FIRST RECORD OF THE FRUIT FLY, *Diarrhegma modestum* (FABRICIUS) (DIPTERA: TEPHRITIDAE) FROM BIHAR.

ZAKKIA MASROOR[1*], MOHAMMAD DANISH MASROOR[2], SARFARAZ ALI[3].

1. P. G. Department of Zoology, Gaya College, Gaya.
2. P. G. Department of Zoology, M.G. College, Gaya.
3. P. G. Department of Biotechnology, M.U. Bodhgaya.

KEY WORDS: - Fruitfly, Tephritidae, *Diarrhegma modestum*, Bihar.

ABSTRACT

The fruit flies (Tephritidae) is highest economic importance insect pests of horticulture around the globe, because a large number of highest value fruit and vegetables being damage by various species of Tephritidae. This study presents the first record of *Diarrhegma modestum* (Fabricius) from Bihar. It can be a new threat on the horticultural commodities of Bihar in incoming days. In West Bengal, Karnataka and Tamilnadu where it is previously reported, is the common pest of drumstick and other vegetables and it causing severe losses to the farmers. In Bihar it was observed on mango and guava plants along with *Bacteorcera latifrons, Bacterocera zonata, Zeugodacus tau* and *Zeugodacus cucurbitae.*

INTRODUCTION

The family Tephritidae, the most catastrophic insect pest commonly known as fruit flies, are the notorious insect pests of horticultural crops. Tephritidae is one of the speciose family among all families of Diptera represents about 500 genera and 4,500 species. In India only 243 species in 79 genera (David & Ramani; 2011) Occurs, under the five sub-families Phytalmine represents 17 species (kapoor et. al., 1993) in the tribe Acathonevrini and eight well known genera including *Diarrhegma.*

Diarrhegma modestum (Fab) is a well-known notorious insect pest of vegetable and fruits worldwide. In India far ago *D. modestum* was reported but mistakenly labeled as *Trypetta incise* Wied in Bigot's handwriting. But Due to its different colour pattern of wings and brown spot on head *D. modestum* Kept in a new genera *Diarrhegma* by M. Bezzi. This species has been previously reported only from West Bengal, Karnataka and Tamilnadu in India, where it breeds in the pods of drumstick (Hancock and Drew; 1994). Incredible ability of drumstick to survive in drought and harsh weather made it to replicate in adverse conditions also.

However, there is no any record of the occurance of *Diarrhegma modestum* (Fab) in Bihar, it will be the first hand record of *D. modestum* from Bihar and observed in the mango and guava plantation orchard located in Magah University Campus (Gaya) and different localities of Narhat village located in Nawada district.

MATERIALS AND METHODS:-

During the course of filed observation, we observed a new type of fruit fly in the mango and guava plantation orchard in Magadh University (Bodhgaya) during April / 2019 . Further the same we observed in mango orchards in Narhat village also. Specimens were collected and brought to the P.G. Department of Zoology, M.U. Bodhgaya. The collect specimens were examined for ten morphological characters along with hyaline wing marks, wings dots, abdominal bands, Black spot on head, yellow scuteller bristles, Colour of tibiae and scutellum patterns included. The morphological identification key followed as M. BEZZI; 1919, Kapoor et. al., 1993, David and Ramani; 2011 and Agrawal and Syeyoshi; 2005. All the data were taken with the help of caliper of the nearest 0.1 mm. collected specimen were also sended for identification confirmation to Dr. K.J. David (Scientist, Entomology ICAR-NBAIR, F.No.NBAIR/IS/2019-20/001) and Dr. Allen L. Norrbom (Systematic Entomology Laboratory, United States Department of Agriculture, Washington. 22 / 04/19 by mail) and confirmed as *D. modestum.* The distribution dynamics confirmed by Dr. K. J. David and Dr. K. Srinivasa Murthy (PME cell, NBAIR) that the *D. modestum* is not yet reported or observed in Bihar. The Study of related literature also supported us in confirming identity and distribution of *Diarrhegma modestum* (Fab). Photographs were taken using a Samsung J Max tablet in GPS enabled mode in the view of piracy in present study.

RESULTS AND SPECIES DESCRIPTION:-

The prime thing of the present study is to record all the characteristic features, photographs, distribution range, host plant along with other useful information of *Diarrhegma modestum* (Fabricius) from survival to morphological point of view as the species is first time observed from Bihar.

Distribution range:- Gaya & Nawada District.

The GPS location of locality where *D. modestum* found at different localities is as follows:-

Gaya:- Coordinates:- 24^0 41^0 16.07" N, 84^0 57' 54. 24" E

Latitude: -	24.687796	**Longitude:-**	84.965065
	24.687477		84.965645
	24.687666		84.965164

Nawada: - Coordinates: - 240 46' 30.64" N, 850 25' 38.09" E

Latitude: - 24.775176 **Longitude: -** 85.427249

SPECIES DESCRIPTION:-

Six bristles on the scutellum, Black transverse bands on the abdomen ; females having deep and clearly visible while male have reduced bands and one among the male observed without bands, well developed hyaline wing markings, Antenna short with plumose arista; only veins R1 and R 4+5 setose above.

Table:-1 Selected morphological characters for Identification.

Characters	Male	Female
Hyaline wing marking	Present	Present
Abdominal Band	Reduced or without	Visible, Dark
Black spot on head	Present	Present
Scutellum	Triangular apical Parallel	Triangular apical parallel
Yellow scuteller bristles	Six	Six
Arista	Plumose	Plumose
Costal bristles	Developed	Developed
Wing color	Black Patterned	Black Patterned
Antennae	Short	Short
Eyes	Narrowed	Narrowed
Ovipositor		Flatted, Blackish in color

Tables:-2 The weather details of localities at the time *D. modestum* observed and specimen collect.

Climatic factors	Bodhgaya 10.04.2019 Time - 1:00 to 3:00 pm	Bodhgaya 19.04.19 Time :- 12:20 to 02:00 pm	Bodhgaya 22.04.2019 Time : 12:00 to 03 :00 pm	Narhat 27.04.19 Time : 4:00 to 6:00 pm
Temperature	30^0C	44^0C	39^0C	37^0C
Wind	11 km / h	22 km /h	9 km /h	15 km /h
Humidity	23%	9%	12%	18%
Pressure	1005 mb	1002 mb	1005 mb	1010 mb

CONCLUSION:-

The number of horticultural Insect pests is rising day by day in Bihar. This is probably due to climate and temperature change which allow the settlement and survival of a new invasive species in the particular locality. The *Diarrhegma modestum* is natively belongs to Bengal. It being notorious pest of Vegetable and fruits is not yet reported from Bihar.

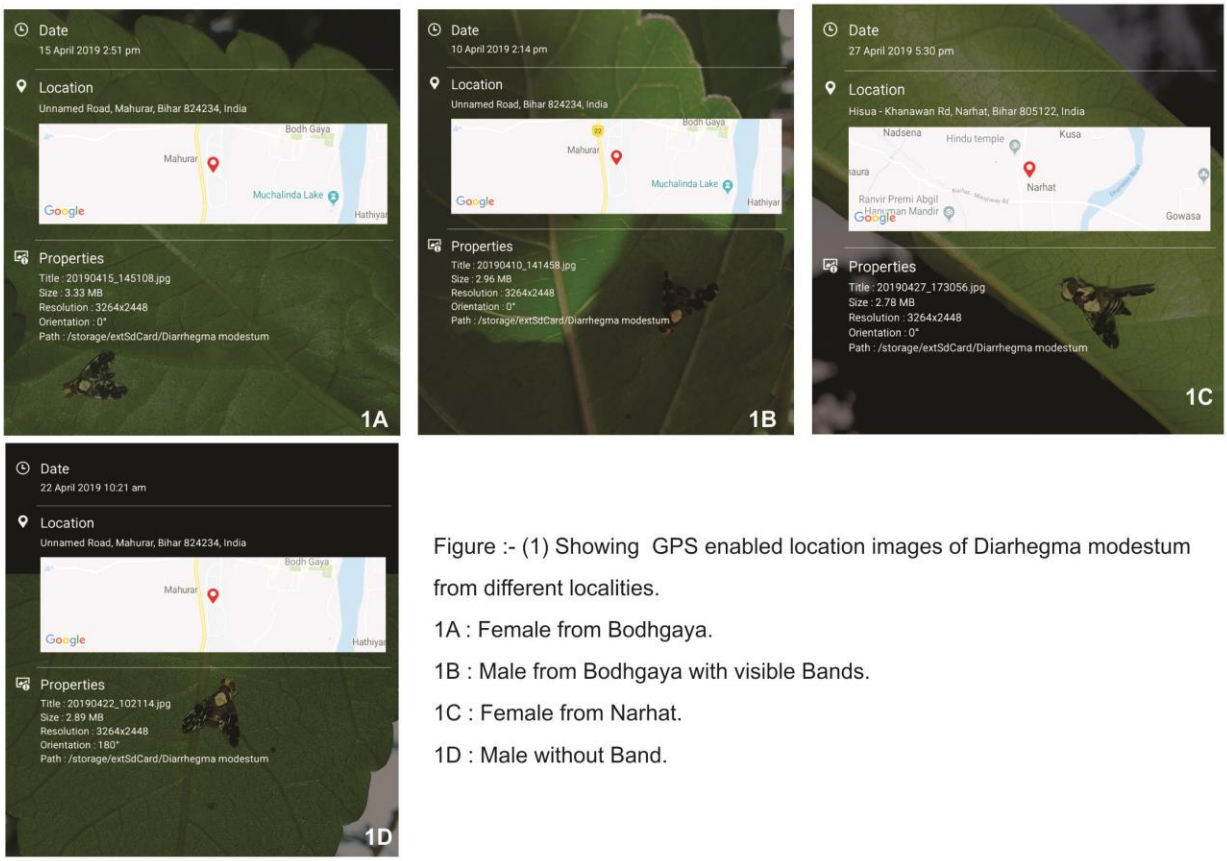

Figure :- (1) Showing GPS enabled location images of Diarhegma modestum from different localities.

1A : Female from Bodhgaya.

1B : Male from Bodhgaya with visible Bands.

1C : Female from Narhat.

1D : Male without Band.

Fig. : 2 - Female *D. modestum* on mango leaf.

Fig. : 3 - Male *D. modestum* without band on abdomen.

Fig. : 4 - *D. modestum* in mating condition.

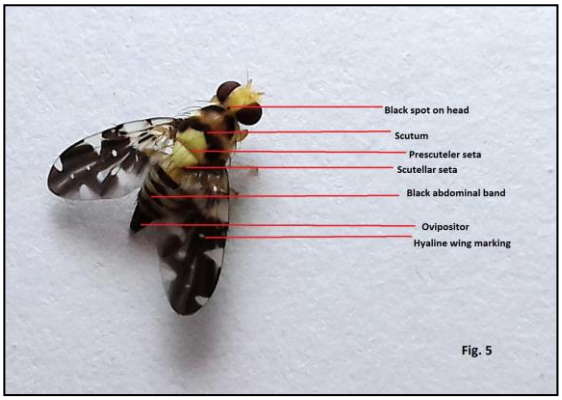

Fig. : 5 - Morphological identification pattern of *D. modestum*.

Therefore present study reported that It is widely distributed in our region. Though this species have collected from Magadh Division, this fruit fly may occur in other parts of Bihar, further studies may needed to explain the whole distribution and infestation range of *D. modestum*. The Prime findings of present study surely help in revealing species distribution in future.

Conflict of Interest: - The present study was not supported by any kind of grant. The authors confirm that this article content has no conflict interest.

Supplementary materials: - During our research, we have uploaded a video of *Diarrhegma modestum.* Which can be viewed at this link:- https://youtu.be/FJIgmJQ33Zg

Acknowledgement:-

We are cordially grateful to Dr. K. J. David (Scientist, Entomology, ICAR-NBAIR), Dr. Allen L. Norrbom (SEL, USDA) to make us sure about the identification of *D. modestum* we are equally grateful to Prof. Dr. Sunil Kumar Singh (Senior Prof. of Entomology and HEAD P.G. Department of Zoology, M.U. Bodhgaya) who trusted and supported a lot to carry out our entire work in relation with Tephritidae fruit file.

REFERENCE :-

1. Agarwal , M.L. and Sueyoshi, M. (2005) Catalogue of Indian fruits flies (Diptera) Tephritidae, oriental insects, 39, 371-400.
2. Bezzi, M. 1913. Indian Trypaneids (Fruit flies) in the collection of the Indian Museum, Calcutta. Mem, Ind. Mus. 3: 31-60.
3. Hancock, D. L. and Drew, R.A. I. 1994, New Species and records of Asian Trypetinae/ Diptera: Tephritidae). Reffles Bull. Zool, 42: 555-591.
4. David, K. J. and Ramani, S. 2011. An Illustrated Key to fruit flies (Diptera: Tephritidae) of Peninsular India and Andaman Nicobar Islands. Zootaxa, 3021, 1-31.
5. Kapoor, V.C. 1993. Indian fruit flies (Insecta: Diptera: Tephritidae). Oxford and IBH Publishing company, New Delhi pp:-258.
6. Kapoor, V.C., Hardy, D. E., Agrawal, M. L. and Grewal, J. S. 1980. Fruit fly (Diptera: Tephritidae) Systematics of the Indian subcontinent. Export India Publications. Jullundur, India. pp: - 113.
7. Hossain, A. M. and Khan A.S. 2013. FIRST RECORD OF THE FRUIT FLY, *Diarrhegma modestum* (FABRICIUS) (DIPTERA: TEPHRITIDAE) FROM BANGLADESH. Bangladesh J. Zool. 2013; 41 (2); 265 - 267.
8. Math, M., & Kotikal., Y. K. 2014; Studies on insect pests of drumstick, *Moringa oliefera* Lamk. Indian J. Plant Prot. 2014; 42: 461-464.
9. Aluja, M. & Norrbom., A.L., 1999 (EDS.), Fruit flies (Tephritidae) Phylogeny and Evolution of Behaviour. CRC Press Boca Raton, pp:- 944.
10. White, I. M. and Elson - Harris, M. 1992; Fruit flies of Economic significance: Their identification and Bionomics, International Institute of Entomology. London pp: - 601.