. Entomol. 2005;44:287-292.
14. Kimura S, Tokumaru S, Kikuchi A. Carrying and transmission of *Eremothecium coryli* (Peglion) Kurtzman as a causal pathogen of yeast-spot disease in soybeans by *Riptortus clavatus* (Thunberg), *Nezara antennata* (Scott), *Piezodorus hybneri* (Gmelin) and *Dolycoris baccarum* (Linnaeus). Jpn. J. Appl. Entomol. Zool. 2008;52:13-18.
 15. Takasu K, Hirose Y, Takagi M. Occasional interspecific competition and within-plant micro habitat preference in egg parasitoids of bean bug, *Riptortus clavatus* (Thunberg) (Hemiptera: Alydidae) in soybean. Appl. Entomol. Zool. 1998;33:391-399.
 16. Leal WS, Higuchi H, Mizutani N, Nakamori H, Kadosawa T, Ono M. Multifunctional communication in *Riptortus clavatus* (Heteroptera: Alydidae): Conspecific nymphs and egg parasitoid *Ooencyrtus nezarae* use the same adult attractant pheromone as chemical cue. J Chem. Ecol. 1995;21:973-985.
 17. Rahman MM, Lim UT. Evaluation of mature soybean pods as a food source for two pod-sucking bugs, *Riptortus pedestris* (Hemiptera: Alydidae) and *Halyomorpha halys* (Hemiptera: Pentatomidae). *PLoS ONE*. 2017;12(4):e0176187. <https://doi.org/10.1371/journal.pone.0176187>.
 18. Ayyar TVR. Hand Book of Economic Entomology for South India. Government Press, Madras, 1963, 516.
 19. Parvathy V. Ecological perspectives and host plant resistance studies of pod feeders in field bean, *Lablab purpureus* (L.) Sweet. M.Sc. (Ag.) Thesis. Acharya N.G. Ranga Agricultural University, Rajendranagar, Hyderabad, 2011.
 20. Krishna TM, Ramaiah M, Prasanthi L, Devi VS, Reddy BC. Pod sucking bug, *Riptortus pedestris*: a serious pest of field bean and cowpea. J. Arid Legum. 2005;2(2):419.
 21. Prashanth K. Molecular characterization of contrast genotypes, bio ecology and management of major insect pests of Dolichos bean, *Lablab purpureus* L. Ph.D. Thesis. Acharya N. G. Ranga Agricultural University, Rajendranagar, Hyderabad, 2014.
 22. Zar JH. Biostatistical Analysis. Fifth edition, Prentice Hall, Upper Saddle River, NJ, 2010.
 23. SAS Institute. SAS User's Guide: Statistics. SAS Institute, Cary, NC, 2012.
 24. Rahman MM. Survey, monitoring and documentation of *Riptortus pedestris* (Hemiptera: Alydidae) in southern region of Bangladesh. Annual research program, Entomology division, Bangladesh Agricultural Research Institute (BARI). 2017-18, 10.
 25. Weibing ZHU, Xin KE, Haisheng YIN. Study on DNA barcoding of *Riptortus* (Hemiptera: Alydidae) in China. 7th International Barcode of Life Conference. id: 2017, 843.
 26. Rekha S, Mallapur CP. Studies on insect pests of dolichos bean in northern Karnataka. Karnataka Journal of Agricultural Sciences. 2007;20(2):407-409.
 27. Wada T, Endo N, Takahashi M. Reducing seed damage by soybean bugs by small-seeded soybeans and delaying the sowing time. Crop Prot. 2006;25:726-731.
 28. Kim IS, Hong KI, Han MJ, Lee MH. Survey on the occurrence of quarantine pests for export in major non-

astriquent persimmon production areas in Korea. RDA. J Crop Prot. (Korea Republic). 1997;39:67-71.