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New record of fruit fly, *Bactrocera nigrofemoralis* White & Tsuruta (Diptera: Tephritidae) from Bihar, India

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Abstract

The presence of fruit fly, *Bactrocera (Bactrocera) nigrofemoralis* White & Tsuruta was recorded first time from the state of Bihar, India. *B. nigrofemoralis* was captured in cuelure (p-acetoxypheyl 2 butanic) based pheromone traps from Bhagalpur (Sabour) and East Champaran (Motihari) districts of Bihar during 2016-17. It can be a new threat on the horticultural commodities of Bihar in incoming days. The distinguishing character of *B. nigrofemoralis* is all the femora is having dark black shining, costal band of the wing confluent with R2+3 and remaining very narrow around costal margin to end at apex of R4+5 and narrow lateral postsutural vittae reaching to intra-alar seta of the thorax.

Keywords: Fruit fly, *Bactrocera nigrofemoralis*, Tephritidae, cuelure trap, Bihar

Introduction

The fruit flies are classical international pests. The family Tephritidae is one of the largest families of insect order Diptera, comprising of predominantly medium sized, pictured-winged and highly ornamented flies commonly known as "Fruit flies" and Peacock flies as a number of species infest a wide variety of fruits, vegetables, flower heads, seeds, leaves and other plant parts [1]. Fruit flies of the family Tephritidae comprise 4,500 species, 500 genera under six subfamilies namely Blepharoneurinae, Dacinae, Phyalmiinae, Tachiniscinae, Tephritinae and Trypetinae [2]. The family Tephritidae under the order Diptera consists of over 4,448 species or subspecies of fruit flies, classified in 481 genera of which 800 species belong to Dacinae fruit flies [3].

In India, fruit flies have been identified as one of the ten most serious problems of agriculture because of their polyphagous nature and cause a huge economic loss of fruits and vegetables which varies from 2.5 - 100 per cent depending upon the crop and season [4, 5]. This region represents the endemic habitat of fruit fly belonging to subfamily Dacinae in India. Importance of fruit flies in the region partly due to their direct damage and their importance in export fruits and vegetables as well as the recent invasions into areas where they were not present [6].

Bactrocera nigrofemoralis White & Tsuruta was recorded in Bangladesh for the first time. The fruit fly species was distinguished from similar-looking *B. nigrifacia* Zhang, Ji & Chen by the presence of the short and narrow lateral post sutural vittae and the very narrow infuscation on the wing costal band. However, there is no any record of the occurrence of *B. nigrofemoralis* in Bihar, it will be the first record of *B. nigrofemoralis* from Bihar and observed in cuelure based pheromone traps installed in the field of cucurbitaceous vegetable crops located in (Sabour) Bhagalpur and (Motihari) East Champaran districts of Bihar.

Material and Methods

Survey and Taxonomic identification of fruit flies

A survey was undertaken from four different agroclimatic zones of Bihar with reference to extreme directions like extreme north, extreme south, etc (Table 1). Form Zone-I East Champaran district (Motihari), Zone-II Kishanganj district (Gachhpara), Zone-III A Bhagalpur district (Sabour) and Zone-III B Nalanda (Pawapuri) and Buxar (Dumrao) districts were visited for collection of fruit flies (Table 2). Adult fruit flies were collected by using lure (para-pheromone i.e. Cuelure), sweep net and larvae collected from infested fruits for taxonomic studies and for maintenance of Stock culture. After proper processing of those specimens, the taxonomic keys were studied as provided by [7, 8, 9, 10, 3].

For further confirmation, collected specimens were also sent to fruit fly specialist Dr. Shakti Kumar Singh (Kala-Azar Medical Research Centre, Muzzafarpur, Bihar, India).

Preservation:

Collected specimens were brought to laboratory of department of Entomology in glass vials and pinned. After pinning specimens were oven dried 45-50°C and preserved in wooden boxes with necessary information i.e. host, locality, date of collection and collector name on tag.

Results and Discussion

Family: Tephritidae

Subfamily: Dacinae

Subgenus *Bactrocera* Macquart

***Bactrocera (Bactrocera) nigrofemoralis* White & Tsuruta**

Material examined

District Bhagalpur, 3 ♂, Sabour, 13 December 2016, Cuelure, District East Champaran, 2 ♂, Motihari, 28 April 2017, Cuelure.

Diagnosis

Head: Face entirely black except narrow fulvous lateral margins and dorsally below antennal sockets (Fig 1).

Thorax: Scutum entirely black, postpronotal lobes and notopleura yellow, mesopleural stripe reaching anterior notopleural seta dorsally, narrow parallel sided lateral postsutural vittae reaching to intra alar seta, medial postsutural vitta was absent, with 2 scutellar, 2 prescutellar, 2 notopleural and 4 scapula setae. Scutellum yellow except for narrow to medium black basal band; legs with fore femora shining black on entire outer surfaces, fulvous on inner surfaces and on basal and apical extremities, mid femora was entirely shining black except dark fulvous on basal and apical extremities, hind femora fulvous except shining black on apical 1/3, fore tibiae fuscous, mid tibiae dark fulvous tending

pale fuscous basally, hind tibiae dark fuscous, tarsal segments entirely fulvous tending darker fulvous on apical four segment (Fig 1).

Wing: Wings with cells bc and c colourless, microtrichia in outer corner of cell c only, a narrow fuscous costal band confluent with R2+3 and remaining very narrow around costal margin to end at apex of R4+5, a very narrow fuscous cubital streak, supernumerary lobe weak (Fig 1).

Leg: Fore femora shining black. The apical portion of hind femora is having dark black marking (Fig 1).

Abdomen: Tergum III dark fuscous to black except red-brown postero-centrally either side of a narrow medial longitudinal black band, tergum IV fuscous to dark fuscous except red-brown postero-centrally either side of a narrow medial longitudinal black band (the postero-centrally red-brown markings extend towards the lateral margins), tergum V red-brown with dark fuscous anterolateral corners and a narrow medial longitudinal fuscous to black band, a pair of oval dark fuscous to black shining spots on tergum V (Fig 1).

Attractant: Cuelure

Host: *Terminalia catappa* (Family Combretaceae)

Bactrocera (Bactrocera) nigrofemoralis White & Tsuruta, in Tsuruta & White, 2001: 79. Holotype male in BMNH.

Remarks: This species is being reported for the first time from Bihar, India.

The present findings are in conformity with earlier findings who reported that *B. nigrofemoralis* having short and narrow lateral post sutural vittae and the very narrow infuscation on the wing costal band^[11]. Similar findings are also reported by Prabhakar *et al.* (2012)^[12] who reported that all the femora of *B. nigrofemoralis* are having dark black marking.



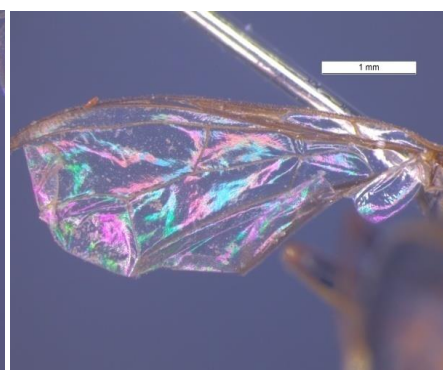
Head (Anterior view)



Thorax (Dorsal view)



Abdomen (Dorsal view)



Wing

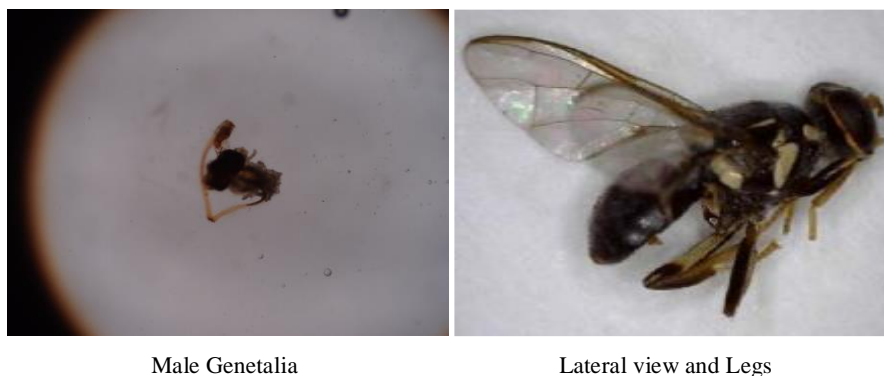


Fig 1: Morphographs of *Bactrocera (Bactrocera) nigrofemoralis* White & Tsuruta

Table 1: Surveyed locations for collection of fruit fly samples

Sl. no.	District (s)	Place (s)	Latitude*	Longitude*	Sample collected/ Method
1	Bhagalpur (Zone IIIA)	Sabour	25°14'26"	87°2'56"	Infested fruits & trap
2	Kisanganj (Zone II)	Gachhpara	26°5'59"	87°57'39"	Infested fruits & trap
3	Baxur (Zone IIIB)	Dumrao	25°34'0"	84°7'42"	Infested fruits & trap
4	Nalanda (Zone IIIB)	Pawapuri	25°5'32"	85°32'17"	Infested fruits & trap
5	East Champaran (Zone I)	Motihari	26°64'70"	84°90'89"	Infested fruits & trap

Table 2: Diversity of fruit flies captured in cue lure trap

Place	Latitude	Longitude	Species of fruit Fly collected
Sabour	25°14'26"	87°2'56"	<i>B. cucurbitae</i> , <i>B. tau</i> , <i>B. caudata</i> , <i>B. nigrofemoralis</i> ,
Gachhpara	26°5'59"	87°57'39"	<i>B. cucurbitae</i> , <i>B. tau</i>
Dumrao	25°34'0"	84°7'42"	<i>B. cucurbitae</i>
Pawapuri	25°5'32"	85°32'17"	<i>B. cucurbitae</i> , <i>B. tau</i>
Motihari	26°64'70"	84°90'89"	<i>B. cucurbitae</i> , <i>B. tau</i> , <i>B. nigrofemoralis</i>

Conclusion

This is the first record of *B. nigrofemoralis* in Bihar. *B. nigrofemoralis* attracted to cue-lure based pheromone traps. Further research could focus on the ecology, and economic impact of *B. nigrofemoralis* in India.

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