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## Bio-ecology and management of the banana skipper, *Erionota thrax* L. (Hesperiidae: Lepidoptera)

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### Abstract

The present study was conducted to assess the infestation, life stages and the efficacy of bio-pesticides and insecticides against skipper in banana. The results of life history of banana skipper, *E. thrax* indicated that the female laid eggs in clusters on the under surface of the leaves of banana plant. The infestation of banana skipper was low in Kadali and Karpooravalli while higher infestation was registered in Nendran and Matti. Life stages of incubation, total larval and pupal period ranged from 6 - 8 days, 24 - 32 days and 10 - 12 days, respectively. Among the treatments, chlorpyrifos, profenophos, Azadirachtin 10000 ppm and *Baeuveria bassiana* were recorded the highest per cent reduction and also higher fruit yield with better cost benefit ratio.

**Keywords:** Banana skipper, *Erionota thrax* (L.), defoliator, biology, management

### 1. Introduction

Banana (*Musa* sp.) is a major fruit crop believed to be originated in South-East Asian and Western pacific regions [12]. Among the 470 species of insect and mites recorded globally in banana as major and minor pests, 250 feed on foliage [7]. On feeding the leaves, foliage feeders cause reduction in the total photosynthetic area. Generally banana is not considered as a preferred host of lepidopteran defoliators with an exception of tobacco caterpillar, *Spodoptera litura* Fab. (Lepidoptera: Noctuidae) that usually infests during early crop growth stages. In India, slug caterpillars such as *Laticia lepida*, *Miresa decadens*, hairy caterpillar, *Euproctis* sp., *Pericalia ricini*, leaf beetle, *Nodostoma subcostatum* were recorded as major defoliators earlier [19]. Owing to climate change coupled with monocropping, ratooning and 'passenger distribution of pests' made some hitherto unknown pests to cause severe problems in banana cultivation especially in South India.

Banana skipper, *Erionota thrax* L. (Lepidoptera: Hesperiidae) is a serious defoliator of banana in East Asian countries [6]. In India, it was reported only from far North Eastern states like Manipur [10, 14], Assam [20, 2], Andaman and Nicobar Islands [18], Coimbatore, Erode districts of Tamil Nadu and Chamrajnagar district [8] and Bangalore [5] of Karnataka. Heavy infestation can damage the whole banana leaf, leaving only the midrib intact. Usually, banana plants can tolerate up to 20% defoliation. However, severe defoliation saving only the midrib can cause considerable reduction in photosynthetic efficiency of plant resulting in a decreased bunch size and weight. These butterflies are also known to infest palms occasionally [11]. During 2014-2015, a sporadic pest outbreak was noticed in Kanyakumari district of Tamil Nadu. The present investigation was carried out to assess the extent of damage by the banana skipper, *E. thrax*, varieties affected and eco-friendly management in banana.

### 2. Materials and Methods

Investigations were carried out in different places (Thiruvattar, Kulasehkaram, Thuckalay, Andoor, Thadikarankonam, Thuvrankadu, Kaliyal, Pechiparai) of Kanyakumari districts in Tamil Nadu during 2014-2015 to assess the infestation, life stages and to evaluate the efficacy of bio-pesticides and insecticides against skipper, *E. thrax* in banana.

#### 2.1. Infestation by banana skipper, *E. thrax* on different banana varieties

Roving surveys were carried out at monthly intervals to make the observations on the infestation by banana skipper, *E. thrax* on different banana varieties at various locations of Kanyakumari districts. A total of 100 plants were selected in each variety and observed individually from different locations for taking observations such as number of plants infested.

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The percentage of infestation was worked out by recording the total number plants and the plants infested by banana skipper under each variety and each surveyed area.

In the field, freshly laid egg masses were collected mostly from the underside of leaves in groups and brought into the laboratory to observe the egg, larval and pupa of banana skipper.

## 2.2. Assessment for the management of banana skipper, *E. thrax*

On farm trials were conducted in farmer's field at five locations in Kanyakumari district, Tamil Nadu during 2014 - 15 to evaluate the efficacy of bio-pesticides and insecticide against skipper, *E. thrax* in banana. There were five treatments including farmer's practices containing five replications in a randomized block design. The treatments were imposed twice at 30 days interval when the incidence was noticed. The observations were recorded as pre-treatment count on 7<sup>th</sup> and 14<sup>th</sup> day after each spray by counting the total number of infested plants in each treatments and the per cent infestation was calculated for each treatment.

## 2.3. Statistical Analysis

The data on percentage were transformed into corresponding angle / arc-sine percentage. The data gathered from field and laboratory experiments were subjected to statistical analysis [3] and the means were compared with Duncan Multiple Range Test (DMRT).

## 3. Results and Discussion

### 3.1. Infestation by banana skipper, *E. thrax* on different banana varieties

Results of roving survey indicated that the infestation of *E. thrax* has brought to force a change in the pest complex of banana. It is also known as banana leaf roller as the caterpillar typically rolls before metamorphosing in to pupa and then to a butterfly. Heavy infestation can damage the whole banana leaf, leaving only the midrib intact. The scattered occurrence of *E. thrax* was first noticed on banana in North Kerala in late 2012 [15]. The skipper was well established and widely distributed from there within a year as experienced in Taiwan during 1986-87 [1]. The results indicated the infestation of *E. thrax* on different varieties of banana recorded low in Kadali (3.16%), Pachanadan (7.19%) and Karpooravalli (13.17%) as compared to the maximum infestation registered in Matti (47.75%), Nendran (45.55%), Neypoovan (35.17%) and Red banana (32.15%) (Table 1). Sivakumar *et al.* [15] opined that the infestation of *E. thrax* on Nendran ranged from 20 to 50 per cent and there was no infestation in Kadali. The pest was recorded from almost all varieties of banana cultivated in the area. But the preference was noticed towards Matti, Nendran, Neypoovan and red banana varieties. The preference may be attributed to the leaf characters such as thickness of leaf lamina. This observation is in contrast with the observation made by Okelle *et al.* [6] in Cavendish variety as they observed maximum number of larvae in broad leaf followed by pre flowered stage plants.

The moth was dark brown with three conspicuous yellow marking on forewing. The egg masses were collected from both surfaces of the leaf as observed earlier [2]. Freshly laid eggs were pinkish red in colour and changed to creamy white before hatching. The life stages of egg (6-8 days), larval (24-32 days) and pupal (10-12 days) period were registered. During the life stages of study period, the average maximum temperature (31.37°C), minimum temperature (25.76°C), relative humidity (79.04%) and rainfall (1967mm/annum)

(Table 2) were recorded. Sharanabasappa *et al.* [13] reported that the banana skipper, *E. torus* laid eggs in clusters on the undersurface of the leaves of the banana plant. Incubation, total larval and pupal period ranged from 7-9 days, 26-33 days and 10-12 days respectively.

### 3.2. Assessment for the management of banana skipper, *E. thrax*

Among the five technology options tested in which application of chlorpyrifos @ 2ml/lit. exerted superiority in all the periods of observations and recorded the mean per cent reduction of infestation (79.45%) where in profenophos @ 2ml/lit. registered 79.32% which was on par with each other. This was followed by Azadirachtin 10000ppm @ 2ml/lit. which registered the per cent reduction of 70.32% and *B. bassiana* @ 2.5 gm/lit. (61.96%) as against the banana skipper, *E. thrax* (Table 3 & 4). These findings were in conformity with the results of Padmanabhan [9] who inferred that profenophos (2ml/lit.) and *B. bassiana* (2.5g/lit.) significantly reduced the banana skipper *E. thrax*. Sivasubramanian *et al.* [16] stated that the stem injection of Neem azal in water (4:4 ratio) was found to be effective in the management of pseudostem weevil in banana. The fungus, *B. bassiana* was an effective field delivery system which is affordable to farmers and ensures effective and persistent activity against the banana weevil [17].

### 3.3. Banana fruit yield

The effect of various technology options in recording higher fruit yield (qtl/ha) was achieved with chlorpyrifos @ 2ml/lit. (272.80 q/ha), profenophos @ 2ml/lit. (271.71qtl/ha) followed by Azadirachtin 10000ppm @ 2ml/lit. (268 qtl/ha) and *B. bassiana* @ 2.5g/lit. (262.40 qtl/ha) when compared to 209.20 quintal per hectare in farmer's practices (Table 4). Irulandi *et al.* [4] reported that the stem injection of monocrotophos @ 4ml/plant followed by Azadirachtin 10000ppm @ 2ml/plant and *B. bassiana* @ 2.5g/lit. resulted in an increase of fruit yield over untreated check to an extent of 43.23, 40.53 and 38.49 percent, respectively.

### 3.4. Cost benefit ratio

Considering the cost of additional yield per hectare over farmer's practices, cost of plant protection and accrued profit per ha in different treatments, mean of cost benefit ratio was higher in chlorpyrifos @ 2ml/lit. (3.22) and profenophos @ 2ml/lit. (3.17) followed by Azadirachtin 10000ppm @ 2ml/lit (3.15) and *B. bassiana* @ 2.5g/lit. (2.87) as compared to control which was 2.32 (Table 4).

**Table 1:** Infestation by *E.thrax* on different banana varieties in Kanyakumari districts

S. No	Cultivars	Mean Infestation (%)
1.	Red banana	32.15 <sup>e</sup>
2.	Nendran	45.55 <sup>s</sup>
3.	Matti	47.75 <sup>h</sup>
4.	Robusta	15.00 <sup>d</sup>
5.	Ney Poovan	35.17 <sup>f</sup>
6.	Kadali	3.16 <sup>a</sup>
7.	Pachanadan	7.19 <sup>b</sup>
8.	Karpooravalli	13.17 <sup>c</sup>
	Mean	24.89

In a column, means followed by a common letter (s) are not significantly different by DMRT (P= 0.05)

**Table 2:** Life stages of *E. thrax* on banana

Stages	Period (days)
Incubation	6 – 8 days
Larval	24 – 32 days
Pupal	10 - 12 days
Weather parameters	
Average Maximum temperature (°C)	31.37
Average Minimum temperature (°C)	25.76
Average Relative humidity (%)	79.04
Total Rainfall (mm)/year	1967

**Table 3:** Assessment for the management of banana skipper, *E. thrax*

S.No	Farmer's name and Village	Technology option 1 (Farmers practices)			Technology option 2 (Chlorpyrifos – 2.0ml/lit.)			Technology option 3 (Profenophos – 2.0ml/lit.)			Technology option 4 (Azadirachtin 10000ppm-2.0ml/lit.)			Technology option 5 ( <i>B. bassiana</i> – 1x10 <sup>8</sup> ·2.5g/lit.)		
		Per cent leaf damage (%)	Per cent reduction (%)	Yield (q/ha)	Per cent leaf damage (%)	Per cent reduction (%)	Yield (q/ha)	Per cent leaf damage (%)	Per cent reduction (%)	Yield (q/ha)	Per cent leaf damage (%)	Per cent reduction (%)	Yield (q/ha)	Per cent leaf damage (%)	Per cent reduction (%)	Yield (q/ha)
1	Pramakumar S Thiruvattar	21.5	0	212	4.2	80.46	276	4.15	80.27	270	6.8	68.6	270	8.5	60.47	265
2	James P Kulasehkaram	22.0	0	210	4.1	81.36	275	4.19	80.25	272	6.5	70.4	271	8.2	62.73	263
3	Paulraj C. Thiruvattar	20.0	0	209	4.2	78.75	271	4.30	77.50	273	5.9	70.5	265	7.7	61.25	261
4	Pradeepkumar P S. Antoor	21.0	0	207	5.0	76.19	272	5.30	75.20	274	6.5	69.0	267	8.0	61.91	263
5	Vijaya A Thiruvattar	20.5	0	208	4.0	80.49	270	4.10	81.80	269	5.5	73.1	267	7.5	63.42	260
<b>Average</b>		21.13		209.2	4.30	79.45	272.8	4.41	79.00	271.6	6.24	70.32	268	7.98	61.96	262.4

**Table 4:** Assessment for the management of banana skipper, *E. thrax*

S. No	Technology option	Mean leaf damage (%) *	Per cent reduction (%)	Yield (q/ha)	Net Return (Rs)	B:C ratio
1.	Farmers practices (Monocrotophos, Cypermethrin)	21.13 <sup>d</sup>	-	209.20	282626	2.32
2.	Spray Chlorpyrifos – 2.0ml/lit.	4.30 <sup>a</sup>	79.45 <sup>a</sup>	272.80	405384	3.22
3.	Spray Profenophos @ 2ml/lit.	4.41 <sup>a</sup>	79.32 <sup>a</sup>	271.71	421212	3.17
4.	Spray Azadirachtin 10000ppm-2.0ml/lit.	6.24 <sup>b</sup>	70.32 <sup>b</sup>	268.00	394540	3.15
5.	Spray <i>B. bassiana</i> – 1x10 <sup>8</sup> ·2.5g/lit.	7.98 <sup>c</sup>	61.96 <sup>c</sup>	262.40	315250	2.87

\* Each value is the mean of five replications

In a column, means followed by a common letter (s) are not significantly different by DMRT (P= 0.05)

#### 4. Conclusion

The banana skipper, *E. thrax* is a serious threat in major banana growing regions of Kanyakumari district for all commercial banana varieties. During last few years' insecticidal control of pests in general has posed problems of residues in the fruits, besides insecticidal resistance and destruction of bio-diversity. Hence while planning for an management activities, host preference and the stage of the pest should be given appropriate weightage to achieve maximum suppression of pest population and also the control measures should be eco-friendly and cost effective.

In the present investigations, the infestation of *E. thrax* on different varieties of banana through roving survey indicated that was low in Kadali followed by Pachanadan and Karpooravalli whereas higher preference was noticed towards Matti, Nendran and rest of the varieties, further higher preference may be due to thickness of leaf lamina. The egg masses were found on from both surfaces of the leaf and it was pinkish red in colour and changed to creamy white before hatching. The life stages of egg, total larval and pupal period ranged from 6 - 8 days, 24 - 32 days and 10 - 12 days, respectively. Though the treatments, chlorpyrifos, profenophos, Azadirachtin 10000 ppm was found effective when compared *Baeuveria bassiana* and also recorded the highest per cent reduction and higher fruit yield with better cost benefit ratio. The fungus, *B. bassiana* was an effective natural control of the pest which is affordable to farmers and ensures effective and persistent activity against the banana skipper. The larval period of skipper was longer during higher humidity in these studies, which also favour the multiplication of fungus and keep the pest under control.

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#### 6. References

- Chiang HS, Hwang MT. The banana skipper, *Erionota torus* (Hesperidae: Lepidoptera): establishment, distribution and extent of damage in Taiwan. *Tropical Pest Management*, 1991; 37(3):207-210.
- Deka, KC, Dutta SK, Goswami MM. Preliminary observations on *Erionota thrax* Linn. (Lepidoptera, Hesperidae): a potential pest of banana in north east India. *Insect Environment*. 1996; 2(1):11.
- Gomez KA, Gomez AA. Statistical procedures for agricultural research. John Wiley and Sons. New York. 1985, 650.
- Irulandi S, Eraivan Arutkani Aiyathan K, Srivara Buddhi Bhuvanewari S. Assessment of biopesticides and insecticide against pseudostem weevil *Odoiporus longicollis* Olivier in red banana. *Journal of Biopesticides*. 2012; 5(Supplementary):68-71.
- Kamala Jayanthi PD, Rami Reddy PV, Vivek Kempuraj, Shashank PR. Outbreak of banana skipper, *Erionota torus* Evans (Lepidoptera: Hesperidae) in southern India: Evidence of expanded geographic range. *Pest Management in Horticultural Ecosystems*. 2015; 21(1):95-97.
- Okolle JN, Mashor M, Ahmad AH. Spatial distribution of banana skipper (*Erionota thrax* L.) (Lepidoptera: Hesperidae) and its parasitoids in a Cavendish banana plantation, Penang, Malaysia. *Insect Science*. 2006; 13:381-389.
- Ostmark MK. Economic insect pests of banana. *Annual Review of Entomology*. 1974; 19:161-176.
- Padmanaban B. Occurrence of banana skipper, *Erionota thrax* (L.), a defoliator of banana on certain parts of India. In: *Global conference of technological challenges and human resources for climate smart horticulture*, NAU, Navasari, Gujarat, Tamil Nadu, India. 2014, 197.
- Padmanaban B. Management of banana skipper, *Erionota thrax* (Linn.) (Lepidoptera:Hesperidae), a defoliator pest of banana. *International Conference on Innovative Insect Management approaches for Sustainable agro Eco-System (IIMASAE)*, January 27 -30, 2015 Organized by Department of Agricultural Entomology and AC & RI, Madurai, Tamil Nadu, India, 2015, 730.
- Prasad B, Singh OL. Insect pests of banana and their incidence in Manipur. *Indian Journal of Hill Farming*. 1987; 1(1):71-73.
- Raju D, Kunte K, Kalesh S, Manoj P, Ogale H, Sanap R. *Erionota torus* Evans, 1941 - Rounded Palm-redeye. Kunte K, Roy P, Kalesh S, Kodandaramaiah U. (eds.). *Butterflies of India*. Indian Foundation for Butterflies. 2015; 20(2):293.
- Robinson JC, Sauer VG. *Bananas and Plantains*. 2nd Ed. CAB International, 2010, 312.
- Sharanabasappa C, Kalleshwaraswamy M, Lavanya MN, Pallavi D. Biology and rate of food consumption of banana skipper *Erionota torus* Evans (Hesperidae: Lepidoptera). *Entomon*. 2016; 41(3):239-246.
- Singh MP. *Erionota thrax* Linn. a serious pest of banana in Manipur and its potential biocontrol agent, *Brachymeria euploae* (West). *Insect Environment*. 1997; 3(2):51-52.
- Sivakumar T, Jiji T, Anitha N. Field observations on banana skipper *Erionota thrax* L. (Hesperidae: Lepidoptera) and its avian predators from southern peninsular India. *Current Biotica*. 2014; 8(3):220-227.
- Sivasubramanian P, Zadda Kavitha R, Jayaprabhavathi S, Samiayyan K. Efficacy of Neem Azal 1.2 EC in the management of banana pseudostem weevil, *Odoiporus longicollis* Olivier. *Karnataka Journal of Agricultural Sciences*. 2009; 22(3):561-563.
- Tumuhaise V, Nankinga CM, Gold CS, Kyamanywa S, Tushemereirwe WK, Ragama P *et al.* Kairomone trapping for delivery of *Beauveria bassiana* to control the banana weevil, *Cosmopolites sordidus* (Germar). *African Crop Science Conference Proceedings*. 2003; 6:346-351.
- Veenakumari K, Mohanraj P. *Erionota thrax thrax* L. (Lepidoptera: Hesperidae), a new record to Andaman Islands. *Journal of the Andaman Science Association*. 1991; 7(2):91-92.
- Vevai EJ. Know your crop, its pest problems and control. *Pesticides*. 1971; 5(6):38-56.
- Wynter Blyth MA. *Butterflies of the Indian Region*. *Journal of the Bombay Natural History Society*. 1957; 26:438-487.