Rec. zool. Surv. India: Vol. 122(2)/207-211, 2022
DOI: 10.26515/rzsi/v122/i2/2022/168496

ISSN (Online) : 2581-8686
ISSN (Print) : 0375-1511

First Record of *Bactrocera (Bactrocera) dorsalis* (Hendel, 1912) (Diptera : Tephritidae) on *Hedychium coronarium* (family Zingiberaceae) from India

Dhriti Banerjee*, Siddharth Singh and Mousumi Chowdhury

Diptera Section, Zoological Survey of India, M- Block, New Alipore, Kolkata - 700053, West Bengal, India; Email: dhritibanerjee@gmail.com

Abstract

The oriental fruit fly, *Bactrocera (Bactrocera) dorsalis* (Hendel, 1912) has been known as a serious pest of fruits and vegetables. Present study has recorded for the first time another role of *B. dorsalis* (Hendel, 1912) as a flower visitor and pollen eater of the plant species *Hedychium coronarium* (J. Koenig, 1783) belongs to Family Zingiberaceae.

Keywords: Diptera, First Record, Flower Visitor, Pest

Introduction

Order Diptera is considered to comprise an essential group of pollinating insects after Hymenoptera. Almost 86 families of Diptera have been reported as flower visitors (Inouye, *et al.*, 2015). They eat nectar and pollen (Larson , *et al.*, 2001). Various workers have recorded pollen feeding habits of different species of Syrphidae, Bombyliidae, Empididae, Tabanidae, Ceratopogonidae, Muscidae, etc. (Deyrup, 1988; Elvers, 1980; Magnarelli, Anderson and Thorne, 1979). Tephritidae is one of the important families uder order Diptera, owing to its phytophagous habit in the larval stage, it has become a economically important severe pest of fruits and vegetables (Clarke, *et al.*, 2005). Though this oriental fruit fly has been well studied for its pest potentiality, as a flower visitor, not much information is available about the fruit fly. Previous studies have reported the nectarivorous habit of tephritid species, *Euphranta (Strulla) crux* (Fabricius, 1794) from *Lantana camara* (Linnaeus, 1753) of family Verbenaceae and *Tectona grandis* (Linnaeus, 1782) of family Lamiaceae (Mitra and Parui, 2002). Besides that, *Bactrocera (Zeugodacus) cucurbitae* (Coquillett, 1849), as well as *Campiglossa cribellata* Bezzi, 1913, were also reported to feed on the nectar of *Cucurbita maxima* Duchesne and *Persicaria chinensis* (Nakai, 1926) of the families Cucurbitaceae and Polygonaceae, respectively (Mitra and Banerjee, 2007). However, *Bactrocera (Bactrocera) dorsalis* (Hendel, 1912) is considered one of the most important pests of a wide range of cultivated and wild vegetables and fruits (Drew and Raghu, 2002). This oriental fruit fly is reported to visit the plants of Asteraceae (Larson, *et al.*, 2001); Cucurbitae, Polygonaceae, and Lamiaceae (Mitra and Banerjee, 2007; Mitra and Parui, 2002). But there is no report of nectar-feeding habit of this tephritid fauna on *Hedychium coronarium* (Family Zingiberaceae).

The distribution pattern of *B. dorsalis* is well studied for its pest potentiality and future range throughout the South East Asia and in a number of Pacific Islands (Stephens, *et al.*, 2007). Besides that, their pest potentiality and range will be assumed to increase in tropical and subtropical regions of the world in the global climate change scenario. Therefore, FAO and biosecurity authorities need to prepare management strategies accordingly. Therefore, aims and objectives of the present study is to provide thorough information about ecology and foraging behaviour of this economically important serious tephritid pest fly along with its taxonomic diagnosis and distribution.

* *Author for correspondence*

Article Received on: 16.02.2022 Accepted on: 28.09.2022

Materials and Methods

The present study has been designed based on continuous observation for the last three years in the study areas of Norther Kolkata, West Bengal. The study area is located at the fringe of urban Kolkata, part of North 24 Parganas. It covers an area of 200 sq. mt. Besides that, the study area is basically a well-maintained garden.

Sampling: Few representative adult flies were collected using aerial net sweeps in and around the garden following Ukey *et al.,* (2013). Specimens were then placed in a killing jar containing cotton soaked with ethyl acetate as a narcotising agent. Then flies were kept dry-pinned, labelled and kept in the collection box for further identification. The specimens were identified using the keys provided by Kapoor (1970). The map was prepared for the present study using Google Earth (Web Version 9.156.0.0) (Figure 1).

Results

Order DIPTERA Linnaeus, 1758
Suborder BRACHYCERA Zetterstedt, 1842
Family TEPHRITIDAE Newman, 1834
Genus ***Bactrocera*** Macquart 1835
Bactrocera (Bactrocera) dorsalis (Hendel, 1912)

1912. *Dacus (Bactrocera) dorsalis* Hendel, *Supplta. Ent*. **1**: 18.

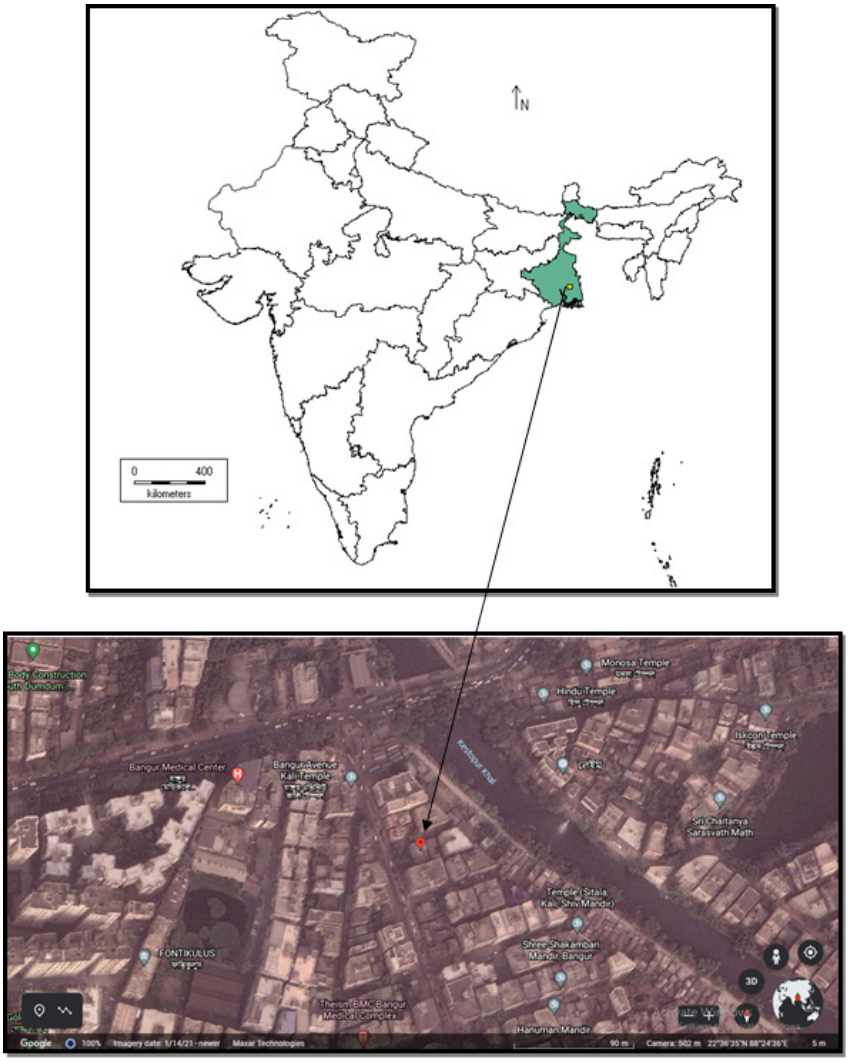

Figure 1. Map showing location of the study area (Garden and agricultural landscape, Block B, Bangur Avenue, North Kolkata).

Type locality: Koshun, Taiwan.

Materials examined: 2♀, 22°36′26″ N, 88°24′38″ E, 9 m, Host plant - *Hedychium coronarium* (J. Koenig, 1783), Bangur Avenue, Kolkata, West Bengal, 21.ix.2021, collected by P. Parui [NZSI].

Diagnosis: Figure 2 exhibits the habitus of *Bactrocera (Bactrocera) dorsalis* (Hendel, 1912). The species *Bactrocera (Bactrocera) dorsalis* could easily be separated from others by the costal band not extending below the second longitudinal vein (R2+3) except at the apex of the wing.

Face with a black spot in the antennal furrow. Mesonotum with two postsutural yellow vittae, scutellum yellow with a narrow black band at base, upper portion of stereopleuron bears a yellow mark. Third abdominal segment with a black band and a longitudinal extending up to fourth terga.

Costal band of wing narrow and enlarged at apex like *Cucurbitae* Coquellett.

Figure 2. Habitus of *Bactrocera (Bactrocera) dorsalis* (Hendel, 1912).

Figure 3. *Bactrocera (Bactrocera) dorsalis* (Hendel, 1912) visiting the whgite flower of *Hedychium coronarium*.

Figure 4. *Bactrocera (Bactrocera) dorsalis* (Hendel, 1912), observed visiting

Legs reddish, fore tibiae with brown tinge on posterior margin, mid with brown tinge at base and hind tibia wholly brown tinge. The ovipositor sharply pointed at apex.

Distribution: In different states within India: Andhra Pradesh, Assam, Bihar, Delhi, Goa, Gujarat, Himachal Pradesh, Punjab, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, Uttarakhand, West Bengal.

Elsewhere: Bangladesh, Bhutan, Cambodia, China (southern), Japan, Hawaiian Islands, Hong Kong, Indonesia, Laos, Malaysia, Marianas, Micronesia, Moluccas, Myanmar, Nepal, North Australia, Ogasawara Islands, Pakistan, Philippines, Singapore, Sri Lanka, Vietnam, Taiwan, Tahiti, Thailand.

Remarks: This fly is a flower visitor and pollen eater of the plant *H. coronarium,* besides its common role as one of the most severe pests of fruits and vegetables.

Foraging Behaviour and Ecology

The species *B. dorsalis* has been observed due to feed on the pollen of the flower of the plant *Hedychium coronarium* (Butterfly lily) of the family Zingiberaceae, commonly called Butterfly lily. Like "early birds" *Platycheirus* and *Melanostoma* (Ssymank, 2001), this *Bactrocera* species starts feeding on pollen early in the morning even when the pollen remains wet and eating for a pretty long time. But they become agile when sunlight touches the flowers. Traits are less common in the early morning (Inouye, *et al.*, 2015). This tephritid species was also observed feeding on a single flower for a long time and experimented that they do not feel much disturbed even when the flower is moved with hand. As the hovering mode of flying is more expensive than all flying modes (Kevan and Baker, 1983), this species continues eating the pollen for the period, perhaps as long as sufficient pollen remains. Flies know to discriminate against flower colour (Lunau, 1993) and perhaps *Bactrocera dorsalis* prefers white colour as a rewarding one. For the last three years (January, 2019 to December, 2021), it is observed to visit this single flower of the Zingiberaceae, specifically whose colour is entirely white and the shape is as in the photo.

The current study records *B. dorsalis* for the first time to feed on the pollen on *Hedychium coronarium* of the family Zingiberaceae.

Discussion

The present short communication records and adds the oriental fruit fly fauna, *B. dorsalis,* as the 72nd flower-visiting dipteran species under 9 pre-existing families (Mitra and Parui, 2002; Mitra and Banerjee, 2007). Present work also reports *Hedychium coronarium* as the 65th plant species and adds the family Zingiberaceae as the 32nd host plant family of this oriental fruit fly. The current study records the *Hedychium coronarium* of the family Zingiberaceae as the host plant of *B. dorsalis* for the first time. Moreover, present short communication significantly reveals that *B. dorsalis* (Hendel, 1912) preferred white coloured flowers of *Hedychium coronarium* over other flowers.

Acknowledgement

The authors are grateful to Mr. Panchanan Parui for helping in the identification of the Tephritidae specimen *B. dorsalis* (Hendel, 1912) and also thankful to Shri. Soushamya De, Zoological Survey of India, Kolkata, for identifying the plant species. Authors also acknowledged the support and help rendered by all the staffs and research scholars of Diptera Section.

References

Clarke, A.R., Armstrong, K.F., Carmichael, A.E., Milne, J.R., Raghu, S., Roderick, G.K. and Yeates, D.K. 2005. Invasive phytophagous pests arising through a recent tropical evolutionary radiation: The *Bactrocera dorsalis* complex of fruit flies. Annu. Rev. Entomol., **50**:293-319. https://doi.org/10.1146/annurev.ento.50.071803.130428 PMid:15355242

Deyrup, M.A. 1988. Pollen-feeding in Poecilognathus punctipennis (Diptera: Bombyliidae). Fla. Entomol., **71**:597-605. https://doi.org/10.2307/3495019

Drew, R.A., Raghu, S. 2002. The fruit fly fauna (Diptera: Tephritidae: Dacinae) of the rainforest habitat of the Western Ghats, India (PDF). Raffles Bull. Zool., **50**(2):327-352.

Elvers, I. 1980. Pollen eating Thricops flies (Diptera, Muscidae) on Arrhenatherum pubescens and some other grasses. Bot. Not., **133**:49-52.

Inouye, D.W., Larson, B.M., Ssymank, A. and Kevan, P.G. 2015. J. Pollinat. Ecol., **16**(16):115-133. https://doi.org/10.26786/1920-7603(2015)15

Kapoor, V.C., 1970. Indian Tephritidae with their recorded hosts. Orient. Insects., **4**(2):207-251. https://doi.org/10.1080/00305316.1970.10433957

Kevan, P.G. and Baker, H.G. 1983. Insects as flower visitors and pollinators. Annu. Rev. Entomol. **28**:407-453. https://doi.org/10.1146/annurev.en.28.010183.002203

Larson, B.H.M., Kevan, P.G. and Inouye, D.W. 2001. Flies and flowers: taxonomic diversity of anthophiles and pollinators. Can. Entomol., **133**:439-465. https://doi.org/10.4039/Ent133439-4

Lunau, K. 1993. Interspecific diversity and uniformity of flower colour patterns as cues for learned discrimination and innate detection of flowers. Experientia, **49**:1002-1010. https://doi.org/10.1007/BF02125649

Magnarelli, L.A., Anderson, J.F. and Thorne, J.H. 1979. Diurnal nectar feeding of salt marsh Tabanidae (Diptera). Environ. Entomol., **8**:544-548. https://doi.org/10.1093/ee/8.3.544

Mitra, B. and Banerjee, D. 2007. Fly pollinators: assessing their value in biodiversity conservation and food security in India. Rec. Zool. Surv. Ind., **107**(1):33-48. https://doi.org/10.26515/rzsi/v107/i1/2007/159161

Mitra, B. and Parui, P. 2002. Diptera flower visitors in Jessore Sloth Bear and Balaram Ambaji Wildlife Sanctuaries, north Gujarat. Bionotes, **4**(2):45.

Ssymank, A. 2001. Vegetation and flower-visiting insects in the cultivated landscape. - Plant communities, flowering phenology, biotope binding and space utilization by hover flies (Diptera, Syrphidae) in the Drachenfelser Ländchen as well as method optimization and landscape assessment. - Animal world in the civilized landscape, Part V series of publications for landscape management and nature conservation, **5**:1-513.

Stephens, A.E.A., Kriticos, D.J. and Leriche, A. 2007. The current and future potential geographical distribution of the oriental fruit fly, *Bactrocera dorsalis* (Diptera: Tephritidae). Bull. Entomol. Res., **97**(4):369-378. https://doi.org/10.1017/S0007485307005044 PMid:17645818

Ukey, N.S., Chandele, A.G., Wagh, S.S. and Bansode, G.M. 2013. Species composition of fruit flies, *Bactrocera* spp. (Diptera: Tephritidae) infesting guava in Maharashrtra. Pest Manage. Hortic. Ecsyst., **19**(2):242-244.