

Studies on sex ratio of fruit fly, *Bactrocera zonata* and identification of fruit fly species *Bactrocera zonata* (Saunders) and *Bactrocera dorsalis* Hendal

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Abstract

The sex ratio of male: female was 1:1.11. The adult of male and female fruit fly of *B. zonata* was smaller in size as compared to males and females of *B. dorsalis*. A broken one black 'T' shaped marking is observed in *B. zonata* while in *B. dorsalis* 'T' shaped marking is clearly visible. The aedeagal length of *B. zonata* is smaller than *B. dorsalis*.

Keywords: Fruit Fly, bactrocera, sex ratio, 'T' shaped, aedeagal

Introduction

Mango (*Mangifera indica*) occupies Pride Place amongst the fruit grown in the country. The mango which belongs to the Family Anacardiaceae is an important tropical and subtropical fruit crop. It is being grown in India for more than 4000 years (Candolle, 1904) [3]. Fruit fly is an important pest of mango belongs to Family Tephritidae and order Diptera. These are commonly called 'Fruit fly' due to their close association with fruits. These are mostly dominant in tropical and sub-tropical areas. Kapoor (1970) [5] listed 128 species of fruit flies and out of these, eight species are found infesting mango fruits in India. These species are *Bactrocera zonata* (Saunders), *Bactrocera dorsalis* Hendel, *Bactrocera correctus* (Bezzi), *Bactrocera diversa* (Coquillett), *Bactrocera hageni* De mejiere, *Bactrocera cucurbitae* (Coq.), *Dacus incisus* Walker and *Dacus tau* (Walker).

The adult Fruit Fly, *Bactrocera zonata* (Saunders) has a habit of congregating with other *Bactrocera* species, under leaves of various fruit trees. Mango and guava are most preferred host for this fruit fly during the fruiting season of the crop. During the post-monsoon period, when the preferred hosts are quite less, the fly may attack citrus, sapota and pomegranate but, when the hosts are not available it may breeds on cucurbits and infestation seen mixed with *Bactrocera cucurbitae* (Narayanan and Batra, 1960) [6].

The adult female fruit fly insert the ovipositor inside the fruits and eggs are deposited in clusters. Dark puncture caused due to the oviposition. Maggots on hatching, feed on the pulp and brown patches appear on the fruit surface. Later on fermenting organisms like bacteria and fungi gain entry through the oviposition puncture and fruit start rotting. Due to this, mesocarp become dirty brown and finally fruit drop down. Rana *et al* (1992) [8] observed that the sex ratio of Male: Female of *Bactrocera zonata* was 1:1.10 when reared on guava of Harayana.

As regard the colour, size and appearance of adult of *Bactrocera zonata*, Atwal (1976) [1]; Srivastava (1997) [9] and Butani and Srivastava (1999) [2] reported that the adult flies have yellow band on third tergite with incomplete costal bands and anal bands. Female have red ovipositor

with black tip markings. Further they mentioned that, adult measures about 10 to 12 mm in length breadth with wing expansion. In Egypt, Iwahashi and Routhier (2001) [4] observed that the body size of *B. zonata* was intermediate between *B. dorsalis* and *B. correcta*. Further, he stated that aedeagal length of female of *B. zonata* was also intermediate between *B. dorsalis* and *B. correcta*. *Bactrocera zonata* (Saunders) is a serious pest of guava and peach, and so commonly called as 'guava fruit fly' or 'peach fruit fly'. The fruit fly species is active throughout the year except colder months i.e. December to middle of February. In India, fruit flies cause 20 percent losses on mango (Negi *et al.* 2000) [7]. Looking to the importance of the pest, present study was carried to study sex ratio of fruit fly, *Bactrocera zonata* and identification keys of fruit fly species *Bactrocera zonata* (Saunders) and *Bactrocera dorsalis* Hendal.

Material and Methodology

For the study of sex ratio, Laboratory reared adult were observed for the sex and the ratio was calculated by separating the male and female from the difference in morphological characters. To study identification of *Bactrocera zonata* and *Bactrocera dorsalis*; adult of fruit fly *B. zonata* and *B. dorsalis* were observed critically under the microscope and the important taxonomic characters were studied.

Result and Discussions

Table 1: Sex ratio of *B. zonata*

Sr. No.	Total number of adults observed	Number of (Male Female)	Sex ratio (Male:Female)
1.	26	12 14	1:1.16
2.	41	20 21	1:1.05
3.	36	19 17	1:0.89
4.	23	12 11	1:0.91
5.	16	09 07	1:0.77
6.	27	14 13	1:0.92
Total	169	80 89	1:1.11

During the present study, adult of *B. zonata* were obtained from the stock culture maintained in the laboratory. The

adult emerged were critically examined and sexed by observing presence or absence of pointed ovipositor. It can be seen from Table 1 that, out of 169 adult observed 80 were males and 89 were female indicating preponderance of female population over male. Thus, the sex ratio of male: female was found to be 1:1.11. According to Rana *et al.* (1992) [8], the sex ratio of *B. zonata* was 1:1.10, which is in close agreement with the present investigation. The adult of male and female fruit fly, *B. zonata* was smaller as compared to male and female of *B. dorsalis* (Plate I and II). The wings of adults consist of dark black spot on the apex part (apical angle) and can be easily visible (Plate III). The dorsum of thorax consist typical 'W' shaped black marking on mesothorax in female while in male, a yellow stripe marking present on both side of dorsum of thoracic region. A black 'T' shaped marking present on the middle part of abdomen and 'T' is broken between fourth and fifth abdominal segments (Plate IV). The aedeageal length of *B. zonata* is smaller as compared to *B. dorsalis*. The adult of male and female fruit fly, *B. dorsalis* was larger as compared to male and females of *B. zonata* (Plate I and II). The wings of adults consist of dark black marking on costal margin extending upto Radius-2 and Radius-3 (R2+3) veins except at the apex angle of the wing (Plate III). The dorsum of thoracic segments consist of yellow strips and black marking in female while in male, a yellow stripe marking present on both side of dorsum of thoracic region. A black 'T' shaped marking present on dorsum of the abdomen of the adult female fruit flies (Plate IV). The aedeageal length of *B. dorsalis* was larger as compared to the *B. zonata*.

Plates

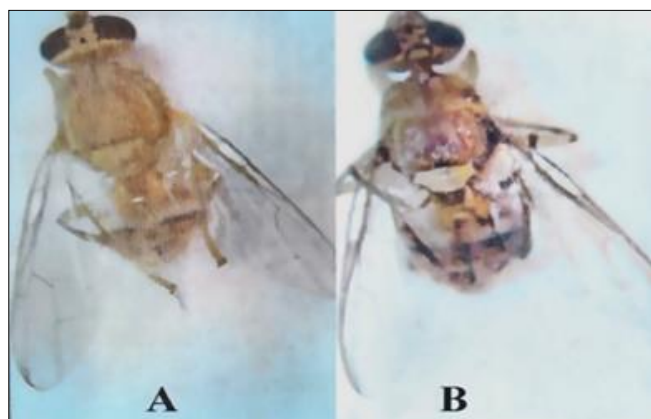


Plate 1: Male of *B. zonata* (A) & *B. dorsalis* (B)

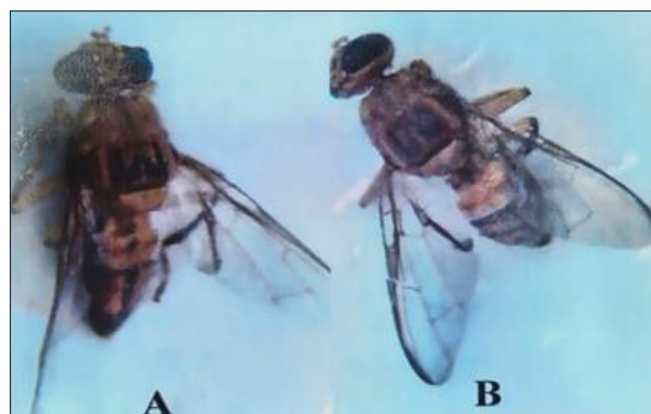


Plate 2: Female of *B. zonata* (A) & *B. dorsalis* (B)



Plate 3: Wings of *B. zonata* (A) & *B. dorsalis* (B)

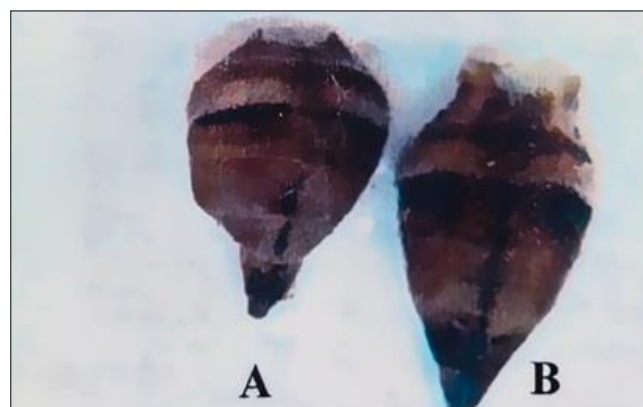


Plate 4: Abdomen of female of *B. zonata* (A) & *B. dorsalis* (B)

Conclusion

The sex ratio of male: female was 1:1.11 in laboratory conditions. The adults of male and female fruit fly of *B. zonata* was smaller in size as compared to males and female of *B. dorsalis*. The wings of *B. zonata* consist of black tip marking on the apex part while, the wings of *B. dorsalis* consist dark black marking on costal band extending along below Radius 1 and Radius 3. Adult female of *B. zonata* consist of 'W' shaped marking on mesothorax while female of *B. dorsalis* consist of longitudinal yellow stripe markings. A broken one black 'T' shaped marking between fourth and fifth abdominal segments is observed in *B. zonata* while in *B. dorsalis*, 'T' shaped marking is clearly visible. The aedeagal length of fruit fly, *B. zonata* is smaller than that of *B. dorsalis*.

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