

# First record of two spotted stink bug, *Perillus bioculatus* (Fab.) from Meerut (U.P.) North India

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**Abstract**— Spotted stink bug, *Perillus bioculatus* female bug lays 25-30 rounded black eggs. Eggs hatch in 5-6 days. The 1st instar nymph lasts for 3.33 days (ranged 3-4 days), however the second instar nymphal period is completed in 3.67 days (ranged 3-4 days), while the 3rd instar takes 4 days (ranged 4 days). The 4th and final instars nymph lasts for 4.67 days (4-5 days), however adult period lasts 6.67 days (ranged 6-7 days). The *P. bioculatus* was found to complete its life cycle on an average in 22.33 days (ranged 20-24 days) in the laboratory. In a laboratory experiment on feeding potential of different stages of bug showed that a single bug consumed 22.0 grubs (ranged 20-22 grubs) during its life period. This bug is recorded as a limiting factor of *Z. bicolorata*.

**Keywords**— First record of two spotted stink bug, *Perillus bioculatus*.

## I. INTRODUCTION

Two spotted stink bug, *Perillus bioculatus* (Fab., 1775) a native of North America is recorded for the first time from Meerut India of a predator of grubs of *Zygogramma bicolorata* Nymphs and adult of two spotted stink bug predate on the grubs of *Zygogramma bicolorata* on Parthenium. Nymphs may pale yellow or reddish-orange in colour. There is a distinct black "Y-shaped" marking on pronotum and two black spots on the prothorax of adults bug. (1). It is believed that the origin of the species is in the southern Rocky Mountains, but its range expanded with the expansion of the range of its primary prey, the Colorado potato beetle, *Leptinotarsa decemlineata*. *P. bioculatus* has repeatedly been introduced into several European countries since 1966 (e.g., Belgium, France, Germany, Italy, Russia, Slovakia, Ukraine, former Yugoslavia) (2), to control *L. decemlineata*. Documentation of establishment in the field is rather vague and often anecdotal, but it probably was hindered by the different phenologies of predator and prey (3). However, observations of successful establishment in the field are available for Greece (Brustel in litt.) and confirmed for European Turkey (Eastern Thrace), where the species has been found since 1992(4-5). Occasionally this predator may provide control of the Colorado potato beetle, but it rarely occurs in large enough numbers to provide adequate control. In the laboratory the species is a polyphagous predator and the recent records come from non-potato fields and orchards. The objective of this study was to investigate the species composition of two spotted stink bug within the Meerut district of the Uttar Pradesh, India.

## II. MATERIALS AND METHODS

District Meerut is situated between 29° 01'N latitude and 77° 45'E longitude at an altitude of 237 meters above the mean sea level. This district falls under north western plains sub- region of Upper Gangatic plains and is spread over a geographical area of 2564 km<sup>2</sup>. The general climate of this district is semi-arid and sub-tropical characterized by very hot summer and cold winters. For biological study of *Perillus bioculatus*, few adult bugs were collected from Parthenium in late May and June and were placed in rearing jar along with potted Parthenium plant as a substrate for egg laying and food for *Zygogramma* grubs and adult and *Zygogramma* grubs released in jar to serve as food for *P. bioculatus*. The jar was covered with muslin cloth, held in position with the help of a rubber band. The egg laid by female on the surface of glass jars was removed with the help of a moist camel hair brush, while those deposited on the substrate were removed along with the substrate. Care was taken so that the eggs were not damaged. The laid eggs of *P. bioculatus* were kept in plastic vials to study the incubation period and duration of other stages of life cycle.

The experiment on feeding potential of nymphs and adults were carried out under laboratory condition at room temperature. For this study plastic vials (4X2 cm) with moistened filter paper at the bottom were used. First instar nymph was provided with succulent stem of Parthenium and the remaining instars of nymphs and newly emerged adults were kept in the separate vials and each vial was provided with 10 grubs (mixed size) as food. The daily consumption of *Zygogramma* grubs by nymphs and adults of *P. bioculatus* were calculated. Thereafter, the number of unconsumed grubs left over in the vials were collected daily and calculated for consumed ones. The actual number of *Zygogramma* grubs was obtained by subtracting the number of *Zygogramma* grubs left over from the total number of *Zygogramma* grubs every day.

For the analysis of biological studies and feeding potential of *P. bioculatus* was subjected to analysis of variance (ANOVA) using SPSS 10.0 for Windows software (SPSS, 1999).

**III. RESULTS AND DISCUSSION**

During the extensive survey of different bio-agents of major insect pests, a predatory pentatomid bug *P. bioculatus* was recorded in the different crops were found predated on the grubs of *Zygogramma bicolorata* on Parthenium. Nymphs of *P. bioculatus* may pale yellow or reddish-orange in colour. The adults bug had a distinct black "Y-shaped" marking on the pronotum and two black spots on the prothorax<sup>6</sup>.

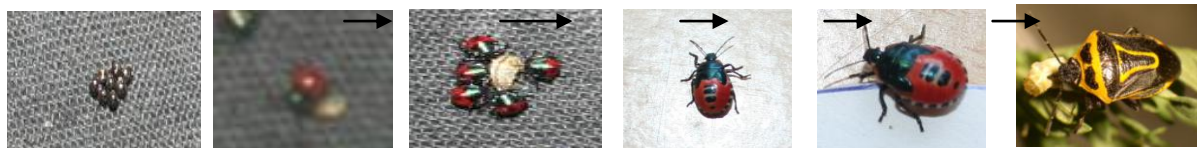


**TABLE 1: BIOLOGY AND FEEDING POTENTIAL OF TWO SPOTTED STINK BUG, PERILLUS BIOCULATUS ON THE GRUBS OF ZYGOGRAMMA BICOLORATA**

**EGG LAYING CAPACITY OF A SINGLE FEMALE IS :** 25-30  
**COLOUR OF EGGS :** BLACK COLOUR

Developmental stage	Length and width (cm)	Period/time (days)	Grub of <i>Zygogramma</i> consumed/bug
Eggs	1.25-1.30 ± 0.003	5.67 ± 0.67 (5-6)	.....
	0.85-0.95 ± 0.003		
1 <sup>st</sup> instar nymph	0.30-0.36 ± 0.017	3.33 ± 0.33 (3-4)	1.67 ± 0.33 (1-2)
	0.19-0.20 ± 0.003		
2 <sup>nd</sup> instar nymph	0.61-0.65 ± 0.012	3.67 ± 0.33 (3-4)	3.00 ± 0.00 (3.0)
	0.46-0.50 ± 0.012		
3 <sup>rd</sup> instar nymph	0.89-0.90 ± 0.003	4.00 ± 0.00 (4.0)	3.33 ± 0.33 (3-4)
	0.72-0.78 ± 0.019		
4 <sup>th</sup> instar nymph	1.20-1.28 ± 0.023	4.67 ± 0.33 (4-5)	3.67 ± 0.33 (3-4)
	0.91-0.93 ± 0.006		
Adult	1.80-1.88 ± 0.023	6.67 ± 0.33 (6-7)	10.33 ± 0.33 (10-11)
	1.20-1.22 ± 0.007		
Total period of time taken from egg laying to adult emergence		22.33 ± 1.20 (20-24)	22.00 ± 0.58 (20-24)
<b>CD &gt; 0.05%</b>			1.122
<b>SE (m)</b>			0.36

Adults begin laying eggs in about 7 days after the copulation. Eggs were laid in a compact double row containing 25-30 eggs on the upper surface of *Parthenium* leaves. Eggs hatch in 5-6 days and first instars begin sucking plant juices from *Parthenium* stems. The eggs of *P. bioculatus* hatch in 5 to 8 days and first instars begin sucking plant juices from potato stems (6). The newly hatched 1<sup>st</sup> instar nymph of *P. bioculatus* were reddish black in colour (Fig: 1b) and size 0.3-0.36 X 0.19-0.2 cm (Table 1) and 1<sup>st</sup> instar nymphal period lasts for 3.33 days (ranged 3-4 days). The second instar nymphal period (Fig: 1c) was completed in 3.67 days (ranged 3-4 days) having a size of 0.61-0.65 X 0.46-0.50 cm, while the 3<sup>rd</sup> instars (Fig:1 d) took 4 days to moult to 4<sup>th</sup> instar (ranged 4 days) with 0.89-0.90 mm in length and 0.72-0.78 cm width in size, respectively. The 4<sup>th</sup> and final instars (Fig: 1 e) nymph lasts for 4.67 days (4-5 days), and it measures 1.20-1.28 cm in length and 0.91-0.93 cm in breadth and takes 4-5 days to change to adult stage. The nymphs were pale yellow or reddish-orange in colour. The eggs hatched in 5 to 8 days and first instars began sucking plant juices from potato stems. Development of all instars requires about 18 to 20 days at 24°C<sup>6</sup>.



**Fig. 1.** Biology of predatory pentatomid bug, *Perillus bioculatus*  
**Fig. 1 (a)** Egg    **(b)** 1<sup>st</sup> instar    **(c)** 2<sup>nd</sup> instar    **(d)**. 3<sup>rd</sup> ins. **(e)** 4<sup>th</sup> instar    **(f)** Adult

The adult *P. bioculatus* (Fig: 1 f) was yellowish red or dark yellow coloured with dark brown head having two black spots on the prothorax and a distinct "Y-shaped" black marking on the pronotum. The adult bug measured 1.80-1.88 cm in length and 1.20-1.22 cm in width. Adults ranged in length from 10 to 12 mm with a distinct black "Y-shaped" marking on the pronotum and two black spots on the thorax<sup>5</sup>. The adult period lasted 6.67 days (ranged 6-7 days) but in contrary, the adult longevity of *P. bioculatus* was reported to be 6 week<sup>6</sup>. The *P. bioculatus* was found to complete its life cycle on an average in 22.33 days (ranged 20-24 days).

Observations on the feeding potential revealed that the first instar nymph of *P. bioculatus* consumed 1.67 grubs (ranged 1-2 grubs), 2<sup>nd</sup> and 3<sup>rd</sup> instar nymphs consumed 3.0 grubs (ranged 3.0 grubs) of *Z. bicolorata*, respectively. However, the 4<sup>th</sup> and final instar nymph consumed 10.33 grubs (ranged 10-11 grubs). The adult bug consumed 6-7 (ranged 6.67 grubs) grubs. During their life period a single bug consumed 22.0 grubs (ranged 20-22 grubs). However, the nymphs of *P. bioculatus* consumed an average of 285 Colorado potato beetle eggs, 3.7 larvae, and 5.1 adults during development of instars 1-5. Others have shown that 4<sup>th</sup> and 5<sup>th</sup> instars nymphs consume up to 59 Colorado potato beetle eggs per day<sup>6</sup>. The two spotted stink bug was recorded as a limiting factor of the *Zygogramma* grub for the management of *Parthenium* grass.

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