



ISSN (E): 2277-7695  
 ISSN (P): 2349-8242  
 NAAS Rating: 5.23  
 TPI 2023; 12(3): 1323-1326  
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 www.thepharmajournal.com  
 Received: 02-01-2023  
 Accepted: 04-02-2023

**Vinay N**  
 Assistant Professor,  
 Department of Entomology,  
 Sun Institute of Agricultural  
 Sciences, Visakhapatnam,  
 Andhra Pradesh, India

**V Rajababu**  
 Associate Professor, Department  
 of Genetics and Plant Breeding,  
 Sun Institute of Agricultural  
 Sciences Visakhapatnam,  
 Andhra Pradesh, India

**G Srinivasulu Naidu**  
 Chairman, Sun Institute of  
 Agricultural Sciences,  
 Visakhapatnam, Andhra  
 Pradesh, India

**Corresponding Author:**  
**Vinay N**  
 Assistant Professor,  
 Department of Entomology,  
 Sun Institute of Agricultural  
 Sciences, Visakhapatnam,  
 Andhra Pradesh, India

## Incidence of banana leaf roller, *Erionota torus* Evans (Lepidoptera: HesperIIDae) in Visakhapatnam, Andhra Pradesh

Vinay N, V Rajababu and G Srinivasulu Naidu

### Abstract

Banana leaf roller, *Erionota torus* has already attained a status of major pest in banana growing areas, causing an average defoliation of 60 percent and yield loss of 20 per cent. During the field visits in Sun Institute of Agricultural Sciences, Visakhapatnam, we noticed an infestation of banana leaf roller on banana plants led to the study. The results of roving survey revealed the per cent incidence of 30.55 on banana plants with an average of 1.29 larvae per plant. The larvae roll the leaves and feeds inside the rolled structures. The larvae were also collected in the field and brought to the laboratory for identification. The confirmation of the pest was done based on both morphological characters and damage symptoms in the field.

**Keywords:** Banana leaf roller, survey, incidence, identification, Visakhapatnam

### Introduction

Banana (*Musa paradisiaca* L.) also known as apple of paradise, is one of the most important fruit crops of India. It is a large perennial herb with leaf sheaths that form the trunk, called pseudostem (Bora *et al.*, 2017)<sup>[2]</sup>. In India, bananas are grown in an area of 924.14 thousand hectares with a production of 33061.79 thousand MT (Indiastat, 2021)<sup>[6]</sup>. Banana is considered as fourth most valuable food after rice, wheat and milk (Ploetz, 2001)<sup>[12]</sup>. Banana plants are stenothermic plants grown under the humid tropical lowlands (15-38°C, optimum 27°C). The medicinal properties of banana are part of the folk medicine of all tropical countries. Bananas are used in special diets where ease of digestibility, low fat, minerals and vitamins are required and they are also a source of compounds with health properties (Fahrasmane *et al.*, 2014)<sup>[4]</sup>. The pulp contains approximately 20 g of carbohydrates per 100 g of fresh pulp, bananas are also a good source of Potassium, Magnesium, Copper and Manganese in the diet, but do not supply much vitamin C or vitamin A, relative to other fruits (Wall, 2006)<sup>[22]</sup>. Bananas are identified as relatively rich in pyridoxine (vitamin B<sub>6</sub>) (Leklem *et al.*, 1999)<sup>[9]</sup>.

Several insect pests are invaded to India and across the globe due to climate change; Fall armyworm, *Spodoptera frugiperda* is one of such examples (Vinay *et al.*, 2022a<sup>[20]</sup>; Vinay *et al.*, 2022b<sup>[21]</sup>; Ganiger *et al.*, 2018<sup>[5]</sup>). Also many secondary pests were outbreak in a severe form; the best illustration is banana leaf roller, *E. torus*, which is now considered as serious pest on banana. The pest is familiar with other vernacular names such as banana skipper, red palm eye, rounded palm redevye, Sikkim palm dart, giant banana skipper and Sikkim palm redevye (Jambagi *et al.*, 2022)<sup>[7]</sup>. The occurrence of this pest has been reported from South-East Asian countries like South China, Burma, Malaya, Vietnam, Papua New Guinea, Thailand, Sri Lanka and North Eastern states of India (Chatter *et al.*, 2020)<sup>[3]</sup>. In India, it has been reported from Kerala (Sivakumar *et al.*, 2014)<sup>[17]</sup>, Tamil Nadu (Padmanaban, 2014)<sup>[11]</sup>, Manipur (Prasad and Singh, 1987)<sup>[14]</sup>, Karnataka and Andhra Pradesh (Kamala Jayanthi *et al.*, 2015)<sup>[8]</sup>, Chattisgarh and Madhya Pradesh (Tippel and Ghorpade, 2012)<sup>[18]</sup>, West Bengal and Assam (Wynter Blyth, 1957)<sup>[24]</sup>, Andaman and Nicobar islands (Veenakumari and Mohanraj, 1991)<sup>[19]</sup>. The larvae of these butterflies can cause a mean defoliation of about 60 per cent and yield loss of about 20 per cent (Okolle *et al.*, 2010)<sup>[10]</sup>. The later instar larvae secrete a waxy powdery substance and cover the entire body. This substance is believed to be by-product of metabolism (Waterhouse *et al.*, 1998)<sup>[23]</sup>. During the field visits in Sun Institute of Agricultural Sciences, Visakhapatnam, the leaf roller larvae were noticed on banana plants. Hence, the survey was conducted to study the incidence level and nature of damage of leaf roller on banana plants.

## Materials and Methods

### Incidence level of Leaf roller

A roving survey was carried out to study the per cent incidence of banana leaf roller, *E. torus* in the student's field of Sun Institute of Agricultural Sciences, Visakhapatnam, Andhra Pradesh [17°48'6" NL and 83°12'5" EL]. The observations were recorded on per cent incidence of leaf

$$\text{Per cent Incidence} = \frac{\text{Number of damaged Plants}}{\text{Total number of plants observed}} \times 100$$

Whereas, the mean number of leaves affected per plant was calculated by counting the total number of affected leaves

$$\text{Mean number of leaves affected per plant} = \frac{\text{Number of leaves affected}}{\text{Total number of leaves in a plant}}$$

Also, the mean number of larvae per plant was studied by opening the rolled leaves and counting the larvae present

$$\text{Mean number of larvae per plant} = \frac{\text{Total number of larvae collected}}{\text{Total number of plants observed}}$$

### Identification and confirmation of pest

The pest was identified based on the damage symptoms in the field and rolled leaves were opened to study the larval characters. The larvae were collected in the field and brought to the Entomology laboratory, Department of Entomology, Sun Institute of Agricultural Sciences, Visakhapatnam. Some of the larvae were reared till adult stage to study the adult characters also few larvae were preserved in 70% alcohol. The taxonomical characters regarding larval and adult specimens were compared with the earlier findings for confirmation of the pest. The damage symptoms and other characters regarding larval and adult of *E. torus* were photographed.

## Results and Discussion

### Incidence level of leaf roller

The data on per cent incidence and mean number of leaf roller larvae per plant was recorded on 16<sup>th</sup> February, 2023. A total of 36 plants were observed to study the per cent incidence of *E. torus* out of which 11 plants were found affected. Hence, the per cent incidence of *E. torus* in the site of experimentation was worked out to be 30.55. Whereas, the mean number of leaves affected per plant was found to be 0.78. The mean number of larvae per plant was observed to be 1.29 (Table 1). The data also inferred that the pest follows clustered distribution in the field i.e. the symptoms of damage were recorded in the neighboring plants but not to the distant plants (Table 2). Our results are in accordance with Sharanabasappa *et al.*, 2016<sup>[16]</sup>; Sharanabasappa *et al.*, 2018<sup>[15]</sup>, who reported that the infestation range of banana skipper was varied between 6.66 to 84.25%, in which the maximum incidence was noticed during pre-flowering period (75.02%), followed by flowering period (45.67), broadleaf stage (29.58%) and bunch period (1.66%) in Shivamogga districts of Karnataka. Poorani *et al.*, 2020<sup>[13]</sup> observed the incidence of 14.62% and 12.14% with a mean number of 0.90 and 1.07 larvae per plant during 2016-17 and 2017-18, respectively from surveyed districts of Karnataka. Anonymous, 2017<sup>[1]</sup> showed the plant damage of 5-54.50% due to banana skipper in Kannara region of Kerala.

roller, mean number of leaves affected per plant and mean number of larvae per plant. The incidence of leaf roller was recorded by counting the number of plants infested or damaged out of total number of plants observed during the study and their per cent incidence was calculated by the formula

from randomly selected five plants and their mean was calculated using the formula

inside the rolled banana leaves from randomly selected five plants and their mean was worked out by using the formula

**Table 1:** Infestation of banana leaf roller, *E. torus* in Practical Crop Production Field

S. No	Parameters	Data observed
1	Infested plants	11
2	Healthy plants	25
3	Total No. of plants observed	36
4	Per cent infestation	30.55
5	Mean No. leaves affected per plant	0.78
6	Mean No. of larvae per plant	1.29

**Table 2:** Incidence pattern of banana leaf roller, *E. torus* in Practical Crop Production Field

	Column 1	Column 2	Column 3	Column 4
Row 1	H	H	NP	H
Row 2	H	NP	NP	NP
Row 3	H	NP	NP	NP
Row 4	H	H	H	H
Row 5	H	H	H	NP
Row 6	I	H	H	NP
Row 7	NP	I	I	NP
Row 8	I	I	I	H
Row 9	H	H	I	NP
Row 10	H	NP	NP	NP
Row 11	H	I	NP	H
Row 12	I	I	NP	H
Row 13	H	H	I	H
Row 14	NP	NP	NP	H

H-Healthy plant, I-Infested plant, NP-No plant

### Identification and confirmation of pest

All the larvae collected in the field were of later instars, having a robust body with waxy coating on it. The head of the larvae was very prominent with dark brown colour (Figure 1). The adults were having convex outer margin and rounded apex (Figure 2). The larvae construct the leaf roles and feed inside and the leaves get torned in this process (Figure 3&4). The larvae of *E. torus* were remain inside the rolled leaves up to pupation and on emergence, the adult butterflies comes out of the cocoon. All these characters were compared with the earlier literatures i.e. Poorani *et al.*, 2020<sup>[13]</sup>, Chatter *et al.*,

2020 <sup>[3]</sup>, Jambagi *et al.*, 2022 <sup>[7]</sup> and Sharanabasappa *et al.*, 2016 <sup>[16]</sup>.



**Fig 1:** Larva of banana leaf roller, *E. torus* feeding on banana leaves;



**Fig 2:** Adult of banana leaf roller, *E. torus*;



**Fig 3:** Leaves rolled by the larvae;



**Fig 4:** Leaves torned due to severe damage

### Conclusion

The banana leaf roller, *E. torus* is attained a status of major pest in last one decade. The per cent incidence of 30.55 was observed in the experimental site with mean number of 1.29 larvae per plant. This pest causes a serious defoliation in the field, affects the photosynthesis and finally decreases the yield of banana. As banana is an economical crop to the farmers of Visakhapatnam, early monitoring is a key strategy to reduce the damage done by the pest and in turn loss to the farmers. More emphasis should be given to bio control agents as they are safe to non-target organisms.

### Acknowledgements

The authors are thankful to the K. Yashoda (Chief Executive Officer) and Santhoshini Patro (HR Manager) of Sun Institute of Agricultural Sciences, Visakhapatnam for providing necessary facilities during the study. The authors are also acknowledges the second year B.Sc. (Agri) students of 2021 batch for helping in the process of recording the data and collection of larvae.

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