FIRST RECORD OF FOUR COLOUR MORPHS OF THE SOUTHERN GREEN STINK BUG, *NEZARA VIRIDULA* (L.) (HETEROPTERA: PENTATOMIDAE), FROM MADHYA PRADESH, INDIA

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ABSTRACT: During the several faunastic surveys of Madhya Pradesh by the Zoological Survey of India Jabalpur since 1960, many specimens of southern green stink bug, *Nezara viridula* (L.), were collected. The collection revealed the presence of four morphs showing the phenomenon of colour polymorphism. These entire colour morphs are the new records for Madhya Pradesh. All the specimens have been submitted to ZSI, Jabalpur.

KEY WORDS: *Nezara viridula* (L.), Polymorphism, Madhya Pradesh, India.

The precision in identification of an organism formulates the fundamental step for most aspects of biological science. In Hemiptera as well as in most of the insect groups, traditional taxonomic research is practiced with morphology as a fundamental, which sometime have great variations in members of a species dealing with a number of characters i.e. polymorphism. These variations have tested taxonomic research for nearly 300 years is one of the important reasons for large number of synonymies (Bickford et al., 2007; Winker, 2005).

Color polymorphisms make available data to explain variation in morphology and ecology of the taxa under consideration. Insects are the best examples among animals to study intra-specific variations including colour polymorphism (Kettlewell, 1973). Within the insects, members of order Hemiptera especially aphids are an attractive group for study where color polymorphism is fairly common (Dixon, 1985; Weber, 1985; Tomiuk et al., 1990). The present study report the colour polymorphism in "The southern green stink bug" for the first time from State of Madhya Pradesh, India.

Nezara viridula (L.), commonly known as "The southern green stink bug" due to its pungent smell is an important pest for various agricultural crops worldwide. It is believed to have Afrotropical origin (Jones, 1988) with a worldwide distribution now (Todd, 1989). It is predominant in most of the warmer regions, damaging a wide variety of fruit, nut, grain, and vegetable crops (Dewitt & Godfrey, 1972; Todd & Herzog, 1980). *N. viridula* is highly polymorphic with 10 different colour morphs which are originated from four basic types that are G, O, F & R (Kiritani & Yukawa, 1963; Yukawa & Kiritani, 1965; Kiritani, 1970; Hokkanen, 1986). These four basic colour forms were distinguished and given names based on the colour pattern on the dorsal body surface (Kiritani & Yukawa, 1963; Yukawa & Kiritani, 1965). *N. viridula* f. *smaragdula* F. (G-type) is the common green form, f. *torquata* F. (O-type) has median and lateral lobes and the anterior margin of the pronotum yellow or orange, f. *viridula* L. (R-type) has green spots on a background of yellow or orange over the entire body, and an

unnamed morph (F-type) is like f. *torquata* except it also has yellow or orange along the margins of the convexium.

The present study is based on the collection made by Zoological Survey of India, Jabalpur, in Madhya Pradesh over a period of 50 years. All the specimens have been deposited in Zoological Survey of India, Jabalpur Insect collections. The objective of the present study is to report four colour morphs of *N. viridula* from the state of Madhya Pradesh for the first time and is probably the first authenticated report of four colour morphs of this species from India.

MATERIAL AND METHODS

During the several faunastic surveys by Zoological survey of India, Jabalpur has collected many specimens of *Nezara viridula* (L.) by hand picking, net trap and light tarp methods, collected from various localities of Madhya Pradesh. Specimens were shorted out and different specimens of *Nezara viridula* (L.) were pinned, drayed and were identified with the help of literature available in ZSI library and Fauna of British India. Four basic colour types G, O and R, are identified and shorted out form collected specimens. Morphology of bugs were studied by Leica microscope M205-A. Photography of various morphs was done by Sony DSC-H10 camera.

Abbreviation used: f.-Variety of *Nezara viridula* (L.); KGNP- Kangerghati National Park; PTR- Pench Tiger Reserve; M.P- Madhya Pradesh; ZSI- Zoological Survey of India.

RESULTS AND DISCUSSION

There are about 10 colour morphs present in all over the world (Yukawa & Kiritani, 1965), few of them are mentioned here viz. f. *smaragdula* (Fabr.), f. *torquata* (Fabr.), f. *viridula* (L.), f. *aurantica* Costa, f. *vicaria* Walker, f. *chiorocephala* Westwood, etc (Table 1). They are symbolized with alphabetically types G, O, R, Y, B and C respectively, in spite of this OR and FR types are the cross product of O, R and F, R types respectively. There are no intermediate forms between such forms as G, O and R, which seem to be fundamental. This color variation occurs in all types during hibernation in temperate regions. R type which is very rare variety reported from District Jhabua, G and O type from all over Madhya Pradesh. Among them G-polymeric form is the most common in Madhya Pradesh due to ecological cline and probability of invasion of G-polymeric form become greater than other types in the habitats. R-polymeric form is the very rare found in our study area. Distant (1902) used the term *var*.a & *var*.b for polymeric forms of this bug. Even though Indian species of *Nezara* Amyot & Serville was studied by Azim and Shafee (1978), the polymorphic forms of the species, *N. viridula* (L.) were not mentioned.

Three colour morphs of *N. viridula* along with notes on colour pattern have recently been reported from Karnataka (Salini, 2011). The author stated that the specimens have been collected "*from various ecosystems covering almost all districts of Karnataka. Besides this, specimens were procured on loan from various agricultural institutions*". However there is no indication of locality and other data for specimen of each colour morph and no information has been provided about the depositions of these specimens in any designated national repository, so that these can be available for others to study.

Different morphological types of *Nezara viridula* (L.) were recorded from Madhya Pradesh. Their distribution frequencies are provided in table 2 and are briefly discussed here.

f. *smaragdula* (Fabr.): Body entirely dark green. Fig.1-A

f. *viridula* (L.): Body yellow with green spots (New record from M.P.) Fig.1-B

f. *torquata* (Fabr.): Median, lateral lobes, anterior margin of pronotum yellow; anterior and lateral margin of head yellow. Fig. 2-A

f. *smaragdula* (Fabr.): Body green-yellowish. Fig. 2-B

f. *torquata* (Fabr.), median and lateral lobes, anterior margin of pronotum yellow, body green-yellowish and f. *viridula* (L.) body yellow with green spots was firstly reported by Yukawa and Kiritani (Yukawa and Kiritani, 1965) from India these two varieties are reported first time from the state of Madhya Pradesh, India.

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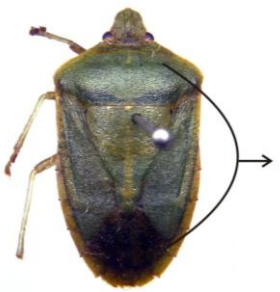
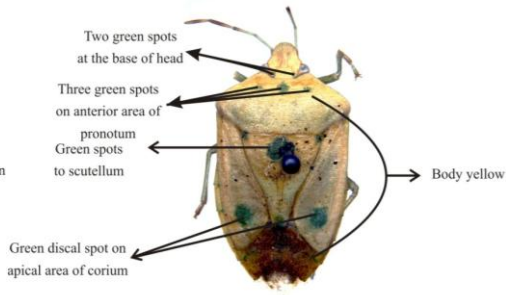
Different morphological varieties of *Nezara viridula* (L.) occurring in Madhya Pradesh



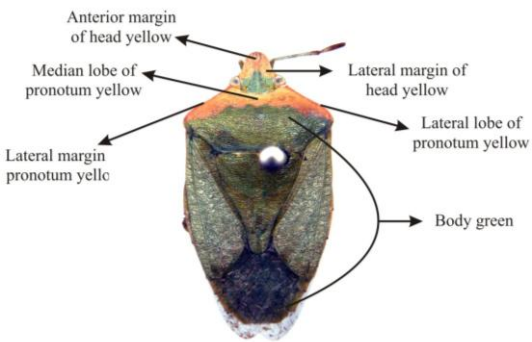
f. *smaragdula* (Fabr.)

Fig. 1 A



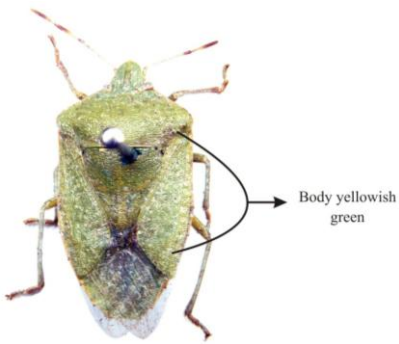
f. *viridula* (L.)

Fig. 1B



f. *torquata* (Fabr.)

Fig. 2 A



f. *smaragdula* (Fabr.)

Fig. 2 B

Table 1. All reported morphs of *Nezara viridula* (L.) all over the world.

S.No.	Morphological name	Type	Morph pattern
1	f. *smaragdula* (Fabr.)	G	Body entirely green
2	f. *torquata* (Fabr.)	O	Median and lateral lobes, anterior margin of pronotum yellow
3	f. *smaragdula* (Fabr.)	-	Body green-yellowish
4	f. *viridula* (L.)	R	Body yellow with green spots
5	f. *aurantica* Costa	Y	Entirely yellow, orange or pink
6	f. *vicaria* Walker	B	Entirely brown
7	f. *chiorocephala* Westwood	C	Entirely cobalt

Table 2. Showing the distribution frequency of different morphological types of *Nezara viridula* (L.) occurring in Madhya Pradesh.

S. No.	Morphological name	Type	Distr. in Madhya Pradesh	No. of exs.
1	f. *smaragdula* (Fabr.)	G	Very High	52
2	f. *torquata* (Fabr.)	O	Low	08
3	f. *smaragdula* (Fabr.)	-	High	30
4	f. *viridula* (L.)	R	Very Rare	01