International Journal of Zoology Studies
ISSN: 2455-7269
Impact Factor: RJIF 5.14
www.zoologyjournals.com
Volume 2; Issue 6; November 2017; Page No. 239-241

Polymorphism in the southern green stink bug, *Nezara viridula* (L.) (Hemiptera: Pentatomidae) From Chandgad Tehsil

[*1] SV More, [2] MS Prashant, [3] Sheetal Kadolkar, [4] Varsha Kesarkar
[1, 3, 4] Department of Zoology, R.B. Madkholkar Mahavidyalaya, Chandgad, District-Kolhapur, Maharashtra, India
[2] AVS College of Education, Department of Zoology, Gantekanive, MC Halli, Tarekere, Chikamagulore, Karnataka, India

Abstract
While surveying bugs of agricultural crops and forest area of Chandgad Tehsil, Kolhapur during June to November 2017, many species were observed, but only 7 adults and a few nymphs of the southern green stink bug *Nezara viridula* were collected from the study area such as 3 species from agricultural crops, 2 species from forest areas and 2 species from common weeds. Among them, 3 color morphs species of *Nezara viridula* were identified and are provided with some natural images of adult species. The present study provides the host plant of nymphs and adult bugs which are pests on different agricultural crops.

Keywords: Chandgad, agricultural crops, *Nezara viridula*, color morphs

Introduction
The insect *Nezara viridula* is a bug which belongs to the subfamily Pentatominae of Pentatomidae. Recently, this species is generally known by the three different names which are the Southern green stink bug in the USA, Southern green shield bug in the UK and Green vegetable bug in Australia and New Zealand and this originates from equatorial regions. The origin of this species is very confusing, as it has two versions, According to the old version, DeWitt and Godfrey (1972) [1] say that the species *Nezara viridula* is a pest presumably originated from Southern Asia and the second version shows that it is originated from Ethiopia of East Africa Jones (1988) [2] and Panizzi (2008) [3] from where it is also distributed in other regions namely, Asia, America and Europe Todd (1989) [4]. This species is economically important because its preference is on legumes, soybean and beans Schaefer and Panizzi (2000) [5]. Southern green stink bug is a pest on various agriculture crops and it is distributed worldwide now. It is well known as a primary pest and highly polyphagus, which feeds on more than 30 families of plant species Panizzi (1997) [6]. According to available literature in the past, two varieties of the Southern green stink bug *Nezara viridula are* mentioned in fauna of British India Series, by Distant (1902) [7]. Then, an entomologist Freeman (1940) [8] gave an account of the genus *Nezara* Amyot and Serville, during his work and he noted that the common green form must receive the status of variety by the law of priority. Later, interesting and important work on Polymorphism on the Southern green stink bug was carried out by Yukawa and Kiritani (1965) [9]. They reported nine polymorphic types of *Nezara viridula* from different geographical regions in the world. Recently, Vivan and Panizzi (2002) [10] have been reported 10 different colour'morphs of *Nezara viridula* which are derived from four basic types from Neotropical region. This is a very common species known all over the world and it is a general insect regularly found in all states of India. Data of the current study confirmed that three morphs of the Southern green stink bug *Nezara viridula* are found in agricultural crops, forest areas and common weeds in Chandgad Tehsil. The present study is basic data on *Nezara viridula* and it may be useful for the Maharashtra state because a little knowledge is available in this state and additional work of their geographical location and richness of the Polymorphism in the southern green stink bug is very essential.

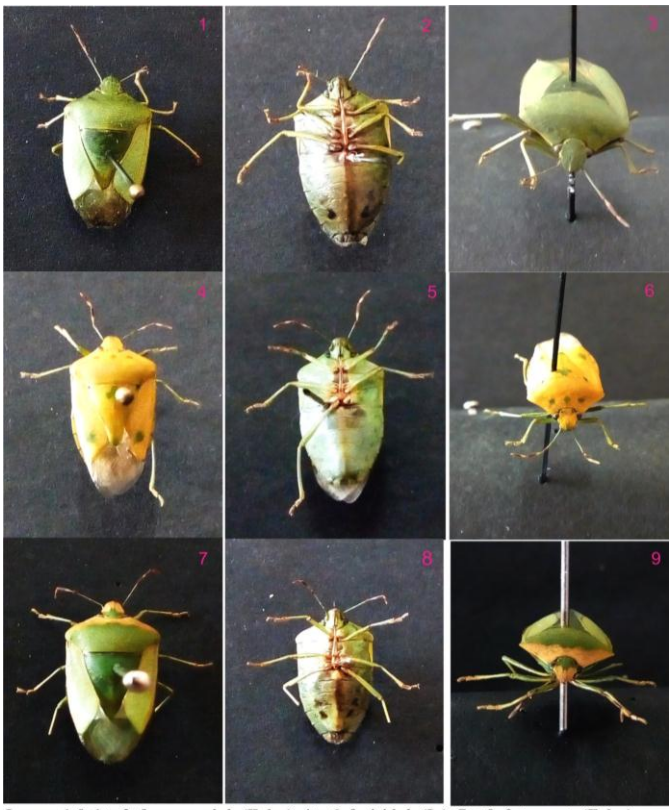
Materials and Methods
The idea of the current study of southern green stink bug *Nezara viridula* was originated in June to November 2017 when we arranged night collection with the help of mercury light in agriculture crops on which most of the various colour morphs of *Nezara viridula* were observed. Collection of this bug was made by sweep net, hand picking and light trap method from agriculture crops, forest areas and common weeds in Chandgad Tehsil in Kolhapur district of Maharashtra. After that collected bugs were transferred into insect containers and brought to the laboratory, then killed with the help of ethyl acetate and adult species were pinned and dried in the oven temperature ranging from the 50 to 58^0 C for 50 minutes. The species *Nezara viridula* was identified with available literature Distant (1902) [7] and research article by Vivan and Panizzi (2002) [10]. Images of the southern green stink bug *Nezara viridula* were taken by Canon PC 1560 Camera. (Images- 1 to 18)

Result and Discussion
The southern green stink bug is widely distributed in all over India. It is a highly polyphagus feeder which feeds on many important plant species. This species produces unpleasant odour by the scent glands, which are the short and broad located on the metasternum. During six months (June to November 2017), many species of *Nezara viridula* were

collected (L.) from study area, including 3 colour morphs and one unidentified morph. The present research paper deals with the three species of colour morphs and one unidentified morph of the southern green stink bug *Nezara viridula* (L.) obtained from the study area. Of these, the first common species f. *smaragdula* (Fabr.) (Plate-1. Images- 1, 2, and 3) was collected in agriculture field and in a light source which is the pest on paddy fields and their nymphal stages are given; (Plate- 2 and 3. Images- 13, 16, 17, 18 and 19). The final instar nymph f. *smaragdula* (Fabr.) was collected on the common okra (*Abelmoschus esculentus)*which is one of the important vegetable crops in the study area and also some natural images of it are provided and this is abundant in the study area. The very important identification characteristic of this species is that it is entirely dark green in colour. The second species of the southern green stink bug *Nezara viridula* (L.) was collected from the light source and its host plant is unknown. This species is totally different from the others and it is easily identified because its dorsal surface is covered with yellow colour and green spots to near ocelli or at the anterior margin of pronotum, green spots to scutellum, caudal apex and apex of each corium (Plate-1. Image- 4, 5 and 6). This is a single species collected from the light source and brought to the laboratory and it was supplied different food material every day such as common okra (*Abelmoschus esculentus),* paddy leaves and grains, leaves of sweet potato and leaves of Ghaneri (*Lantana sp.)* were mostly provided to it for three days, but their yellow colour did not change. Finally we came to the conclusion that this is the original colour of *Nezara viridula* (L.). The third color morph f. *torquata* (Fabr.) is not common in the study area and only two samples of it were collected. They were collected from the light source with the help of insect net. These species differ from above mentioned two species because its anterior margin of the head, lateral lobe, median lobe, their median and anterior area of pronotum, lateral margins of the pronotum are yellow in colour and the remaining portion is green in colour, scutellum is dark green and thickly punctuate, corium is yellowish green, the shape of pronotum is closely similar to the first morph f. *smaragdula* (Fabr.), abdomen with four black spots, and its length is 14.6 mm and width 8.4 mm (Plate-1. Image- 7, 8 and 9). During collection, we collected another unidentified colour morphs species of the southern green stink bug *Nezara viridula* (L.) from light source. This species may be interesting and their morphological characteristics are closely related to the above mentioned third species f. *torquata* (Fabr.) but their colour is slightly different and the ventral surface is yellowish green, and abdomen is without black spots, colour of lateral, median of head; lateral margins of pronotum, anterior and median lobe of pronotum is slightly yellowish- white, scutellum is greenish yellow with less punctuate, corium greenish in colour, the body and shape of pronotum slightly differs from the third morph f. *torquata* (Fabr.) and its body length is 15.4 mm and width 8.2. In addition, images of the ventral, dorsal, and dorsal view of head are given (Plate-2. Image- 10, 11, 12, 14 and 15).

A very few studies reported colour variation among *Nezara viridula* from India. It is mentioned in the following text. The southern green stink bug *Nezara viridula* (L.) was collected by English Entomologist Distant (1902) [7] in his fauna of British India. He collected two varieties out of which one species found in Bombay and other bug collected in Bangalore, but he didn't mention the names of the two varieties but briefly provided their morphological characteristics. Comprehensive work on polymorphism in the southern green stink bug *Nezara viridula* (L.) was carried out by Yukawa and Kiritani (1965) [9] from different geographical regions in the world. They have reported 9 colour morphs which are the G, O, F and R type. After Distant's work, Azim and Shafee (1978) [11] studied Indian species of *Nezara* Amyot and Serville but they did not mention colour morphs of Indian species of *Nezara viridula* (L.). Then, important information was added about the polymorphism of the southern green stink bug *Nezara viridula* (L.) from Karnataka state by Salini (2011) [12]. She collected bugs from various ecosystems and reported 3 colour forms with diagnostic character. She concludes that the species *Nezara viridula* (L.) occurs in three colour morphs in nature. Chandra *et al.* (2014) [13] gave the additional knowledge of polymorphism of the southern green stink bug *Nezara viridula* (L.) from Madhya Pradesh. They have reported four colour morphs of the southern green stink bug. They briefly provided the morphological variation among the species of *Nezara viridula* (L.). Recently, Lam *et al.* (2015) [14] studied on the polymorphism of the southern green stink bug from Vietnam and they reported 10 colour morphs together with G, O, F, R, OR, GY, OG, Y, B, and C.

Plate 1



Images 1-9. 1 to 3- f. *smaragdula* (Fabr.); 4 to 6- f. *viridula* (L.); 7 to 9- f. *torquata* (Fabr.)

Plate 2

Images 10-18. 10 to 12- unidentified morph; 13- f. *smaragdula* (Fabr.) on paddy field; 14 to 15 unidentified morph on common shrub and grass; 16 to 17 fourth and fifth instar on fruits; 18 fourth instar on okra

Plate 3

19. fourth and fifth instar on okra

Conclusion

The current study provides basic information of the southern green stink bug *Nezara viridula* (L.) from Chandgad Tehsil, Kolhapur. Additional work is very necessary to find out the richness of color morphs of the southern green stink bug *Nezara viridula* (L.) from Maharashtra state. Study area provided 3 colour morphs of the southern green stink bug *Nezara viridula* (L.) and one unidentified colour morph, which provides the colour images of dorsal and ventral view, dorsal view of head and host plant and they are not yet mentioned by the earlier workers who recently studied colour morphs of Indian species *Nezara viridula* (L.) from India.

Acknowledgement

The authors are thankful to the authorities of R. B. Madkholkar College for facilities. We are also thankful to Mr. P. A. Gawas, Department of Computer science, R. B. Madkholkar College, Chandgad for the photo plate preparation.

References

1. Dewitt NB, Godfrey GL. The literature of arthropods associated with soybeans II. A bibliography of the southern green stink bug *Nezara viridula* Linnaeus Hemiptera: Pentatomidae. Natural History Survey Biological Notes. 1972; 3(78):1-23.
2. Jones WA. World review of the parasitoids of the southern green stink bug, Nezara viridula L. Annals of the Entomological Society of America, 1988; 81:262-273.
3. Panizzi AR. Southern green stink bug, *Nezara viridula* L. Hemiptera: Heteroptera: Pentatomidae. In Encyclopedia of Entomology. Capinera JL editor. Springer, Heidelberg, 2008; 3471-3471.
4. Todd WJ. Ecology and Behavior of *Nezara viridula*. Annual Review of Entomology, 1989; 34:273-292.
5. Schaefer CW, Panizzi AR. Sting bugs Pentatomidae, Heteroptera of economic importance. CRC Press, Boca Raton, 2000, 828.
6. Panizzi AR. Wild host of pentatomids: Ecological significance and role their pest status on crops. Annual Review of Entomology, 1997; 42:99-122.
7. Distant WL. Rhynchota Heteroptera. In: Blanford WT. Ed. The Fauna of British India Including Ceylon and Burma. Taylor and Francis, London, 1902-2008; 3471-3471. XXXVII+ 438.
8. Freeman P. A contribution to the study of the genus *Nezara* Amyot and Serville Hemiptera, Pentatomidae. Transactions of the Royal Entomological Society of London, 1940; 90:351-374.
9. Yukawa J, Kiritani K. Polymorphism in the Southern Green Stink Bug. Pacific Insects. 1965; 7(4):639-642.
10. Vivan LM, Panizzi AR. Two new morphs of the Southern Green Stink Bug, *Nezara viridula* L., Heteroptera: Pentatomidae, in Brazil. Neotropical Entomology. 2002; 51(3):475-476.
11. Azim MN, Shafee SA. Indian species of the genus *Nezara* Amyot and Serville Hemiptera: Pentatomidae. Journal of Bombay Natural History Society. 1978; 75(2):507-511.
12. Salini S. Polymorphism in southern green stink bug, *Nezara viridula* L. Hemiptera: Pentatomidae. Current biotica. 2011; 4(2):482-485.
13. Chandra K, Kushwaha S, Tyagi K. First record of four colour morphs of the southern green stink bug, *Nezara viridula* L. Heteroptera: Pentatomidae, from Madhya Pradesh, India. Munis Entomology and Zoology Journal, 2014; 9:254-257.
14. Lam TTN, Lam TX, Lan TN. Polymorphism of the Southern Green Stink Bug *Nezara viridula* Linnaeus, 1758 Hemiptera: Pentatomidae In Vietnam. Biological Forum – An International Journal. 2015; 7(1):276-281.